Hello, Quarto

R Package jmpwashdata

For this analysis we will use the **jmpwashdata** R Package by Dickinson (2021). The package contains all data compiled by the WHO/UNICEF Joint Monitoring Programme (JMP).

```
library(jmpwashdata)
library(tidyverse)
library(gt)
library(ggthemes)
```

World Bank income groups

We will also use the World Bank income classification for 218 countries. This data was downloaded and stored as an XLSX file using an R script in `src`.

```
income_groups_df <- read_rds("data/wb-income-groups.rds")
```

```
income_groups_df %>%
  count(income_group) %>%
  gt()
```

income_group	n
High income	81
Upper middle income	54
Lower middle income	54
Low income	28
NA	1

Basic Sanitation & GDP

Data for the most recent year, basic sanitation in urban areas, calculate urban population, and join income groups.

```
# Perform data manipulation operations on the jmp_wld_sanitation data frame
jmp_wld_sanitation_gdp_income <- jmp_wld_sanitation |>
  # Filter the rows where the year column is equal to the maximum year value
  filter(year == max(year)) |>
  # Select the columns from name to prop_u and the san_bas_u column
  select(name:prop_u, san_bas_u) |>
  # Create a new column named pop_u
  mutate(pop_u = pop_n * 1000 * prop_u / 100) |>
  # Drop the pop_n and prop_u columns
  select(-pop_n, -prop_u) |>
  # Perform a left join with the income_groups_df data frame
  left_join(income_groups_df) |>
  # Drop the rows that have missing values in the san_bas_u & income_group cols
  drop_na(san_bas_u, income_group)
```

```
Joining with `by = join_by(iso3)`
```

Basic Sanitation Uganda

```
# Create a vector of color codes
color_scale_sanitation <- c("#8cce8f", "#fff381", "#ffda5a", "#ffbc02")

# Create a vector of sanitation indicators
fct_sanitation <- c("basic", "limited", "unimproved", "open defecation")

# Perform data manipulation operations on the jmp_wld_sanitation data frame
jmp_uga_sanitation <- jmp_wld_sanitation |>
  # Filter the rows where the iso3 column is equal to "UGA" and the year column
  # is equal to 2000 or 2020
  filter(iso3 == "UGA") |>
  filter(year == 2000 | year == 2020) |>
  # Select the name, iso3, year, and columns from san_bas_n to san_od_n
  select(name, iso3, year, san_bas_n:san_od_n) |>
  # Reshape the data frame from wide to long format
```

```
  pivot_longer(cols = san_bas_n:san_od_n,
               names_to = "indicator",
               values_to = "percent") |>
  # Rename the indicator column based on the values of the san_bas_n to san_od_n
  # columns
  mutate(indicator = case_when(
    indicator == "san_bas_n" ~ "basic",
    indicator == "san_lim_n" ~ "limited",
    indicator == "san_unimp_n" ~ "unimproved",
    indicator == "san_od_n" ~ "open defecation"
  )) |>
  # Convert the indicator column to a factor with levels specified by the
  # fct_sanitation vector
  mutate(indicator = factor(indicator, level = fct_sanitation))
```

Income

Figure 1 is a box- and jitterplot of countries with percentages of populations with access to basic sanitation in 2020 grouped by income classifications.

```
ggplot(data = jmp_wld_sanitation_gdp_income,
       mapping = aes(x = income_group,
                     y = san_bas_u,
                     color = income_group)) +
  geom_boxplot(outlier.shape = NA) +
  geom_jitter(width = 0.1, size = 4, alpha = 0.5) +
  labs(x = NULL, y = "percent") +
  scale_color_colorblind() +
  theme_minimal(base_size = 16) +
  theme(legend.position = "none")
```

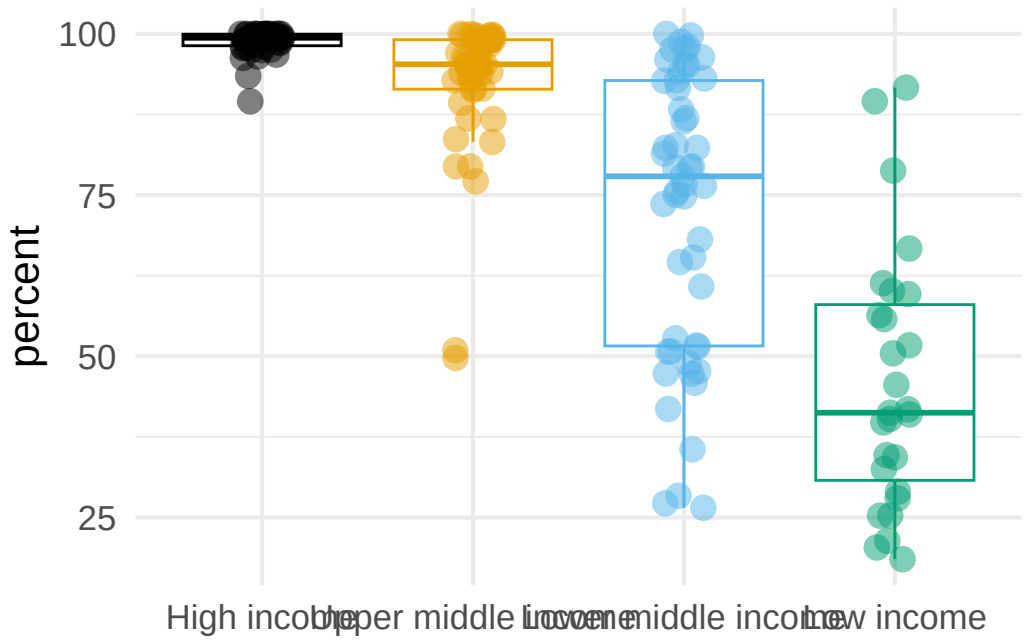

Figure 1: Access to santation (urban) in 2020 by income classifications.

Regions

Table 2 shows urban sanitation indicators for global regions in 2020.

```
jmp_reg_sanitation |>
  filter(year == max(year)) |>
  filter(!str_detect(region, "income")) |>
  select(region, san_bas_u:san_od_u) |>
  drop_na() |>
  gt(rowname_col = "region") |>
  cols_label(
    san_bas_u = md("**basic**"),
    san_lim_u = md("**limited**"),
    san_unimp_u = md("**unimproved**"),
    san_od_u = md("**open defecation**")
  ) |>
  fmt_percent(columns = san_bas_u:san_od_u,
              decimals = 0,
              scale_values = FALSE)
```

Table 2: Urban sanitation indicators for global regions.

	basic	limited	unimproved	open defecation
Central and Southern Asia	79%	17%	3%	1%
Eastern and South-Eastern Asia	95%	3%	2%	1%
Europe and Northern America	99%	1%	1%	0%
Latin America and the Caribbean	93%	4%	3%	0%
Northern Africa and Western Asia	95%	2%	2%	0%
Oceania	71%	9%	17%	3%
Sub-Saharan Africa	46%	32%	17%	5%
Fragile or Extremely Fragile	62%	22%	13%	3%
Least Developed Countries	48%	29%	20%	4%
Landlocked Developing Countries	62%	22%	14%	2%
Small Island Developing States	83%	10%	5%	2%
World	88%	8%	3%	1%

Uganda

Figure 2 shows the sanitation ladder for Uganda.

```
ggplot(data = jmp_uga_sanitation,
       mapping = aes(x = year,
                     y = percent,
                     fill = indicator)) +
  geom_area() +
  labs(title = "Uganda: sanitation ladder (national)",
       x = NULL, y = "percent", fill = "indicators") +
  scale_fill_manual(values = color_scale_sanitation) +
  scale_x_continuous(breaks = c(2000, 2020)) +
  theme_minimal(base_size = 16) +
  theme(panel.grid.minor = element_blank())
```

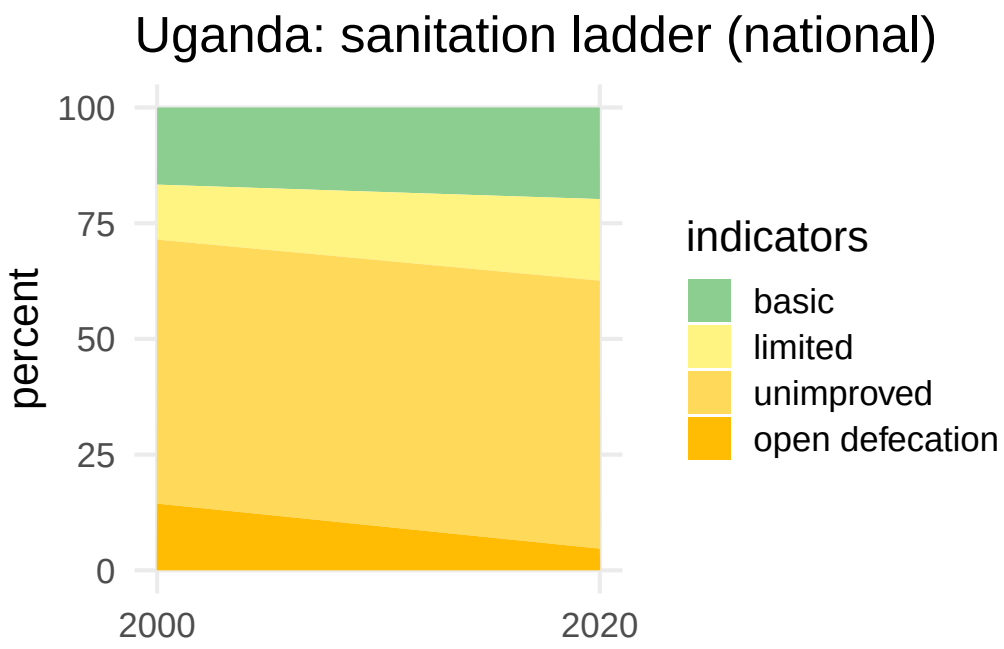

Figure 2: Sanitation indicators for Uganda on a national level.

They told you so

Kalina and Tilley (2020) did.

Dickinson, Nicolas. 2021. "Jmpwashdata: WHO/UNICEF Joint Monitoring Programme Water and Sanitation Data."

Kalina, Marc, and Elizabeth Tilley. 2020. ""This Is Our Next Problem": Cleaning up from the COVID-19 Response." *Waste Management* 108 (May): 202–5. https://doi.org/10.1016/j.wasman.2020.05.006.