

Homework 2

BST 5600

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```
library(sf)
library(tidyverse)
library(tigris)
library(tmap)
library(GISTools)
```

First we'll pull in both the COVID deaths and the population counts for each county. We only care about Missouri, so we'll filter to only Missouri and we'll also remove the statewide unallocated row in each dataset.

```
deaths <- read_csv("../data/raw/hw/covid_deaths_usafacts.csv") %>%
  filter(StateFIPS == 29 & countyFIPS != 0)
```

```
## Rows: 3193 Columns: 772
## -- Column specification -----
## Delimiter: ","
## chr (3): County Name, State, StateFIPS
## dbl (769): countyFIPS, 2020-01-22, 2020-01-23, 2020-01-24, 2020-01-25, 2020-...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
population <- read_csv("../data/raw/hw/covid_county_population_usafacts.csv") %>%
  filter(State == "MO" & countyFIPS != 0)
```

```
## Rows: 3195 Columns: 4
## -- Column specification -----
## Delimiter: ","
## chr (2): County Name, State
## dbl (2): countyFIPS, population
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Now we'll read in the shapefiles for Missouri through tigris.

```
mo_shapefiles <- counties(29)
```

```
## |
```

Let's join all those together now.

```
mo <- mo_shapefiles %>% merge(population, by.x = "GEOID", by.y = "countyFIPS") %>%
  merge(deaths, by.x = "GEOID", by.y = "countyFIPS")
```

Ok, these deaths are cumulative, so we'll need to subtract the first day from the last day for each year of interest.

```

mo$`2020_deaths` <- mo$`2020-12-31`
mo$`2021_deaths` <- mo$`2021-12-31` - mo$`2020-12-31`

mo <- mo %>%
  dplyr::select(colnames(.) %>% discard(function(x) grepl("2020-", x, fixed = T))) %>%
  dplyr::select(colnames(.) %>% discard(function(x) grepl("2021-", x, fixed = T))) %>%
  dplyr::select(colnames(.) %>% discard(function(x) grepl("2022-", x, fixed = T)))

```

Now we can calculate the rates per 100k.

```

mo$`2020_rates` <- mo$`2020_deaths` / mo$population * 100000
mo$`2021_rates` <- mo$`2021_deaths` / mo$population * 100000

```

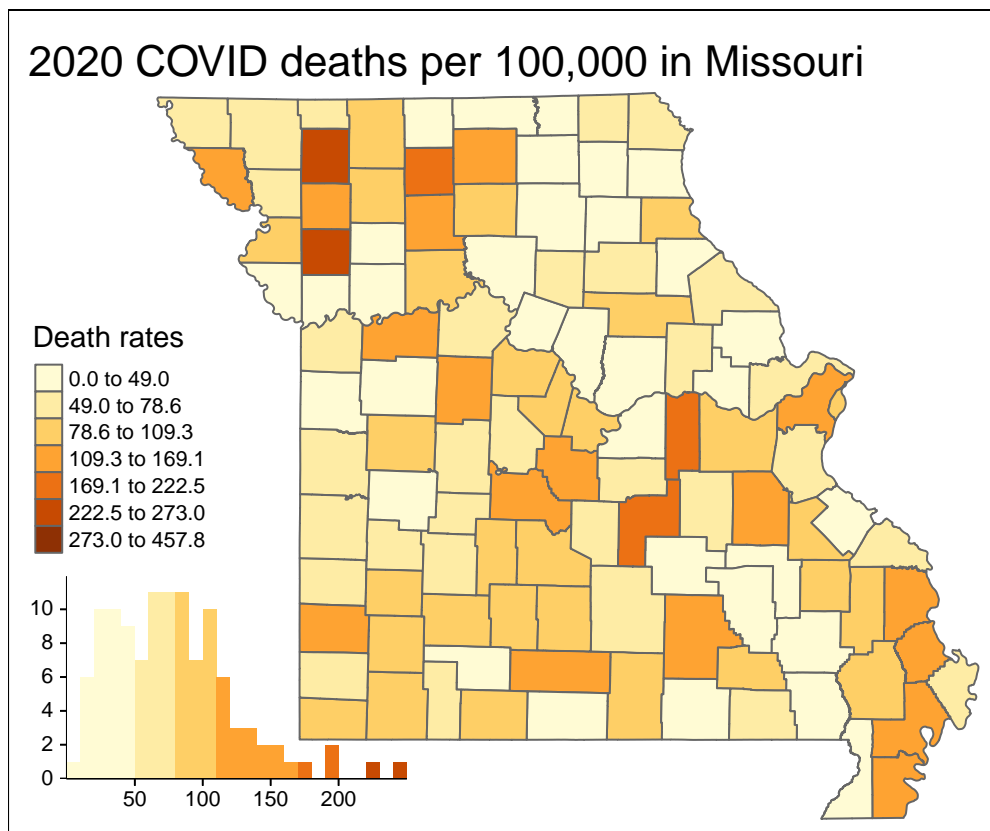
Our data is all set up, now we can do the mapping. We'll start by making a choropleth map of the 2020 rates in all of MO.

```

rate_breaks <- c(0, round(quantileCuts(c(mo$`2020_rates`, mo$`2021_rates`), 7), 1),
  max(c(mo$`2020_rates`, mo$`2021_rates`)))

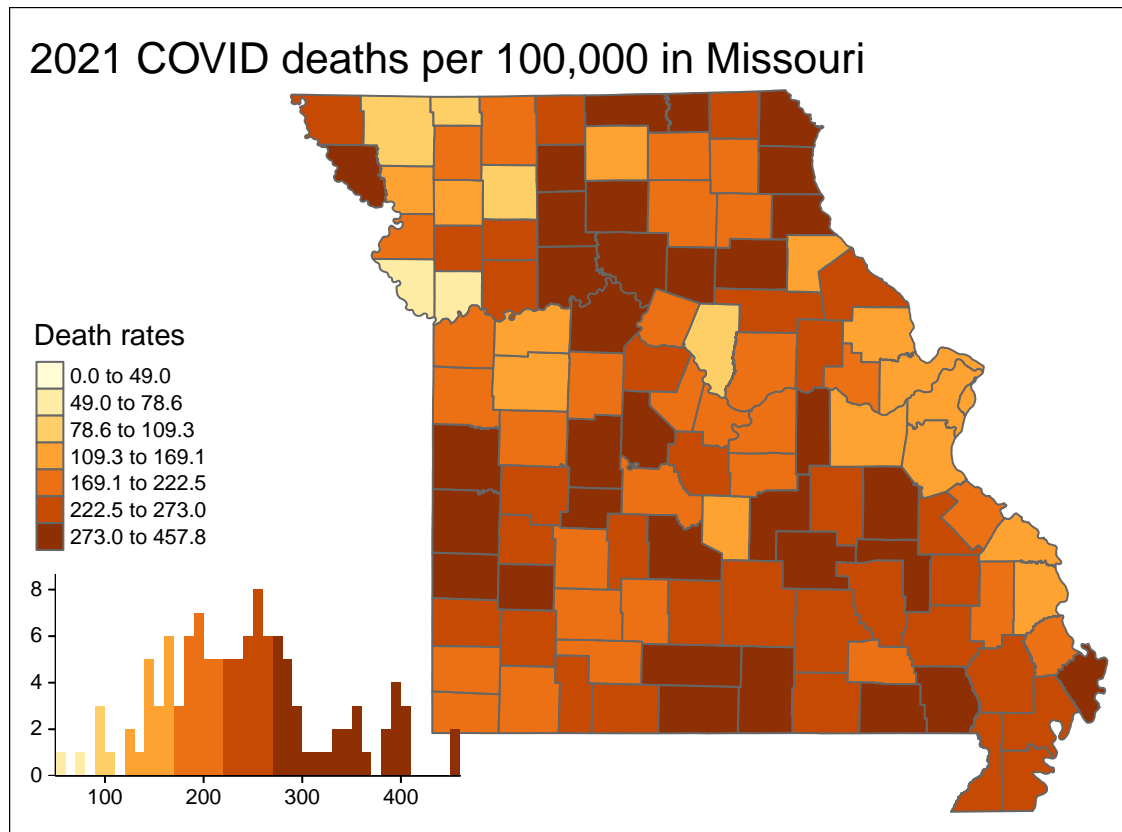
tm_shape(mo) +
  tm_polygons("2020_rates", title = "Death rates", legend.hist = T,
    breaks = rate_breaks) +
  tm_layout(title = "2020 COVID deaths per 100,000 in Missouri",
    legend.position = c("left", "bottom"),
    inner.margins = c(0.025, 0.15, 0.1, 0.025))

```



Let's do the same for 2021 death rates.

```
tm_shape(mo) +
  tm_polygons("2021_rates", title = "Death rates", legend.hist = T,
              breaks = rate_breaks) +
  tm_layout(title = "2021 COVID deaths per 100,000 in Missouri",
            legend.position = c("left", "bottom"),
            inner.margins = c(0.03, 0.25, 0.1, 0.025))
```



Now let's make two maps that's specifically for the St. Louis EMS region.

```
stl_ems_counties <- c("071", "099", "113", "163", "183", "189", "219", "510")
stl_mo <- filter(mo, COUNTYFP %in% stl_ems_counties)

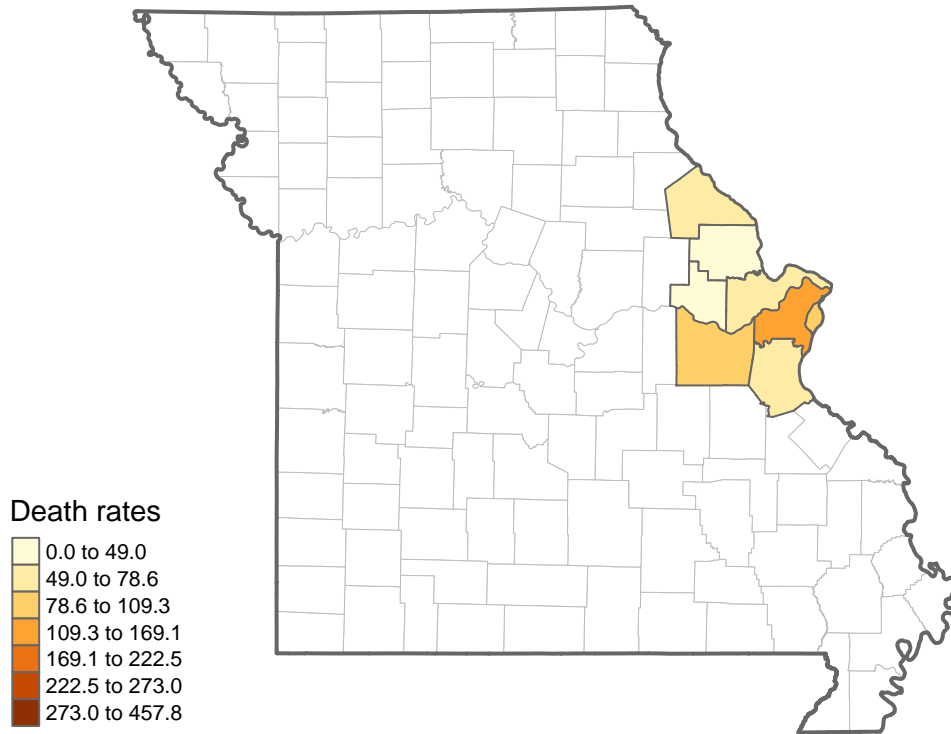
stl_rate_breaks <- c(0, round(quantileCuts(c(stl_mo$`2020_rates`,
                                             stl_mo$`2021_rates`), 7), 1),
                    max(c(stl_mo$`2020_rates`, stl_mo$`2021_rates`)))

mo_outline <- st_union(mo)

tm_shape(mo) +
  tm_fill("white") +
  tm_borders("grey", lwd = 0.5) +
  tm_shape(mo_outline) +
  tm_borders(lwd = 2) +
  tm_shape(stl_mo) +
  tm_polygons("2020_rates", title = "Death rates", breaks = rate_breaks) +
  tm_layout(title = "2020 COVID deaths per 100,000 in St. Louis EMS Region",
            legend.position = c("left", "bottom"),
```

```
inner.margins = c(0.025, 0.15, 0.1, 0.025))
```

2020 COVID deaths per 100,000 in St. Louis EMS Region



```
tm_shape(mo) +
  tm_fill("white") +
  tm_borders("grey", lwd = 0.5) +
  tm_shape(mo_outline) +
  tm_borders(lwd = 2) +
  tm_shape(stl_mo) +
  tm_polygons("2021_rates", title = "Death rates", breaks = rate_breaks) +
  tm_layout(title = "2021 COVID deaths per 100,000 in St. Louis EMS Region",
    legend.position = c("left", "bottom"),
    inner.margins = c(0.025, 0.15, 0.1, 0.025))
```

2021 COVID deaths per 100,000 in St. Louis EMS Region

