Difference in Gender Inequality Index by Country

```
library(countrycode)
library(usethis)
library(rmarkdown)
library(knitr)
library(tinytex)
library(here)
```

```
## here() starts at /Users/clarerickard/Library/CloudStorage/GoogleDrive-clareluikart@gmail.com/My Drive
```

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.1
## v purrr     1.0.2
```

```
## -- 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(broom)
library(sf)
```

```
## Linking to GEOS 3.13.0, GDAL 3.9.3, PROJ 9.5.0; sf_use_s2() is TRUE
```

```
library(fs)
library(janitor)
```

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

```
library(tmap)
```

```
## Registered S3 methods overwritten by 'stars':
##   method             from
##   st_bbox.SpatRaster sf
##   st_crs.SpatRaster  sf
## Breaking News: tmap 3.x is retiring. Please test v4, e.g. with
## remotes::install_github('r-tmap/tmap')
```

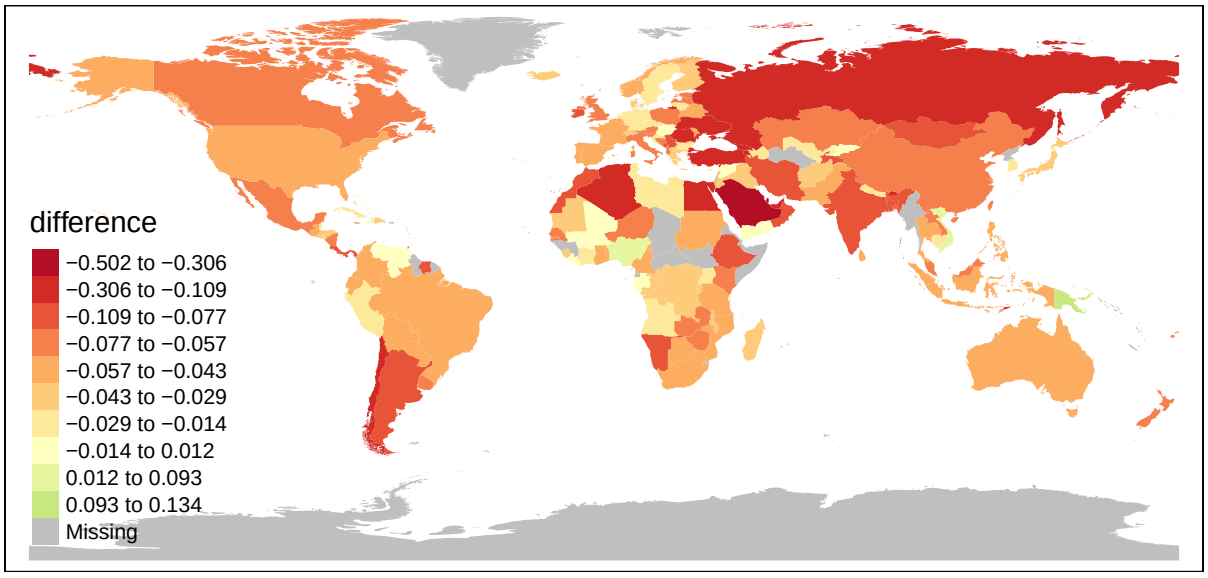
```
library(tmaptools)
library(ggplot2)
library(dplyr)
```

```
#read in world countries simple features
world_countries <- read_sf(here("World_Countries_(Generalized)_9029012925078512962.geojson"))

# read in inequality data
inequality <- read_csv(here("HDR23-24_Composite_indices_complete_time_series.csv"))
```

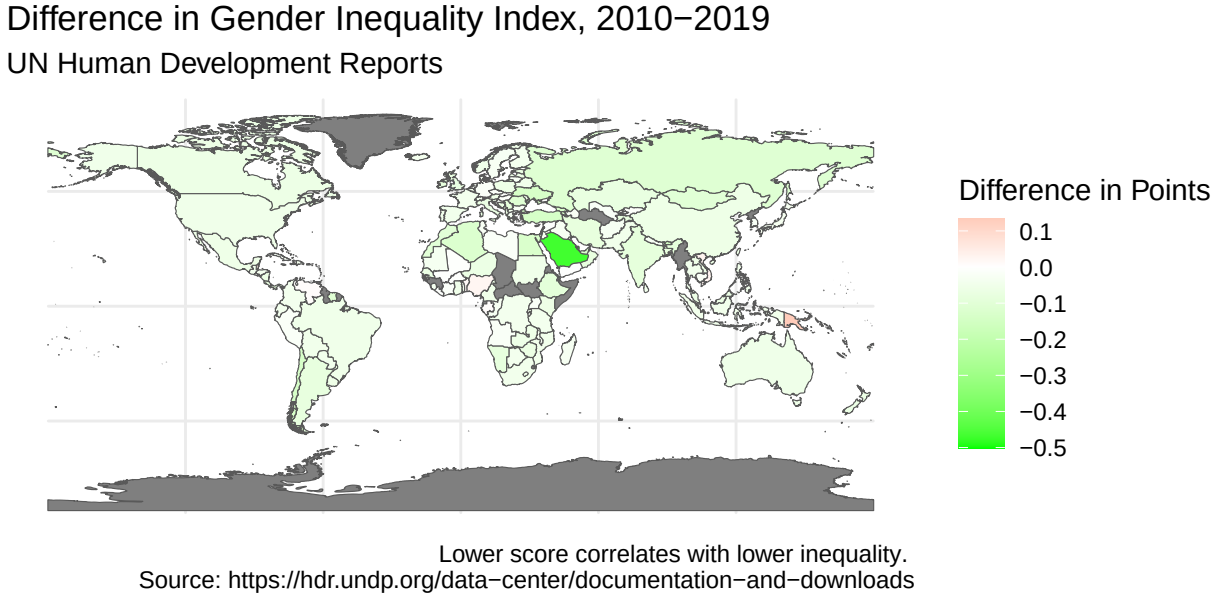
```
## Rows: 206 Columns: 1076
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr    (4): iso3, country, hdicode, region
## dbl (1072): hdi_rank_2022, hdi_1990, hdi_1991, hdi_1992, hdi_1993, hdi_1994,...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# create data frame of just what we need
inequality_2010_2019 <- select(inequality, country, iso3, gii_2019, gii_2010)

# create column for difference in gii
inequality_2010_2019 <- inequality_2010_2019 %>%
  clean_names(.,) %>%
  rename(., iso = iso3) %>%
  select(iso, gii_2019, gii_2010) %>%
  mutate(., difference = gii_2019 - gii_2010)

# clean names world_countries
world_countries <- clean_names(world_countries)

# change country code in world countries to iso3
world_countries$iso <- countrycode(world_countries$iso, "iso2c", "iso3c")

# join data
world_countries_difference_gii <- left_join(world_countries, inequality_2010_2019, by="iso")

# plot data
qtm(world_countries_difference_gii,
    fill="difference",
    fill.n=10,
    fill.style="kmeans",
    midpoint= 0,
    borders = NULL)
```

```
## Variable(s) "difference" contains positive and negative values, so midpoint is set to 0. Set midpoint
```




```
ggplot(world_countries_difference_gii, aes(fill = difference)) +
  geom_sf() +
  scale_fill_gradient2("Difference in Points",   low = "green",
  mid = "white",
  high = "red",
  midpoint = 0,) +
  theme_minimal() +
  labs(
    title = "Difference in Gender Inequality Index, 2010-2019",
    subtitle = "UN Human Development Reports",
    caption = "Lower score correlates with lower inequality. \nSource: https://hdr.undp.org/data-center/
  )
```



These show the change in gender equality by country, as measured by Gender Inequality Index.

```
positive_difference <- dplyr::filter(world_countries_difference_gii, difference>0)
positive_difference
```

```
## Simple feature collection with 10 features and 8 fields
## Geometry type: MULTIPOLYGON
## Dimension:     XY
## Bounding box:  xmin: -89.2164 ymin: -11.6425 xmax: 155.9668 ymax: 35.68861
## Geodetic CRS:  WGS 84
## # A tibble: 10 x 9
##      fid country     iso   countryaff aff_iso                 geometry gii_2019
##  * <int> <chr>       <chr> <chr>      <chr>          <MULTIPOLYGON [°]>    <dbl>
##  1    23 Belize      BLZ   Belize     BZ      (((-88.2995 18.48293, -8~    0.46
##  2    24 Benin       BEN   Benin      BJ      (((2.732954 7.658209, 2.~    0.652
##  3    61 Cyprus      CYP   Cyprus     CY      (((33.27229 34.70955, 33~    0.235
##  4    83 Gabon       GAB   Gabon      GA      (((11.54429 -2.816564, 1~    0.527
##  5   100 Haiti       HTI   Haiti      HT      (((-73.11111 19.62694, -~    0.624
##  6   121 Kuwait      KWT   Kuwait     KW      (((47.46339 28.98446, 47~    0.225
##  7   162 Nigeria     NGA   Nigeria    NG      (((11.79944 7.296664, 11~    0.694
##  8   174 Papua New ~ PNG   Papua New~ PG      (((146.3791 -8.584709, 1~    0.816
##  9   246 Venezuela   VEN   Venezuela~ VE      (((-66.31029 10.62602, -~    0.497
## 10   247 Vietnam     VNM   Viet Nam   VN      (((107.079 17.10804, 107~    0.391
## # i 2 more variables: gii_2010 <dbl>, difference <dbl>
```

Only 10 countries had higher inequality in 2019 than 2010.

```r
negative_difference <- dplyr::filter(world_countries_difference_gii, difference<=0 & !is.na(difference))
  arrange(., difference)
top_negative_difference <- head(negative_difference)$country
```

The following countries, in order, had the largest improvements in inequality. `Qatar, Saudi Arabia, Bhutan, Turkiye, Ukraine, Chile`