

County Level Data

2025-11-20

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.6
## vforcats   1.0.1     v stringr   1.6.0
## v ggplot2   4.0.1     v tibble    3.3.0
## v lubridate 1.9.4     v tidyv     1.3.1
## v purrr    1.2.0
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()   masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(dplyr)
library(ggplot2)
library(stringr)
library(readr)
library(tigris)
```

```
## To enable caching of data, set `options(tigris_use_cache = TRUE)`
## in your R script or .Rprofile.
```

```
library(sf)
```

```
## Linking to GEOS 3.13.0, GDAL 3.8.5, PROJ 9.5.1; sf_use_s2() is TRUE
```

Load in election data and clean

```
props <- read_csv("Ohio Ballot Issues 2023 copy.csv")
```

```
## New names:
## Rows: 8880 Columns: 12
## -- Column specification
## ----- Delimiter: ","
## (12): November 7, 2023 General Election Official Canvass, ...2, ...3, ....
## 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.
## * `` -> `...2`
## * `` -> `...3`
## * `` -> `...4`
```

```

## * `` -> '...5'
## * `` -> '...6'
## * `` -> '...7'
## * `` -> '...8'
## * `` -> '...10'
## * `` -> '...12'

props <- props[-c(1:3), ]

colnames(props) <- c(
  "County Name", "Precinct Name", "Precinct Code", "Region Name", "Media Market", "Registered Voters", "B
)

props_county <- props |>
  mutate(across(
    c("Registered Voters", "Ballots Counted",
      "abortion_yes", "abortion_no", "weed_yes", "weed_no"),
    ~ readr::parse_number(as.character(.x))
  )) |>
  group_by(`County Name`) |>
  summarise(
    `Registered Voters` = sum(`Registered Voters`, na.rm = TRUE),
    `Ballots Counted` = sum(`Ballots Counted`, na.rm = TRUE),
    abortion_yes = sum(abortion_yes, na.rm = TRUE),
    abortion_no = sum(abortion_no, na.rm = TRUE),
    weed_yes = sum(weed_yes, na.rm = TRUE),
    weed_no = sum(weed_no, na.rm = TRUE)
  )

props_county <- props_county |>
  mutate(voter_turnout = (`Ballots Counted` / `Registered Voters`) * 100,
         abortion_diff = abortion_yes - abortion_no,
         abortion_turnout = abortion_yes + abortion_no,
         weed_diff = weed_yes - weed_no,
         weed_turnout = weed_yes + weed_no,
         abortion_weed_diff = abortion_diff - weed_diff,
         prop_turnout_diff = abortion_turnout - weed_turnout,
         abortion_margin = (abortion_diff / abortion_turnout) * 100,
         weed_margin = (weed_diff / weed_turnout) * 100,
         diff_margin = (abortion_weed_diff / `Ballots Counted`) * 100,
         across(c(abortion_margin, weed_margin, diff_margin), ~ round(.x, 2)))

```

Load in shapefile data

```

ohio_sf <- st_read("ohio_county_level.shp")

## Reading layer 'ohio_county_level' from data source
##   '/Users/jackholland/Downloads/School/GOV 1372/Final Project/Gov Final Repository/ohio_county_level'
##   using driver 'ESRI Shapefile'
## Simple feature collection with 88 features and 4 fields

```

```

## Geometry type: POLYGON
## Dimension:      XY
## Bounding box:  xmin: -84.8203 ymin: 38.40342 xmax: -80.5187 ymax: 42.32713
## Geodetic CRS:  NAD83

ohio_prop_map_df <- ohio_sf |>
  left_join(props_county, by = c("NAME" = "County Name"))

```

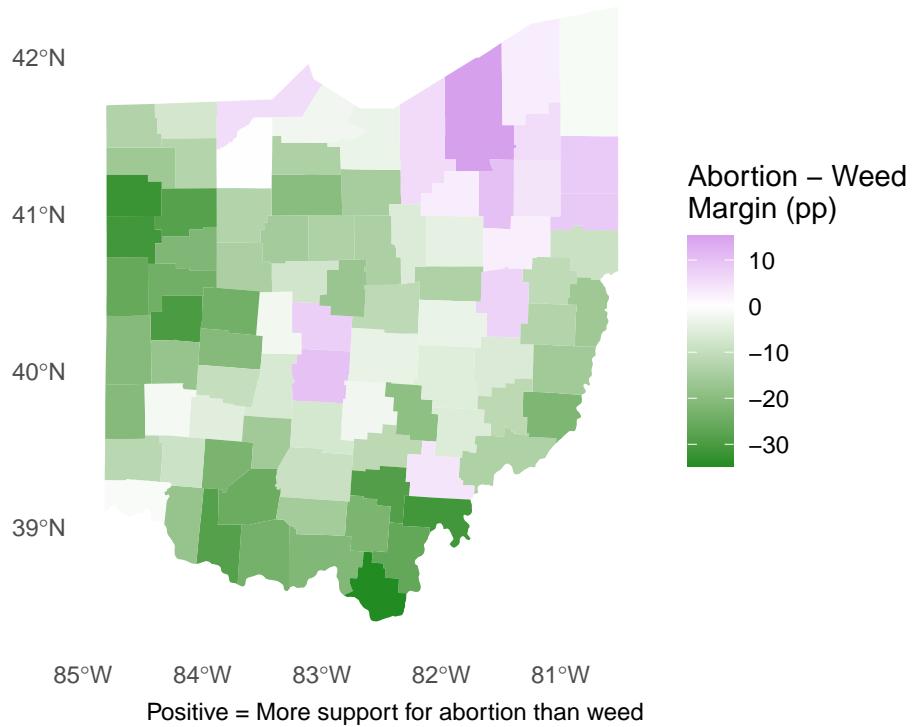
First Map!

```

ggplot(ohio_prop_map_df) +
  geom_sf(aes(fill = diff_margin), color = NA) + scale_fill_gradient2(
    low = "forestgreen",
    mid = "white",
    high = "darkviolet",
    midpoint = 0,
    name = "Abortion - Weed\\nMargin (pp)" )+
  labs(
    title = "Ohio County-Level Disparities\\nAbortion vs. Marijuana Ballot Margins (2023)",
    caption = "Positive = More support for abortion than weed") +
  theme_minimal() +
  theme(panel.grid = element_blank(),
        legend.position = "right"
  )

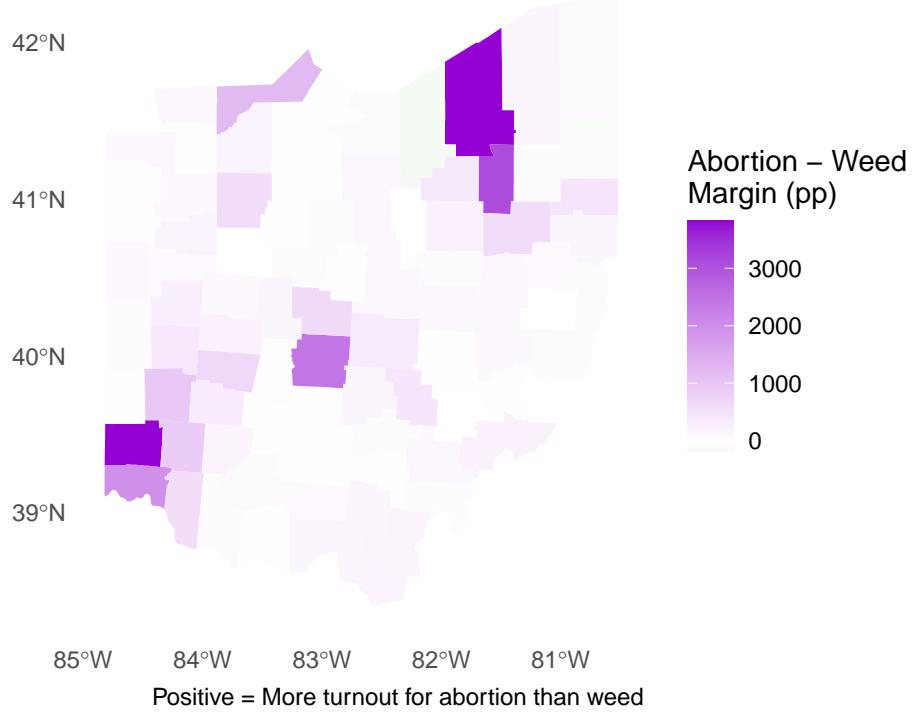
```

Ohio County–Level Disparities Abortion vs. Marijuana Ballot Margins (2023)



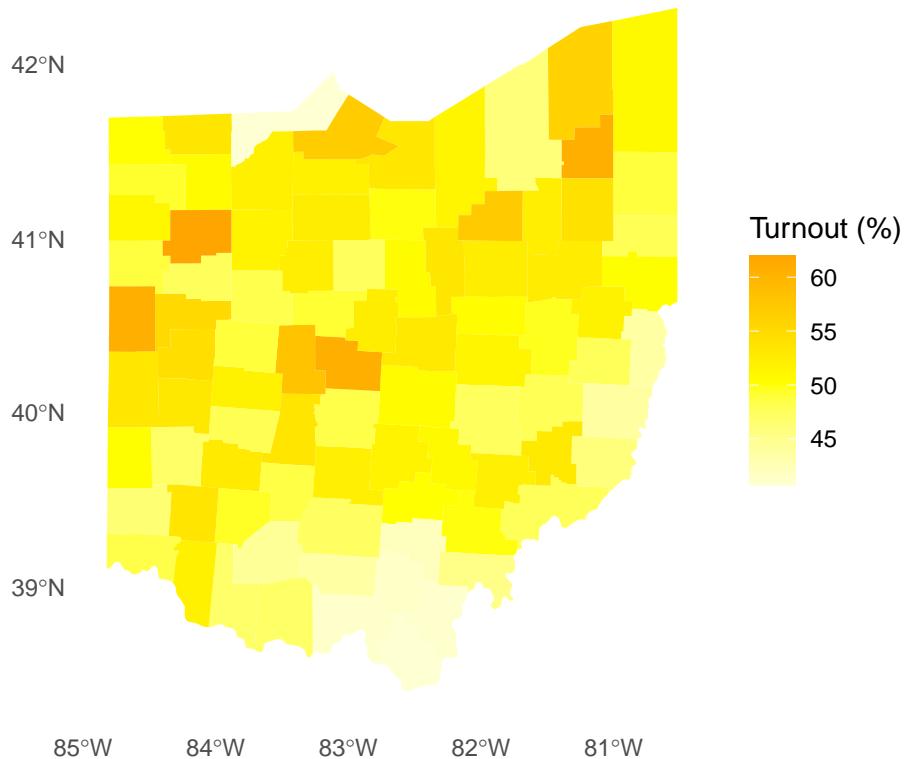
```
ggplot(ohio_prop_map_df) +
  geom_sf(aes(fill = prop_turnout_diff), color = NA) + scale_fill_gradient2(
    low = "forestgreen",
    mid = "white",
    high = "darkviolet",
    midpoint = 0,
    name = "Abortion – Weed\nMargin (pp)")
  labs(
    title = "Ohio County–Level Turnout Disparities\nAbortion vs. Marijuana (2023)",
    caption = "Positive = More turnout for abortion than weed") +
  theme_minimal() +
  theme(panel.grid = element_blank(),
        legend.position = "right")
)
```

Ohio County–Level Turnout Disparities Abortion vs. Marijuana (2023)



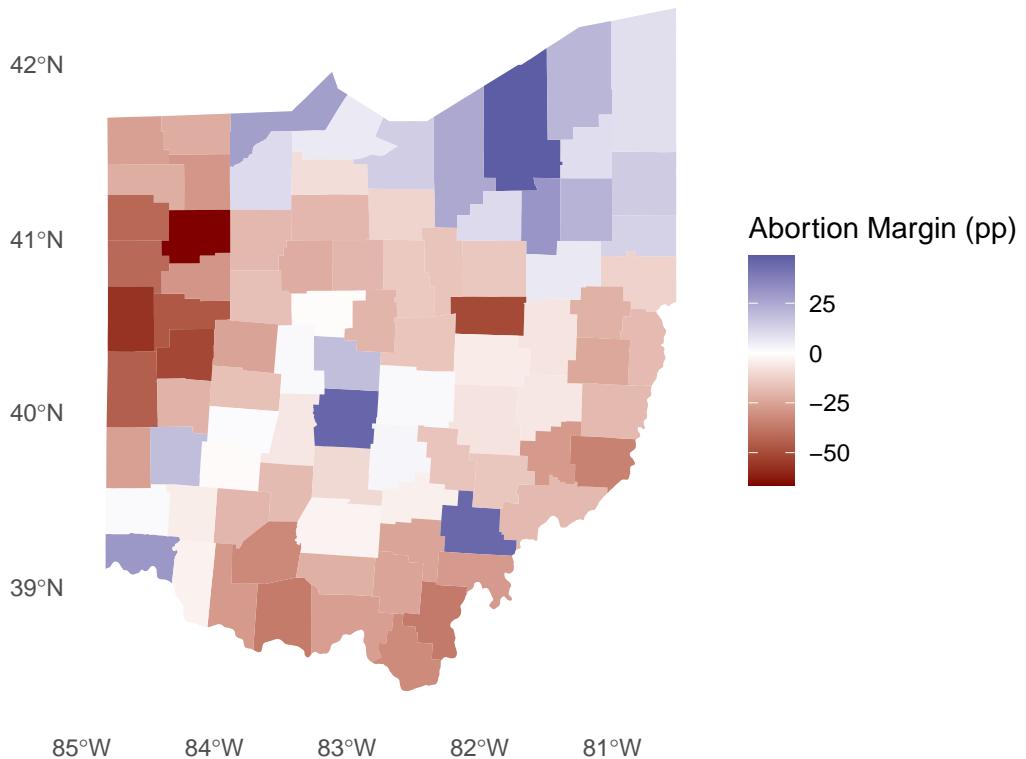
```
ggplot(ohio_prop_map_df) +  
  geom_sf(aes(fill = voter_turnout), color = NA) + scale_fill_gradient2(  
    low = "white",  
    mid = "yellow1",  
    high = "orange",  
    midpoint = 50,  
    name = "Turnout (%)") +  
  labs(  
    title = "Ohio County–Level Turnout (2023)" +  
      theme_minimal() +  
      theme(panel.grid = element_blank(),  
            legend.position = "right")  
  )
```

Ohio County–Level Turnout (2023)



```
ggplot(ohio_prop_map_df) +  
  geom_sf(aes(fill = abortion_margin), color = NA) + scale_fill_gradient2(  
    low = "#800000",  
    high = "#002B84",  
    midpoint = 0,  
    name = "Abortion Margin (pp)"  
) + labs(  
  title = "Ohio Abortion Referendum (2023)" ) +  
  theme_minimal() + theme(  
    panel.grid = element_blank(),  
    legend.position = "right"  
)
```

Ohio Abortion Referendum (2023)

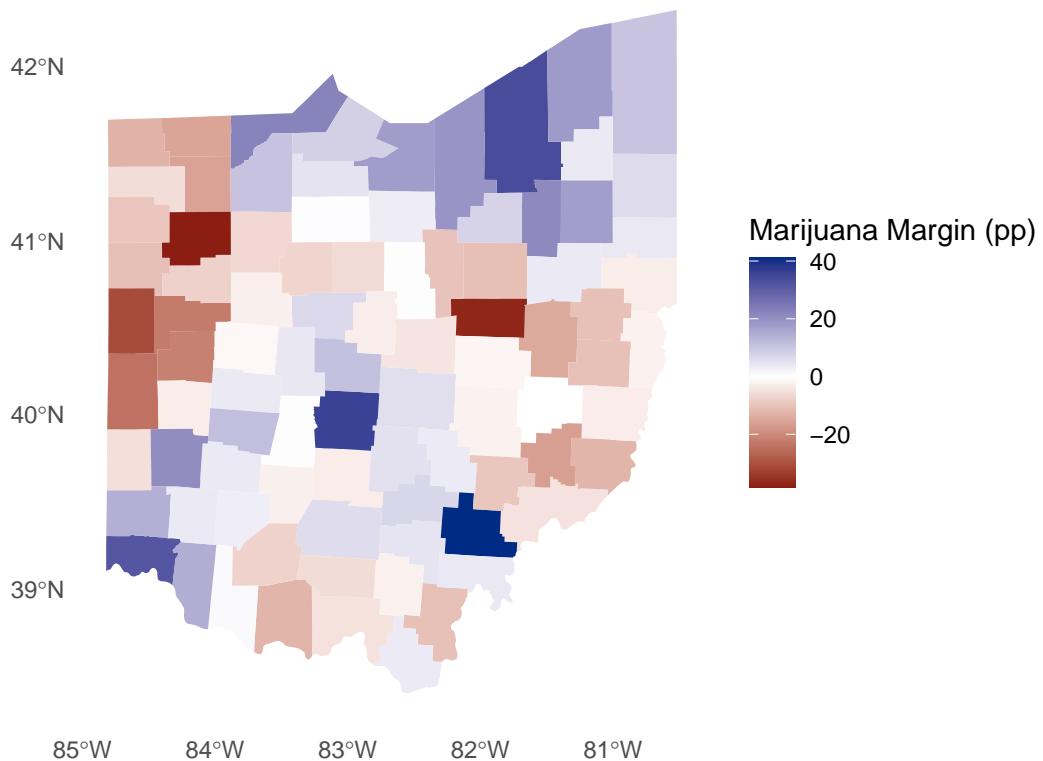


```
min(ohio_prop_map_df$weed_margin)

## [1] -38.4

ggplot(ohio_prop_map_df) +
  geom_sf(aes(fill = weed_margin), color = NA) + scale_fill_gradient2(
    low = "#800000",
    high = "#002B84",
    midpoint = 0,
    name = "Marijuana Margin (pp)"
  ) + labs(
    title = "Ohio Marijuana Referendum (2023)" +
      theme_minimal() + theme(
        panel.grid = element_blank(),
        legend.position = "right"
      )
  )
```

Ohio Marijuana Referendum (2023)



Looking at census data

```
library(tidyverse)
library(janitor)

## 
## Attaching package: 'janitor'

## The following objects are masked from 'package:stats':
## 
##     chisq.test, fisher.test

library(stringr)

age_raw <- read_csv("AgeRace.csv", show_col_types = FALSE)

## New names:
## * ` ` -> `...379` 

meta_raw <- read_csv("ACSDP5Y2023.DP05-Column-Metadata.csv", show_col_types = FALSE)

age_raw <- age_raw[-1, ]
```

```

estimate_cols <- names(age_raw)[str_detect(names(age_raw), "DP\\d{2}_.+E$")]
id_cols <- intersect(c("GEO_ID", "NAME"), names(age_raw))

age_est <- age_raw |>
  select(all_of(id_cols), all_of(estimate_cols))

rename_map <- meta_raw |>
  clean_names() |>
  transmute(
    var = column_name,
    label = label
  ) |>
  filter(str_detect(var, "DP\\d{2}_.+E$")) |>
  mutate(
    label = label |>
      str_replace_all("(?i)^Estimate!!", "") |>
      str_replace_all("!!", " / ") |>
      str_replace_all("[^A-Za-z0-9/ &-]+", " ") |>
      str_squish(),
    new_name = label |>
      str_to_lower() |>
      str_replace_all("/", " ") |>
      str_replace_all("&", "and") |>
      str_replace_all("-", " ") |>
      str_replace_all("\\s+", "_")
  ) |>
  select(var, new_name) |>
  distinct()

rename_map <- rename_map |>
  filter(str_detect(new_name, "percent"))

rename_map_keep <- rename_map |>
  filter(var %in% names(age_est)) |>
  mutate(new_name = make.unique(new_name, sep = "_"))

keep_vars <- c(id_cols, rename_map_keep$var)
valid_map <- setNames(rename_map_keep$var, rename_map_keep$new_name)

age_clean <- age_est |>
  select(all_of(keep_vars)) |>                                # only keep id + percent vars
  rename(!!!!valid_map) |>
  mutate(
    NAME = str_squish(NAME),
    county = NAME |>
      str_replace(",\\s*Ohio$", ""),
      str_replace("\\s*County$", ""),
      str_to_title()
  ) |>
  relocate(county, .after = NAME)

age_clean <- age_clean |>
  mutate(across(all_of(names(valid_map)), ~ as.numeric(.x)))

```

```

## Warning: There were 5 warnings in 'mutate()'.
## The first warning was:
## i In argument: 'across(all_of(names(valid_map)), ~as.numeric(.x))'.
## Caused by warning:
## ! NAs introduced by coercion
## i Run 'dplyr::last_dplyr_warnings()' to see the 4 remaining warnings.

```

```

age_clean_selective <- age_clean |>
  select(county, percent_sex_and_age_total_population, percent_sex_and_age_total_population_male, percent_sex_and_age_total_population_female, percent_sex_and_age_total_population_under_5_years, percent_sex_and_age_total_population_5_to_9_years, percent_sex_and_age_total_population_10_to_14_years, percent_sex_and_age_total_population_15_to_19_years, percent_sex_and_age_total_population_20_to_24_years, percent_sex_and_age_total_population_25_to_34_years, percent_sex_and_age_total_population_35_to_44_years, percent_sex_and_age_total_population_45_to_54_years, percent_sex_and_age_total_population_55_to_59_years, percent_sex_and_age_total_population_60_to_64_years, percent_sex_and_age_total_population_65_to_74_years, percent_sex_and_age_total_population_75_to_84_years, percent_sex_and_age_total_population_85_years_and_over)
)
```

```

race_clean <- age_clean |>
  select(county, percent_race_total_population_one_race, percent_race_total_population_one_race_white, percent_race_total_population_one_race_black_or_african_american, percent_race_total_population_one_race_native_hawaiian_and_other_pacific_islander, percent_race_total_population_one_race_hispanic_or_latino_and_race_total_population_hispanic_or_latino_of_any_race)
)
```

```

##Merge age and race data with existing data

```

```

ohio_joined_age <- ohio_prop_map_df |>
  left_join(
    age_clean_selective,
    by = c("NAME" = "county")
  )

ohio_joined_race <- ohio_joined_age |>
  left_join(
    race_clean,
    by = c("NAME" = "county")
  )

```

```

library(tidyverse)
library(stringr)

edu_raw <- read_csv("EduAttain.csv", col_names = FALSE, show_col_types = FALSE)

new_names <- edu_raw %>%
  slice(2) %>%
  unlist() %>%
  as.character()

edu <- edu_raw %>%
  slice(-c(1, 2))      # remove first two rows
colnames(edu) <- new_names

nm <- names(edu)
nm <- replace_na(nm, "")

estimate_cols2 <- nm[str_detect(nm, regex("Estimate!!Total!!", ignore_case = TRUE))]

id_candidates <- c("Geographic Area Name")
id_cols2 <- intersect(id_candidates, nm)

edu_estimate <- edu %>%
  select(any_of(id_cols2), all_of(estimate_cols2))

nm2 <- names(edu_estimate)
nm2 <- replace_na(nm2, "")

estimate_cols3 <- nm2[str_detect(nm2, regex("AGE BY EDUCATIONAL ATTAINMENT", ignore_case = TRUE))]

edu_estimate2 <- edu_estimate %>%
  select(any_of(id_cols2), all_of(estimate_cols3))

# 4) Clean county name; optionally keep only county rows
edu_estimate2 <- edu_estimate2 %>%
  mutate(
    `Geographic Area Name` = str_squish(`Geographic Area Name`),
    county = `Geographic Area Name` %>%
      str_replace(",\\s*Ohio$", "") %>%
      str_replace("\\s*County$", "") %>%
      str_squish() %>%
      str_to_title()
  ) %>%
  relocate(county, .after = `Geographic Area Name`)

edu_totals <- edu_estimate2 %>%
  mutate(across(
    contains("Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT"),
    ~ readr::parse_number(as.character(.x))
  )) %>%
  mutate(
    pop_18_24      = `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 18 to 24 years`,
    pop_25plus     = `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over`
  )

```

```

pop_18plus      = pop_18_24 + pop_25plus,

# Less than high school (18-24 "less than HS") + (25+ "less than 9th" + "9-12 no diploma")
lt_hs_18plus   = `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 18 to 24 years!!Less th
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!Less th
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!9th

# High school graduate (18-24 HS grad) + (25+ HS grad)
hs_grad_18plus = `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 18 to 24 years!!High s
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!High

# Some college or associate's (18-24 some college/AA) + (25+ some college no degree + AA)
some_coll_18plus =
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 18 to 24 years!!Some co
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!Som
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!Ass

# Bachelor's or higher (18-24 BA+) + (25+ BA + Grad/Prof)
ba_plus_18plus = `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 18 to 24 years!!Bachelor
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!Bach
                  `Estimate!!Total!!AGE BY EDUCATIONAL ATTAINMENT!!Population 25 years and over!!Grad

# 4) keep a clean output set with better labels
select(
  `Geographic Area Name`, county,
  pop_18_24, pop_25plus, pop_18plus,
  lt_hs_18plus, hs_grad_18plus, some_coll_18plus, ba_plus_18plus
)

```

```

library(sf)
library(tidyverse)

inc_raw <- read_csv("Incomes_2.csv", show_col_types = FALSE) %>%
  as_tibble()

```

```

ohio_joined_race <- ohio_joined_race %>%
  left_join(inc_raw, by = "NAME")

```

```

class(ohio_joined_race)

```

```

## [1] "sf"           "data.frame"

```

```

ohio_joined_race <- ohio_joined_race %>%
  mutate(`2022_BFA_Percap_Income` = as.numeric(`2022_BFA_Percap_Income`))

```

```

ggplot(ohio_joined_race) +
  geom_sf(aes(fill = `2022_BFA_Percap_Income`), color = NA) + scale_fill_gradient2(
    low = "white",
    high = "forestgreen",
    midpoint = min(ohio_joined_race$`2022_BFA_Percap_Income`, na.rm = TRUE),
    name = "2022 BFA Income per Capita by County (pp)"

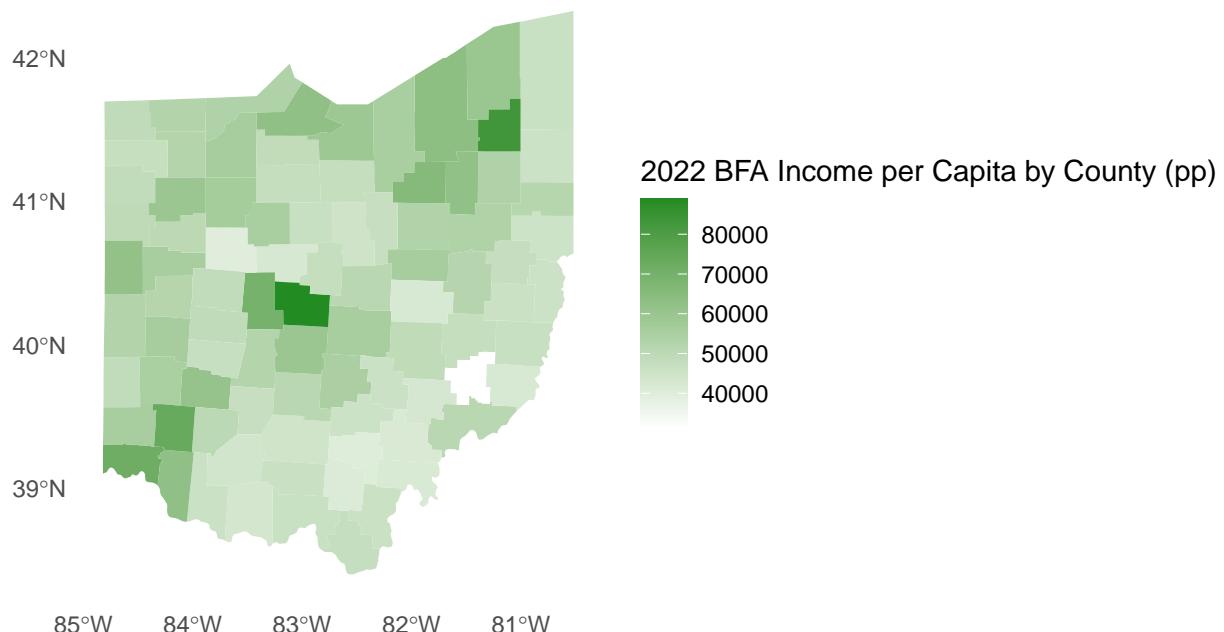
```

```

)+> labs(
  title = "Ohio Incomes (2023)" +
  theme_minimal() + theme(
    panel.grid = element_blank(),
    legend.position = "right"
  )

```

Ohio Incomes (2023)



```

#Our first mode: Regressing the margin difference between abortion and weed on some of our covariates:

diff_model <- lm(diff_margin ~ voter_turnout + pct_female + pct_white + `2022_BFA_Percap_Income`, data =
  summary(diff_model)

## 
## Call:
## lm(formula = diff_margin ~ voter_turnout + pct_female + pct_white +
##     '2022_BFA_Percap_Income', data = ohio_joined_race)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max 
## -23.7003  -5.2420   0.6845  5.5716  23.3134 
## 
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)    
## (Intercept) 2.463e+01  4.041e+01   0.610   0.5438
## 
```

```
## voter_turnout      7.891e-01  3.105e-01   2.541   0.0129 *
## pct_female         1.202e-01  7.070e-01   0.170   0.8654
## pct_white          -9.025e-01  1.429e-01  -6.317  1.26e-08 ***
## '2022_BFA_Percap_Income' -1.624e-05  1.701e-04  -0.096   0.9241
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.764 on 83 degrees of freedom
## Multiple R-squared:  0.4468, Adjusted R-squared:  0.4202
## F-statistic: 16.76 on 4 and 83 DF,  p-value: 4.163e-10
```