Environmental Issue in Ventura County Author: Marie Tolteca

```
# Loading in packages
library(tidyverse)
library(sf)
library(here)
library(dplyr)
library(tmap)

# read in geodatabase of EJScreen data at the Census Block Group level and cities.
ejscreen <- sf::st_read(here::here("data", "ejscreen","EJSCREEN_2023_BG_StatePct_with_AS_
```

```
Reading layer `EJSCREEN_StatePctiles_with_AS_CNMI_GU_VI' from data source
  `/Users/marietolteca/Documents/MEDS/EDS223-HW/EDS223-
HW1/data/ejscreen/EJSCREEN_2023_BG_StatePct_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
```

```
cities <- sf::st_read(here::here("data", "City_Boundary","City_Boundary.shp"))
```

```
Reading layer `City_Boundary' from data source
  `/Users/marietolteca/Documents/MEDS/EDS223-HW/EDS223-
HW1/data/City_Boundary/City_Boundary.shp'
  using driver `ESRI Shapefile'
Simple feature collection with 10 features and 11 fields
Geometry type: MULTIPOLYGON
Dimension:     XY
Bounding box:  xmin: 6162344 ymin: 1867837 xmax: 6370545 ymax: 1996012
Projected CRS: NAD83 / California zone 5 (ftUS)
```

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

# filter to a county you are interested in
ventura <- ejscreen %>%
  dplyr::filter(CNTY_NAME %in% c("Ventura County"))

# find the average values for all variables within counties
california_counties <- aggregate(california, by = list(california$CNTY_NAME), FUN = mean)
# tried 'drop_na()' but mapping didn't work '
```

Run for Interactive Map

Making Map Interactive

Removing Interactive Map. Turning into plot

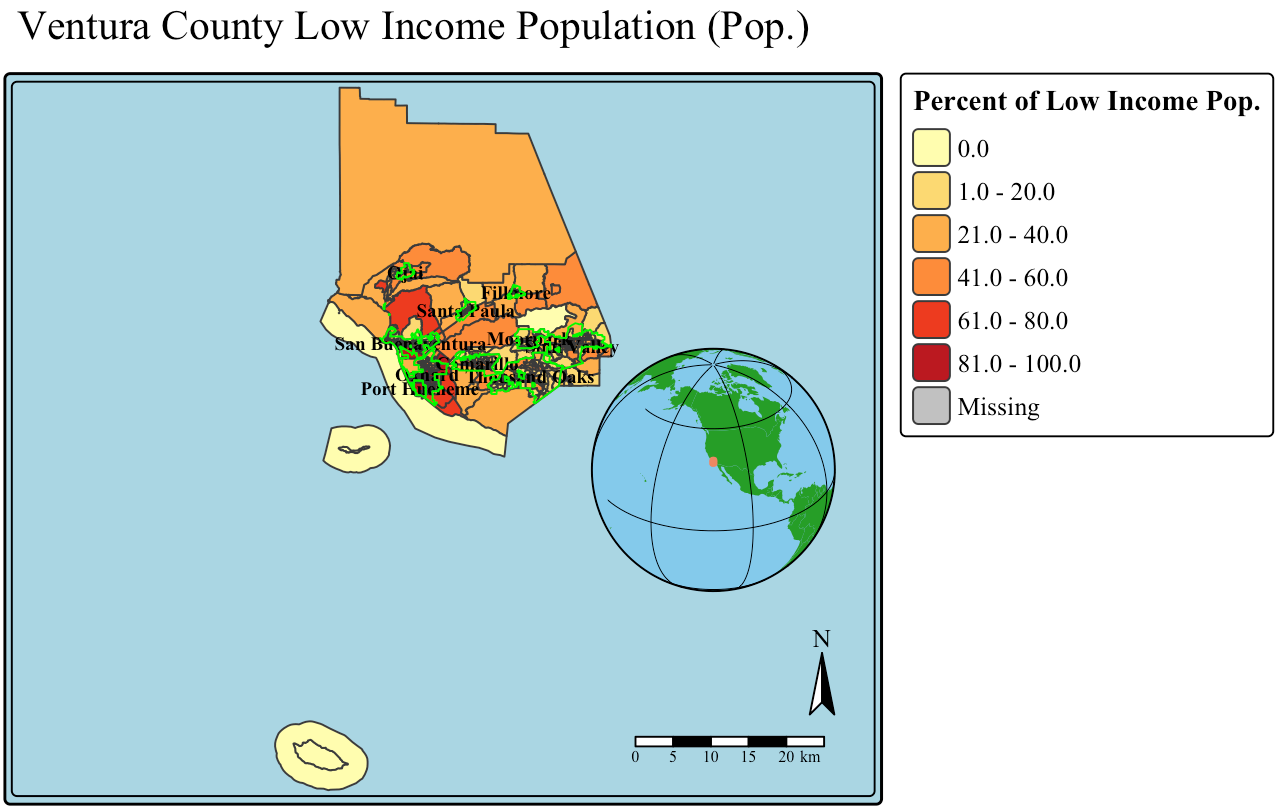
Map 1: Low-income population

```
# Name of map- using ventura data
ventura_low <- tm_shape(ventura) +
  # Using low income varibale
  tm_polygons("P_LOWINCPCT",
              # adding title
              title = "Percent of Low Income Pop.",
              # color palette that shows percentile low income
              palette = "YlOrRd",
              # style for legend numbers
              style = "pretty") +

  tm_layout(main.title = "Ventura County Low Income Population (Pop.)",
            # background color on map
             bg.color = "lightblue",
            # size of map (portrait, landscape, etc.)
            asp = 1.2,
            # Bold letters on legend
            legend.title.fontface = 2,
            #Changing font type
            text.fontfamily = "Times New Roman",
            # text size
            legend.text.size = 0.8,
            frame.double_line = TRUE)+
  tm_shape(cities) +
  # Looks better when in interactive mode
  tm_text("city_name",
          # making letters bold
          fontface = "bold",
          # size of letters
          size = 0.6)+
          # background label
          #bgcol = "white") + # looks better with interactive map
  #changing the border color of the cities
  tm_borders(col = "green",
             # size of line/border
             size=0.5)+
  # adding minimap
  tm_minimap()+
```

```
    tm_layout(
      #position of mini globe
    attr.position = c("right", "bottom"))+
  # adding compass
  tm_compass()+
  # adding scale bar
  tm_scalebar()

# Printing map
print(ventura_low)
```




```
# Saving Map to figs folder
tmap_save(ventura_low, here("figs", "ventura_low.jpeg"))
```

Interpretation: Low-Income: For my interpretation of the percentile for low income, it is evident that in the Oxnard Plain areas (Oxnard, San Buenaventura, and Port Hueneme) and Santa Paula, have a bigger Percentile of Low Income population. This could be because of the type of jobs around these areas, agriculture fields, and construction. Majority of this area consist of the 101- Freeway that means these lower income communities get hit with a big part of particulate matter. Personally, I grew up around these areas, in particular North Oxnard, where it has undergone gentrification and continues to go.

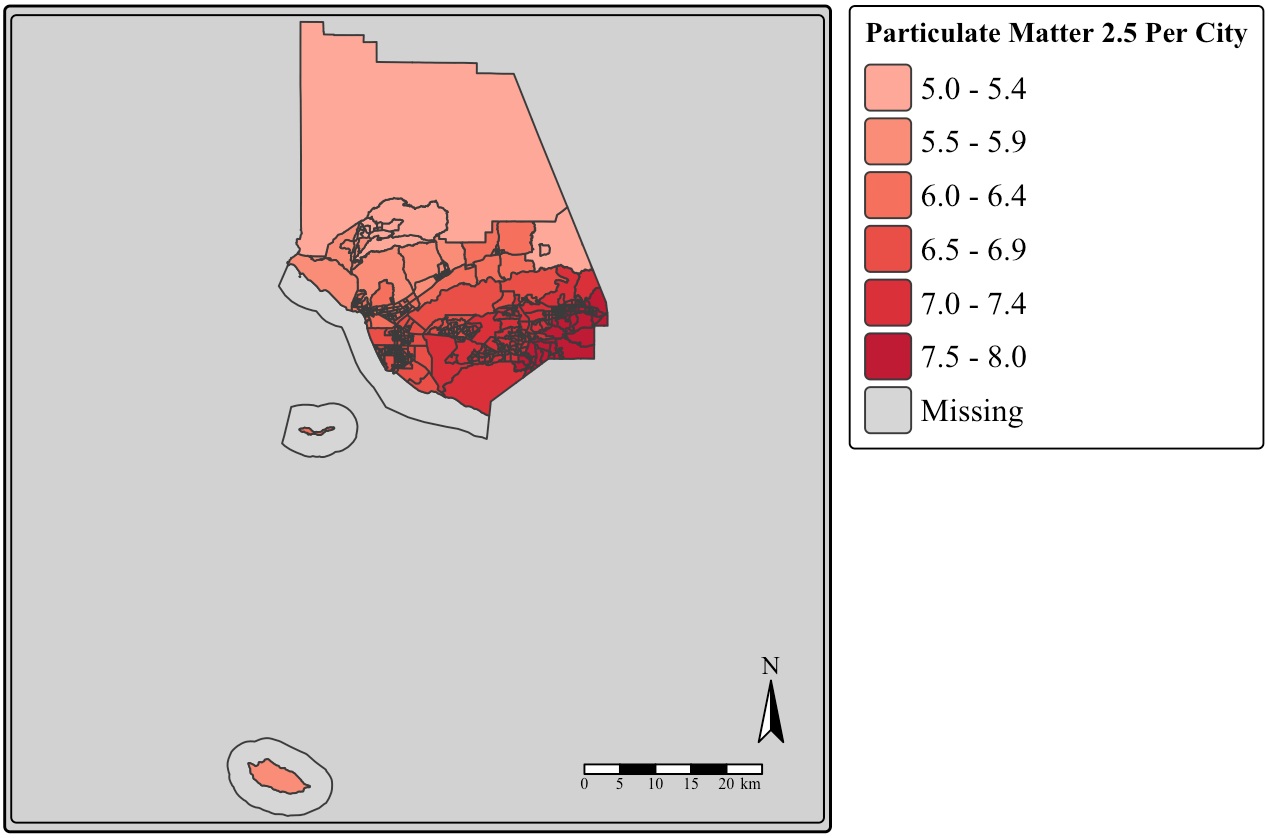
Map 2: PM2.5 levels

```r
ventura_pm25 <- # Using particulate matter varibale
  tm_shape(ventura)+
  # variable particulate matter
  tm_polygons("PM25",
              title = "Particulate Matter 2.5 Per City",
              #Color of map for pm2.5
              palette = "red",
              #legend numbers
              style = "pretty") +

  tm_layout(main.title = "Particulate Matter 2.5 in Ventura County",
            # background color on map
             bg.color = "lightgrey",
            # size of map (portrait, landscape, etc.)
            asp = 1,
            # Bold letters on legend
            legend.title.fontface = 2,
            #Changing font type
            text.fontfamily = "Times New Roman",
            # text size
            legend.text.size = 1,
            #frame on map
            frame.double_line = TRUE)+
  #tm_minimap()+
  tm_compass()+
  tm_scalebar()

#printing map
ventura_pm25
```

Particulate Matter 2.5 in Ventura County

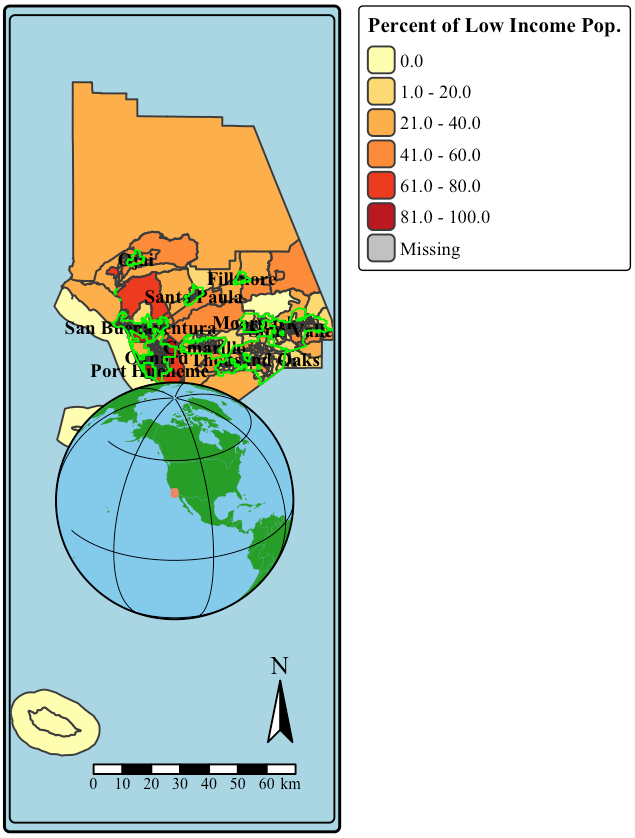



```
#saving map
tmap_save(ventura_pm25, here("figs", "ventura_pm25.jpeg"))
```

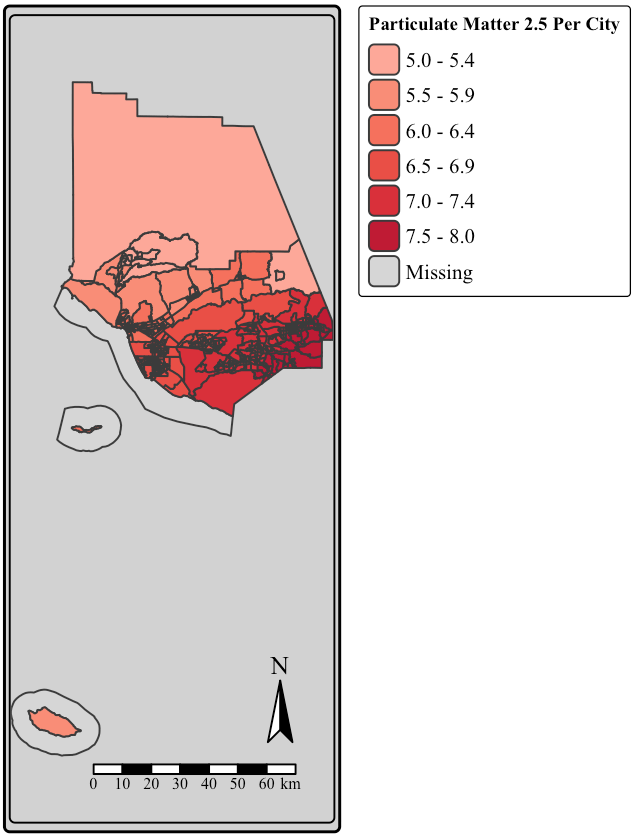
Interpretation: Particulate Matter 2.5: With the increase of infrastructure I assumed the increase of particulate matter would come into play. In addition to the increase of particulate matter 2.5 Ventura County has been recently affect with a rise in wildfires. Wildfires have increased within the last few years mostly in the mountains where dry areas are common, as well as dry river beds with invasive species. In Ventura County the low income population seems to be exposed to more air pollution, showcasing an environmental injustice to certain residents.

```
#Both Maps Side-by-side
tmap_arrange(ventura_low, ventura_pm25)
```

Ventura County Low Income Population (Pop.)



Particulate Matter 2.5 in Ventura County



Overall, using this the `tmap` package, I focused in Ventura County to look at the Low Income population and Particulate Matter 2.5. I was interested to look at the low income population since some areas are being improved more than others, particularly the area in North Oxnard where you can see a dark shade of red. I grew up un this area and lot of gentrification has occurred throughout my lifetime. Being able to document and visually see the population of low income come being affected by new construction is saddening. With the two maps we are able to see that the low income population is affected by environmental injustice.

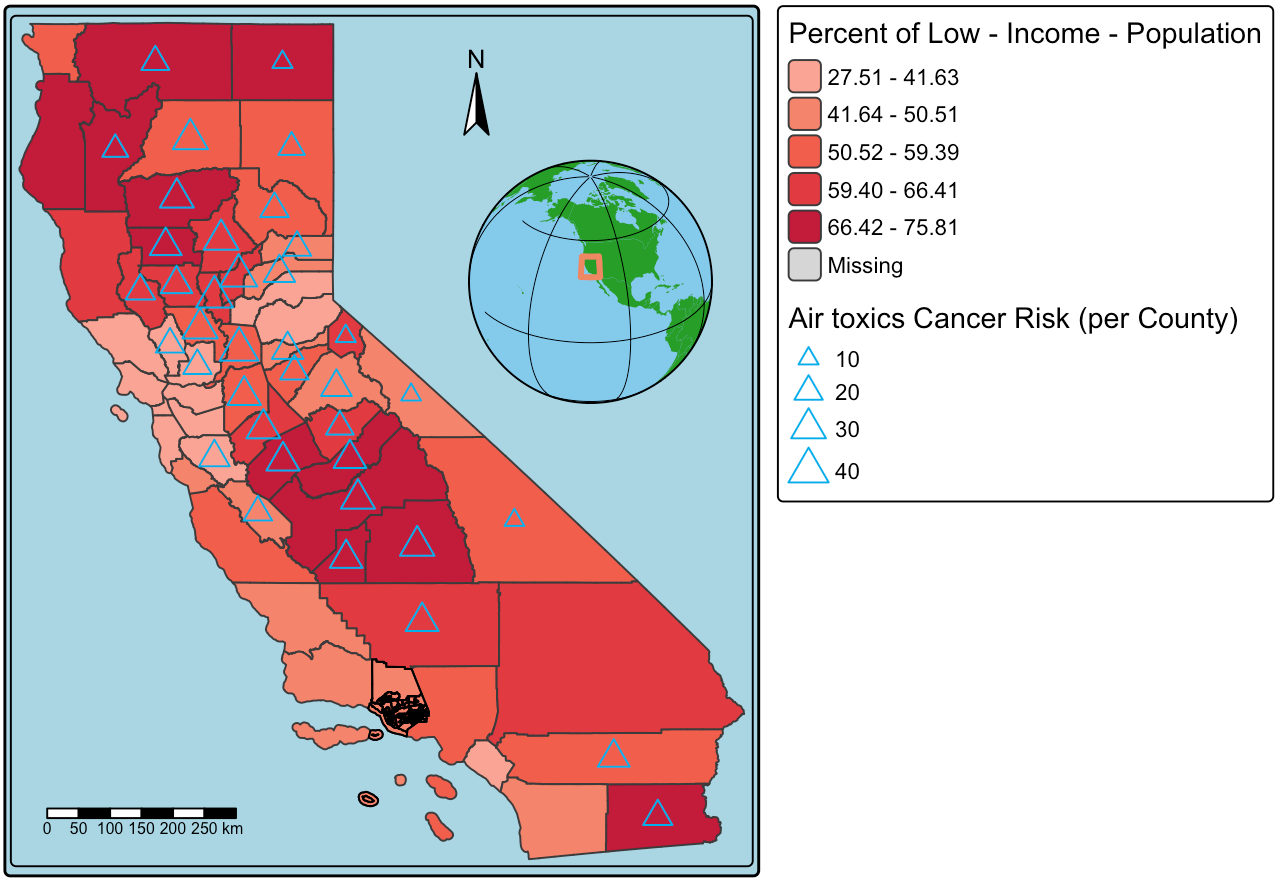
For Fun - The State of California Low-Income Population and Air toxics of Cancer Risk in California

- Interesting how most of the central valley and surrounding areas have a higher percent of air toxic cancer risk than anywhere else in the state of California. I have a hypothesis of why that might be, the central valley is known to have lots of agriculture fields. It is one of the highest producers throughout California, the pesticides that the agriculture needs might have an affect towards these communities.

```
# Printing only the state of California
CA_Low_Income <- tm_shape(california_counties) +
  # Showcasing Low - income across California
  tm_polygons("P_LOWINCPCT", # Defines how to plot the object
```

```
              title = "Percent of Low - Income - Population",
              palette = "red",
              style = "quantile") +
  tm_symbols(size = "CANCER",
             shape = 2,
             size.legend = tm_legend(orientation = "portrait",
                                     title = "Air toxics Cancer Risk (per County)"),
             col = "deepskyblue2")+
  tm_layout(frame.double_line = TRUE,
            bg.color = "lightblue") +
  tm_shape(ventura) +
  tm_lines()+
  tm_scalebar(position = c("left", "bottom"))+
  tm_compass(position = c("right", "top")) +
  tm_minimap(position = c("right","top"))

CA_Low_Income
```




```
tmap_save(CA_Low_Income, here("figs", "CA_lowincome.jpeg"))
```