Fruit Trees and Birth Place Correlation Project

Meagan Fairfield-Peak

3/2/2022

Is there correlation between the number of fruit trees and the surrounding population's birth place for Census Tracts in Baltimore City?

Libraries

```
library(tidycensus)
library(tidyverse)
library(tigris)
library(sf)
library(tmap)
library(corrr)
library(segregation)
options(tigris_use_cache = TRUE)
```

Obtaining Baltimore City Place of Birth by Nativity and Citizen Status through American Community Survey Tables 2015 - 2019

Native: is for US Citiizens that were born in the US Foreign is for US Citizen that were born outside of the US Non_Citizen is for the population born outside the US and is not a US citizen

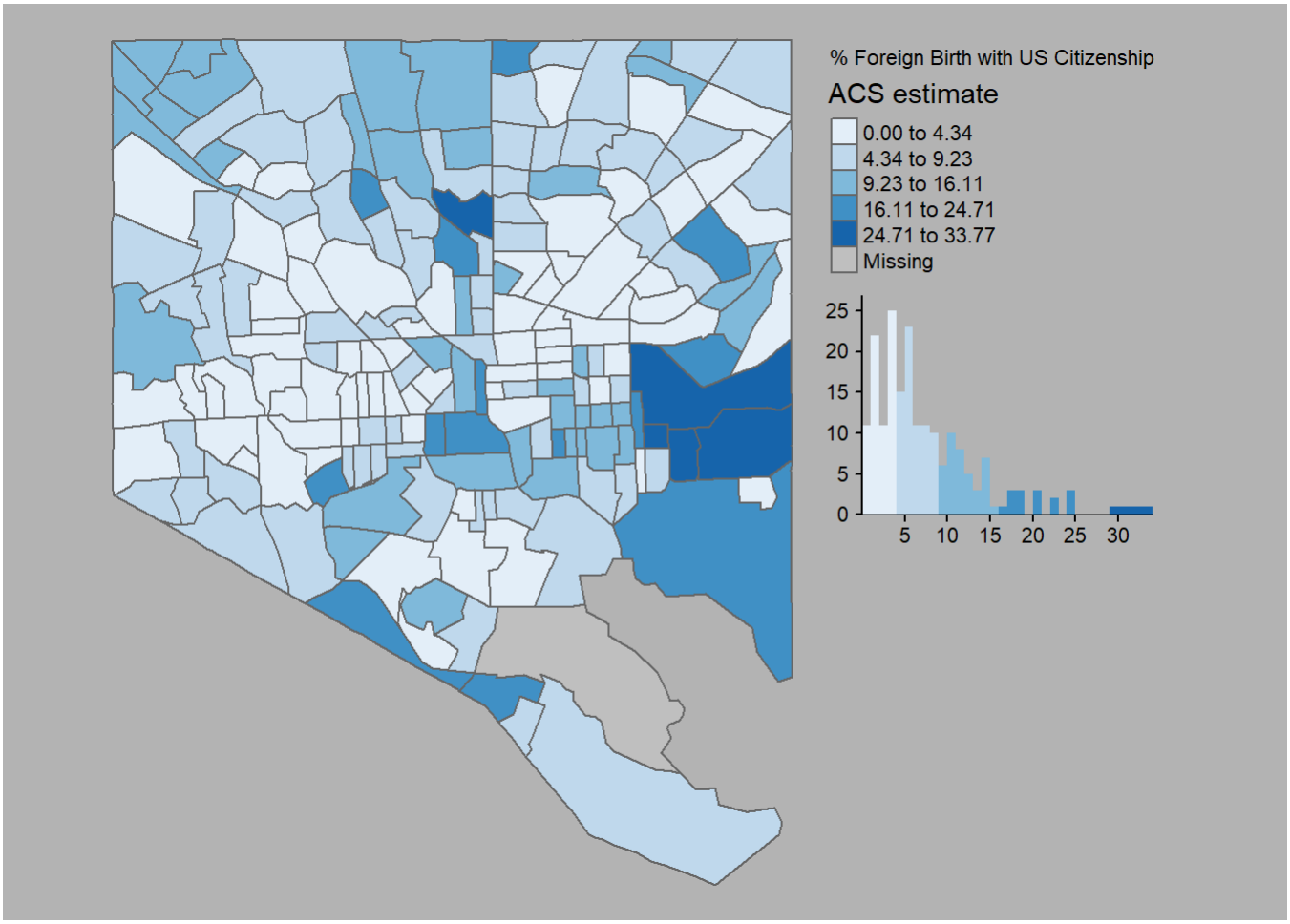
```
balt_place_birth <- get_acs(
  geography = "tract",
  state = "MD",
  county = "Baltimore city",
  variables = c(native= "B05002_002",
                foreign = "B05002_013",
                non_citizen = "B05002_021"),
  summary_var = "B05002_001",
  geometry = TRUE,
  output = "wide",
  year = 2019
  )
```

Calculating and adding percentages for each variable

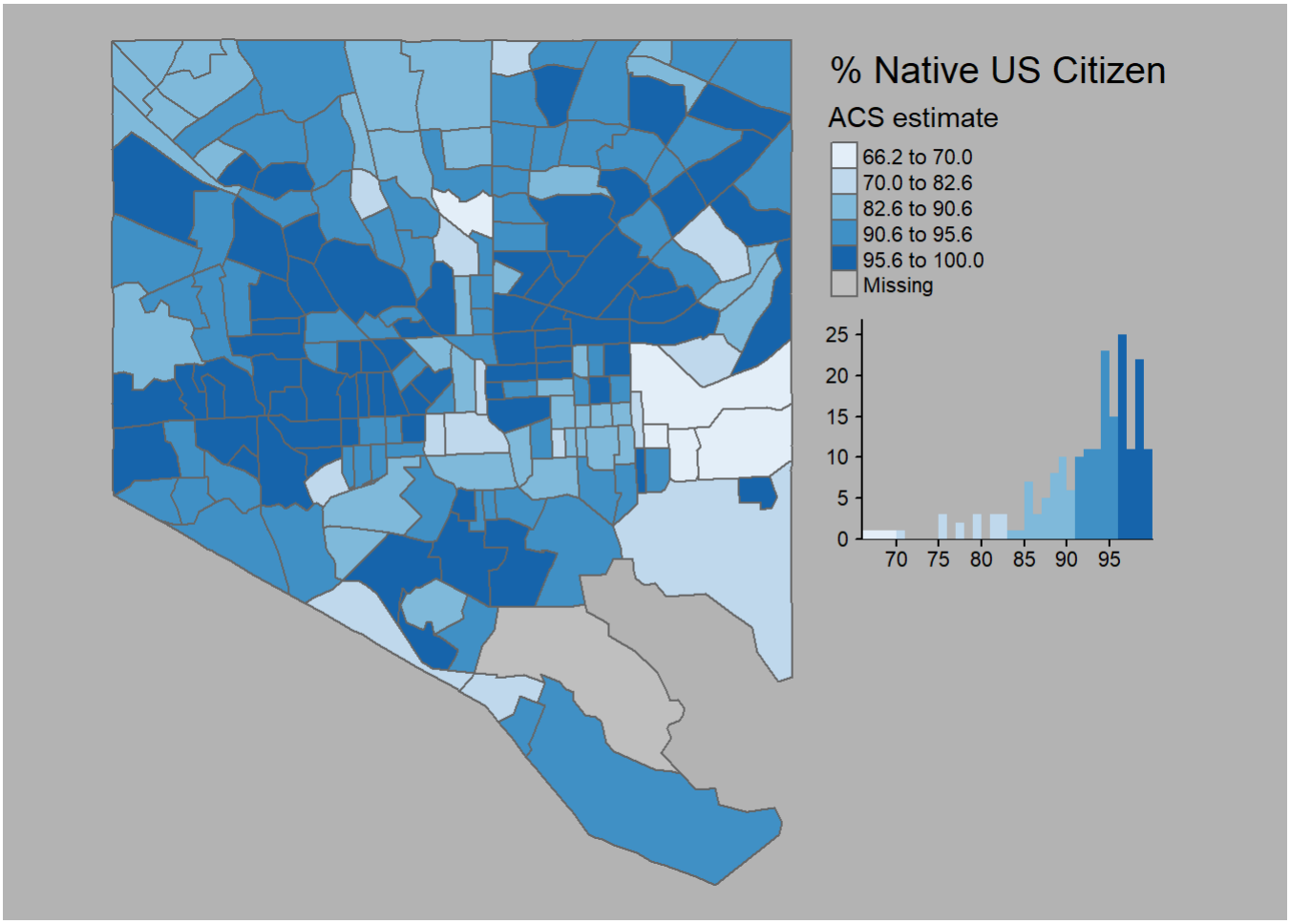
```
balt_place_birth$percentf <- (balt_place_birth$foreignE / balt_place_birth$summary_est)*100

balt_place_birth$percentn <- (balt_place_birth$nativeE / balt_place_birth$summary_est)*100

balt_place_birth$percentc <- (balt_place_birth$non_citizenE / balt_place_birth$summary_est)*100
```

Displaying the Percentages of each population birth place.

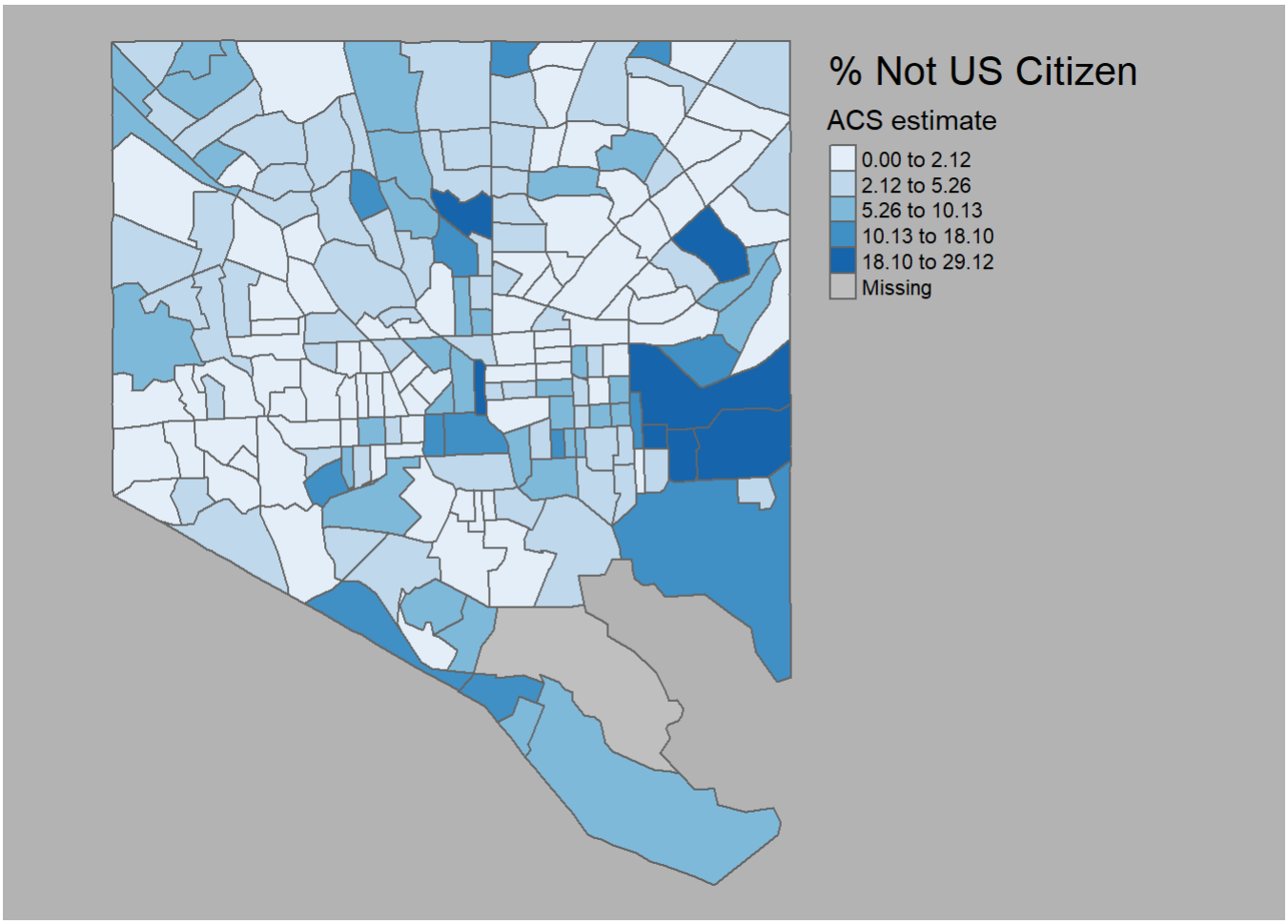
```
tm_shape(balt_place_birth,
 projection = sf::st_crs(4269)) +
 tm_polygons(col = "percentf",
 style = "jenks",
 n = 5,
 palette = "Blues",
 title = "ACS estimate",
 legend.hist = TRUE) +
 tm_layout(title = "% Foreign Birth with US Citizenship",
 frame = FALSE,
 legend.outside = TRUE,
 bg.color = "grey70",
 legend.hist.width = 5,
 fontfamily = "Verdana")
```



```
tm_shape(balt_place_birth,
 projection = sf::st_crs(4269)) +
 tm_polygons(col = "percentn",
 style = "jenks",
 n = 5,
 palette = "Blues",
 title = "ACS estimate",
 legend.hist = TRUE) +
 tm_layout(title = "% Native US Citizen",
 frame = FALSE,
 legend.outside = TRUE,
 bg.color = "grey70",
 legend.hist.width = 5,
 fontfamily = "Verdana")
```



```
tm_shape(balt_place_birth,
 projection = sf::st_crs(4269)) +
 tm_polygons(col = "percentc",
 style = "jenks",
 n = 5,
 palette = "Blues",
 title = "ACS estimate",
 ) +
 tm_layout(title = "% Not US Citizen",
 frame = FALSE,
 legend.outside = TRUE,
 bg.color = "grey70",
 fontfamily = "Verdana")
```

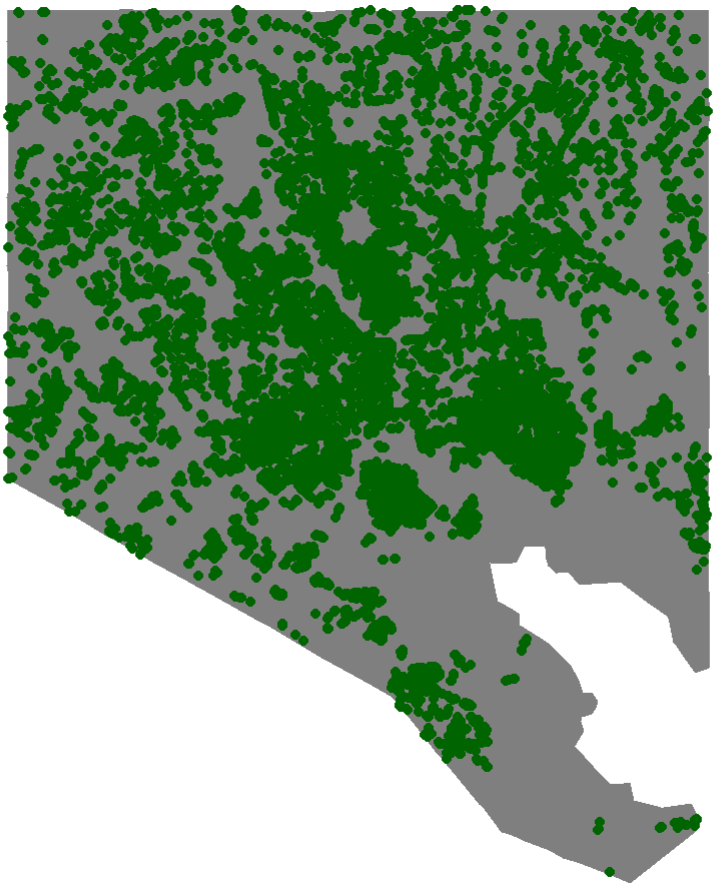


Importing Fruit Tree Data through a geojsons url.

```
fruit_trees_url <- "https://s3.us-west-2.amazonaws.com/secure.notion-static.com/2cbbd858-87f6-4409-90b4-465f54c75928/treeinv_fruittrees.geojson?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-PAYLOAD&X-Amz-Credential=AKIAT73L2G45EIPT3X45%2F20220303%2Fus-west-2%2Fs3%2Faws4_request&X-Amz-Date=20220303T180100Z&X-Amz-Expires=86400&X-Amz-Signature=03b95c8ff42c9b0caa9f3fd343beec9ba256e34649f5431a1727f64273ca1e67&X-Amz-SignedHeaders=host&response-content-disposition=filename%20%3D%22treeinv_fruittrees.geojson%22&x-id=GetObject"

fruit_trees <- st_read(fruit_trees_url) %>%
  st_transform(4269)
```

Displaying Fruit Tree Locations

```
ggplot() +
  geom_sf(data = balt_place_birth, color = "NA", fill = "grey50") +
  geom_sf(data = fruit_trees, color = "darkgreen") +
  theme_void()
```

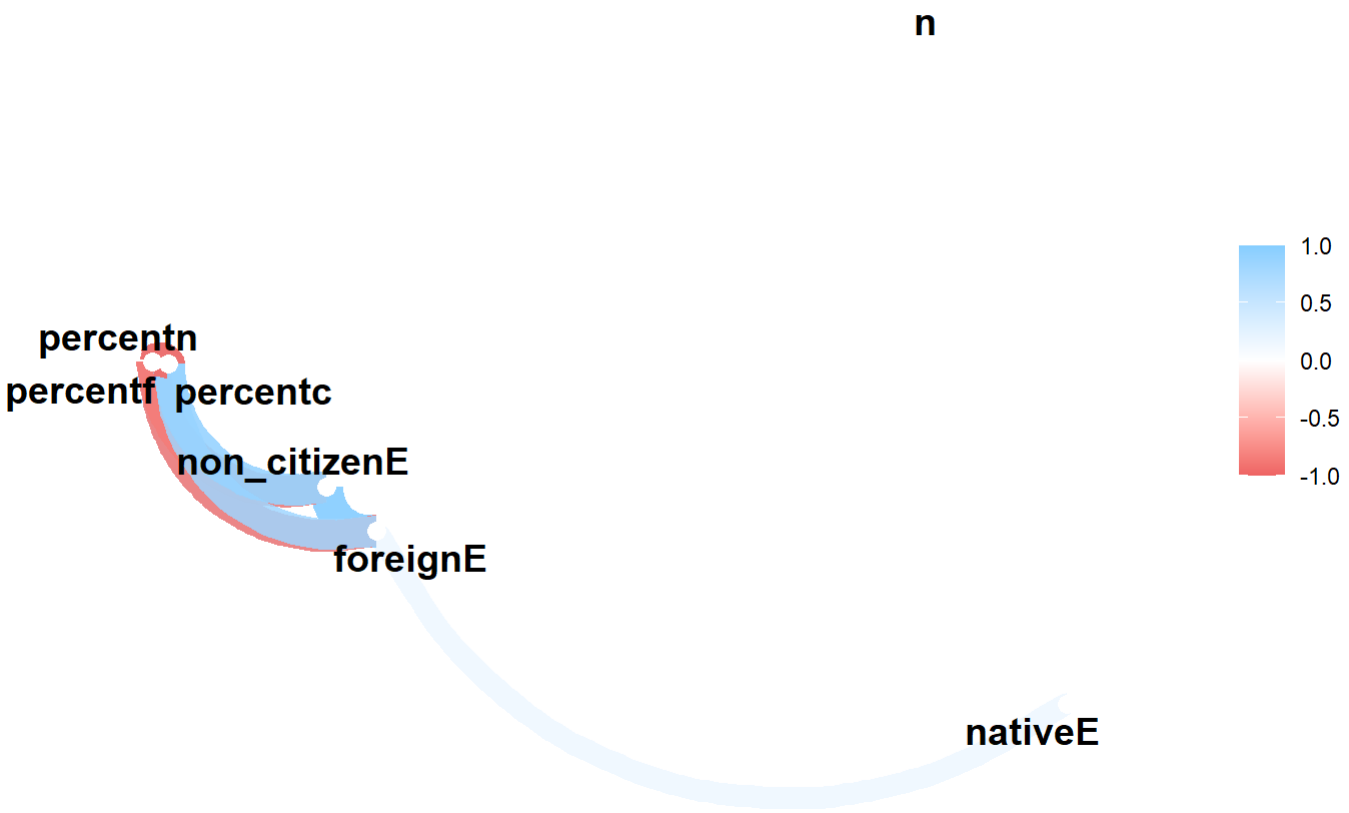


Find tree points within Baltimore City Tract polygons

```
trees_tracts <- st_join(fruit_trees, balt_place_birth, join = st_within)

tree_tract_count <- count(as_tibble(trees_tracts), GEOID)

tracts_w_trees <- left_join(balt_place_birth, tree_tract_count)
```

Calculating and Displaying the correlation

```
#Removing variables that are not considered and non-numeric variables
tree_estimates <- tracts_w_trees %>%
  select(-GEOID, -NAME, -nativeM, -foreignM, -non_citizenM, -summary_est, -summary_moe) %>%
  st_drop_geometry()

correlations <- correlate(tree_estimates, method = "pearson")

network_plot(correlations)
```



As it can be seen in the above figure there is no correlation between birth place of the population to the amount of fruit trees in Baltimore tracts.

```
balt_place_birth2 <- get_acs(
  geography = "tract",
  state = "MD",
  county = "Baltimore city",
  variables = c(native= "B05002_002",
                foreign = "B05002_013",
                non_citizen = "B05002_021"),
  summary_var = "B05002_001",
  geometry = TRUE,
  year = 2019
  )
```

`mutual_local()` decomposes the Mutual Information Index into unit-level segregation scores. The left join allows to join the segregation scores with the Baltimore tracts to be able to display them.

```
balt_seg <- balt_place_birth2 %>%
  mutual_local(
    group = "variable",
    unit = "GEOID",
    weight = "estimate",
    wide = TRUE
  )
```

```
balt_tracts_seg <- left_join(balt_place_birth2, balt_seg)

balt_tracts_seg %>%
  ggplot(aes(fill = ls)) +
  geom_sf(color = NA) +
  coord_sf(crs = 4296) +
  scale_fill_viridis_c(option = "inferno") +
  theme_void() +
  labs(fill = "Local nationality\nsegregation index")
```