Treatment Mapping

Load Libraries

```
library(tidyverse)
library(here)
library(arrow)
library(sf)
library(urbnmapr)
library(naniar)
library(janitor)
library(ggiraph)
options(scipen = 99)
```

Today's Data

The data we will analyze today is SAMHSA's TEDS-D Dataset. The metadata can be found here

Reading in feather files with `arrow`

```
#teds_d <- read_parquet(here("data/tedsD_2012_2020.parquet"))
```

Clean names

```
# teds_d <- teds_d %>%
#   clean_names()
```

Selecting for relevant columns for today's class

- State
- Frequency of use at discharge
- Treatment Service
- Length of Stay
- Reason for Discharge

```
# teds_d_select <- teds_d %>%
#   select(freq1_d, stfips, services_d, los, reason)
```

```
#write_parquet(teds_d_select, here("data/teds_d_lecture.parquet"))
```

```
teds_d_select <- read_parquet(here("data/teds_d_lecture.parquet"))
```

NA Analysis

How does the documentation label missing data?

```
teds_d_select[teds_d_select == "-9"] <- NA
```

```
miss_var_summary(teds_d_select)
```

```
# A tibble: 5 x 3
  variable    n_miss  pct_miss
  <chr>        <int>     <num>
1 freq1_d    7263891 51.8
2 services_d 4715728 33.6
3 reason         140  0.000997
4 los             18  0.000128
5 stfips           0  0
```

Variable Re-coding

Frequency of Use at Discharge

```
teds_d_select$freq1_d <- as.character(teds_d_select$freq1_d)

teds_d_select$freq1_d[teds_d_select$freq1_d == "1"] <- "no use"

teds_d_select$freq1_d[teds_d_select$freq1_d == "2"] <- "some use"

teds_d_select$freq1_d[teds_d_select$freq1_d == "3"] <- "daily use"

teds_d_select$freq1_d[is.na(teds_d_select$freq1_d)] <- "unknown"
```

Services

```
teds_d_select$services_d <- as.character(teds_d_select$services_d)


teds_d_select$services_d[teds_d_select$services_d == "1"] <- "Detox, 24-hour, hospital inpati

teds_d_select$services_d[teds_d_select$services_d == "2"] <- "Detox, 24-hour, free-standing i

teds_d_select$services_d[teds_d_select$services_d == "3"] <- "Rehab/residential, hospital (no

teds_d_select$services_d[teds_d_select$services_d == "4"] <- "Rehab/residential, short term

teds_d_select$services_d[teds_d_select$services_d == "5"] <- "Rehab/residential, long term (n

teds_d_select$services_d[teds_d_select$services_d == "6"] <- "Ambulatory, intensive outpatien

teds_d_select$services_d[teds_d_select$services_d == "7"] <- "Ambulatory, non-intensive outpa

teds_d_select$services_d[teds_d_select$services_d == "8"] <- "Ambulatory, detoxification"

teds_d_select$services_d[is.na(teds_d_select$services_d)] <- "unknown"
```

Reason

```
teds_d_select$reason <- as.character(teds_d_select$reason)

teds_d_select$reason[teds_d_select$reason == "1"] <- "completed"

teds_d_select$reason[teds_d_select$reason == "2"] <- "dropped out"
```

```
teds_d_select$reason[teds_d_select$reason == "3"] <- "terminated by facility"

teds_d_select$reason[teds_d_select$reason == "4"] <- "transfered"

teds_d_select$reason[teds_d_select$reason == "5"] <- "incarcerated"

teds_d_select$reason[teds_d_select$reason == "6"] <- "death"

teds_d_select$reason[teds_d_select$reason == "7"] <- "other"
```

Mapping

We want to map the percentage of complete treatments by state

First, let's calculate the percentage of completed treatments by state

```
percent_completed_by_state <- teds_d_select %>%
  group_by(stfips) %>%
  summarize(
    total_cases = n(),
    completed_cases = sum(reason == "completed", na.rm = TRUE)
  ) %>%
  mutate(percentage_completed = (completed_cases / total_cases) * 100)
```

Next, let's bring in some mapping data

```
states_map <- get_urbn_map(map = "states", sf = TRUE)
```

What do we notice that's different between the teds-d stfips column and the states_map stfips column?

```
percent_completed_by_state$stfips_recode <- sprintf('%02d', percent_completed_by_state$stfips
```

```
colnames(percent_completed_by_state)[colnames(percent_completed_by_state) == "stfips_recode"]
```

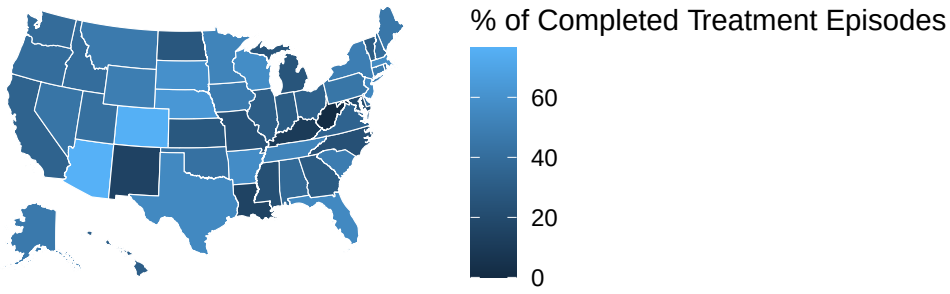
Joining data

```
percent_completed_by_state_map <- full_join(percent_completed_by_state,
                          states_map,
                          by = "state_fips")
```

```
old-style crs object detected; please recreate object with a recent sf::st_crs()
```

Plotting Map

```
ggplot(percent_completed_by_state_map) +
  geom_sf(percent_completed_by_state_map,
          mapping = aes(geometry = geometry, fill = percentage_completed),
          color = "#ffffff", size = 0.25) +
  labs(fill = "% of Completed Treatment Episodes") +
   coord_sf(datum = NA)+
   theme_minimal()
```



Making interactive with `ggiprah`

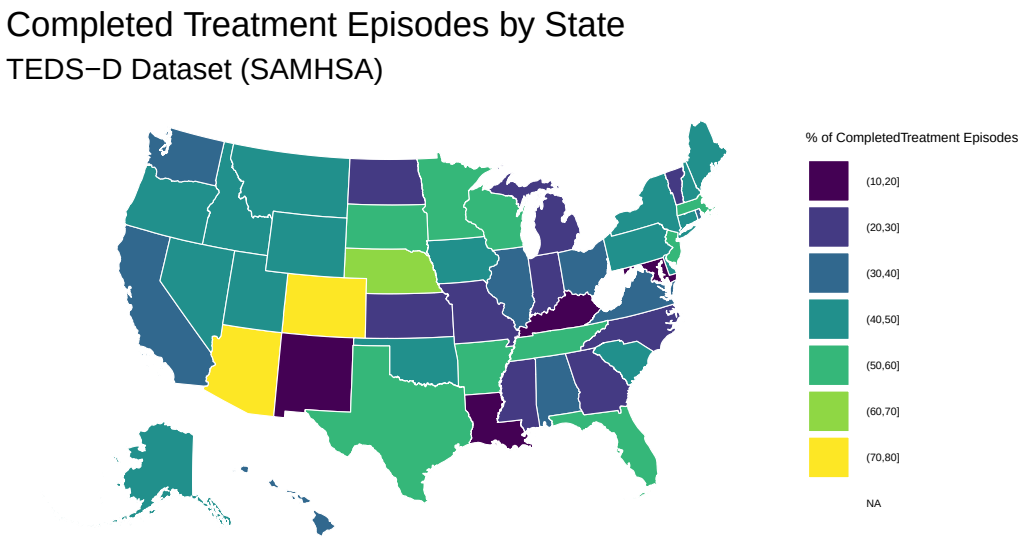
```
interactive_completed_treatment_map <- ggplot(percent_completed_by_state_map) +
  geom_sf_interactive(
    mapping = aes(
      geometry = geometry,
      fill = percentage_completed,
      tooltip = paste("State FIPS:", stfips, "<br>Completed:", percentage_completed, "%", "<
    ),
    color = "#ffffff",
    size = 0.25
```

```
  ) +
  labs(fill = "% of Completed Treatment Episodes") +
  coord_sf(datum = NA) +
  theme_minimal()

# Use `girafe` to render the interactive plot
#girafe(ggobj = interactive_completed_treatment_map)
```

Round & Add state name to tooltip

Adding color bins

```
percent_completed_by_state_map <- percent_completed_by_state_map %>%
  mutate(percentage_bin = cut(percentage_completed, breaks=c(0, 10,20,30,40,50, 60, 70, 80)))

ggplot(percent_completed_by_state_map) +
  geom_sf(mapping = aes(geometry = geometry, fill = percentage_bin),
          color = "#ffffff", size = 0.25) +
  labs(fill = "% of CompletedTreatment Episodes",
      title = "Completed Treatment Episodes by State",
      subtitle = "TEDS-D Dataset (SAMHSA)") +
  scale_fill_viridis_d(option = "D") +
  coord_sf(datum = NA) +
  theme_minimal() +
  theme(
    panel.background = element_blank(),
    axis.ticks = element_blank(),
    axis.text.x = element_blank(),
    axis.text.y = element_blank(),
    legend.text = element_text(size = 4),
    legend.title = element_text(size = 5),
    strip.text = element_text(size = 4)
  )
```




```
#Use 'girafe' to render the interactive plot
#girafe(ggobj = interactive_completed_treatment_map)
```

Assignment

1. Make an interactive map with `ggiraph` showing the percentage of completed treatments that end with no use at discharge
2. How does the percentage of treatments being completed & percentage of treatments ending with no use vary by the service and length of stay. Create at least 3 visualizations to try and answer this question