```r
library(tidyverse)

library(readxl)

library(purrr)

library(dplyr)

#1

GDP=read_excel("GDP.xlsx")

Fertility=read_excel("fertility.xlsx")

Life_Expectancy=read_excel("life_expectancy.xlsx")

Children_Mortality=read_excel("children_mortality.xlsx")

Population=read_excel("population.xlsx")


#2
# Function to extract the column name with country names

my_func <- function(df, common_name = "Country") {

  # Assuming the column with country names is the first column

  country_column <- names(df)[1]


  # Assign a common name to the country column

  df <- rename(df, !!common_name := !!country_column)


  return(country_column)

}


my_func(GDP)

my_func(Fertility)

my_func(Life_Expectancy)

my_func(Children_Mortality)

my_func(Population)
```

```
#3

tidy_children_mortality <- gather(Children_Mortality, key = "Year", value = "ChildrenMortality", -
Country)

tidy_life_expectancy <- gather(Life_Expectancy, key = "Year", value = "LifeExpectancy", -Country)

tidy_fertility <- gather(Fertility, key = "Year", value = "Fertility", -Country)

tidy_population <- gather(Population, key = "Year", value = "Population", -Country)

tidy_GDP <- gather(GDP, key = "Year", value = "GDP", -Country)


Dataset <- full_join(tidy_children_mortality, tidy_life_expectancy, by = c("Country", "Year")) %>%
  full_join(tidy_fertility, by = c("Country", "Year")) %>%
  full_join(tidy_population, by = c("Country", "Year")) %>%
  full_join(tidy_GDP, by = c("Country", "Year"))


Dataset$Year <- as.numeric(Dataset$Year)


#4

Continent <- read_tsv("continent-info.tsv", col_names = c("Country","Continent"))

Continent <- distinct(Continent, Country, .keep_all = TRUE)


# Left join final_tidy_dataset with continent_info based on the "Country" column

Dataset <- left_join(Dataset, Continent, by = "Country")


#5

Country_pairs <- list(
  c("Sri Lanka", "Turkey"),
  c("Poland", "South Korea"),
  c("Malaysia", "Russia"),
  c("Pakistan", "Vietnam"),
  c("Thailand", "South Africa")
```

```
)
```

Child_Mortality_2015 <- Dataset %>%

 filter(Year == 2015 & (Country %in% unlist(Country_pairs)))

Pairs_Dataset = Child_Mortality_2015 %>%

  select(Country, ChildrenMortality) %>%

  spread(Country, ChildrenMortality)

Pairs_Dataset %>%

  select("Sri Lanka", "Turkey", "Poland", "South Korea", "Malaysia", "Russia", "Pakistan", "Vietnam", "Thailand", "South Africa")

```
# A tibble: 1 × 10
  `Sri Lanka` Turkey Poland `South Korea` Malaysia Russia Pakistan Vietnam Th
ailand
        <dbl>  <dbl>  <dbl>         <dbl>    <dbl>  <dbl>    <dbl>   <dbl>
<dbl>
1         8.7   13.5    5.2           3.5      8.2    9.6     81.1    21.7
12.3
# i 1 more variable: `South Africa` <dbl>
```

#6

Plot_Data <- Dataset %>%

  filter(Year == 1962) %>%

  select(Continent, LifeExpectancy, Fertility, Population)

ggplot(Plot_Data, aes(x = Fertility, y = LifeExpectancy, color = Continent, size = Population)) +

  geom_point() +

  scale_size_continuous(range = c(2, 10)) + # Adjust the range of point sizes

  labs(title = "Life Expectancy vs Fertility (1962)",

     x = "Fertility",

     y = "Life Expectancy",

     color = "Continent",

```
        size = "Population") +

 theme_minimal()
```

Life Expectancy vs Fertility (1962)
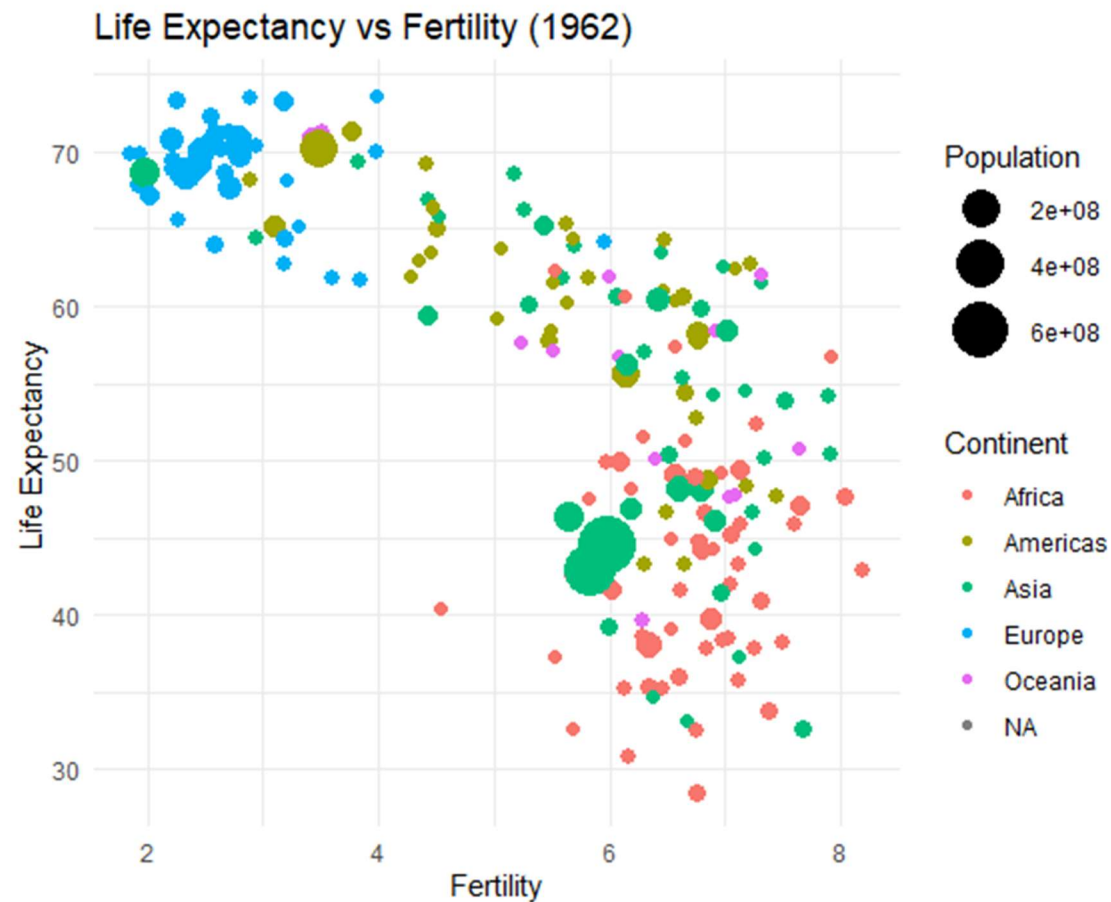
#7

```
OECD <- c("Australia","Austria","Belgium","Canada","Chile",
        "Country","Czech Republic","Denmark","Estonia",
        "Finland","France","Germany","Greece","Hungary",
        "Iceland","Ireland","Israel","Italy","Japan",
        "Korea","Luxembourg","Mexico","Netherlands",
        "New Zealand","Norway","Poland","Portugal",
        "Slovak Republic","Slovenia","Spain","Sweden",
        "Switzerland","Turkey","United Kingdom","United States")
```

```r
OPEC <- c("Algeria", "Angola", "Ecuador", "Iran", "Iraq",

      "Kuwait", "Libya","Nigeria", "Qatar", "Saudi Arabia",

      "United Arab Emirates", "Venezuela")


Dataset <- Dataset %>%
  mutate(IsOECD = Country %in% OECD,
      IsOPEC = Country %in% OPEC)


#8
Dataset <- Dataset %>%
  mutate(Organization = case_when(
    Country %in% OECD ~ "OECD",
    Country %in% OPEC ~ "OPEC",
    TRUE ~ Continent
  ))


ggplot(Dataset, aes(x = Fertility, y = LifeExpectancy,
                    color = Organization, size = Population)) +
  geom_point() +
  scale_size_continuous(range = c(2, 10)) +
  scale_color_manual(name = "Organization",
          values = c("OECD" = "red", "OPEC" = "blue", "Asia" = "green",
                  "Africa" = "orange", "Americas" = "purple", "Europe" = "brown")) +
  labs(title = "Life Expectancy vs Fertility",
      x = "Fertility",
      y = "Life Expectancy",
      color = "Organization",
      size = "Population") +
  theme_minimal()
```

Life Expectancy vs Fertility
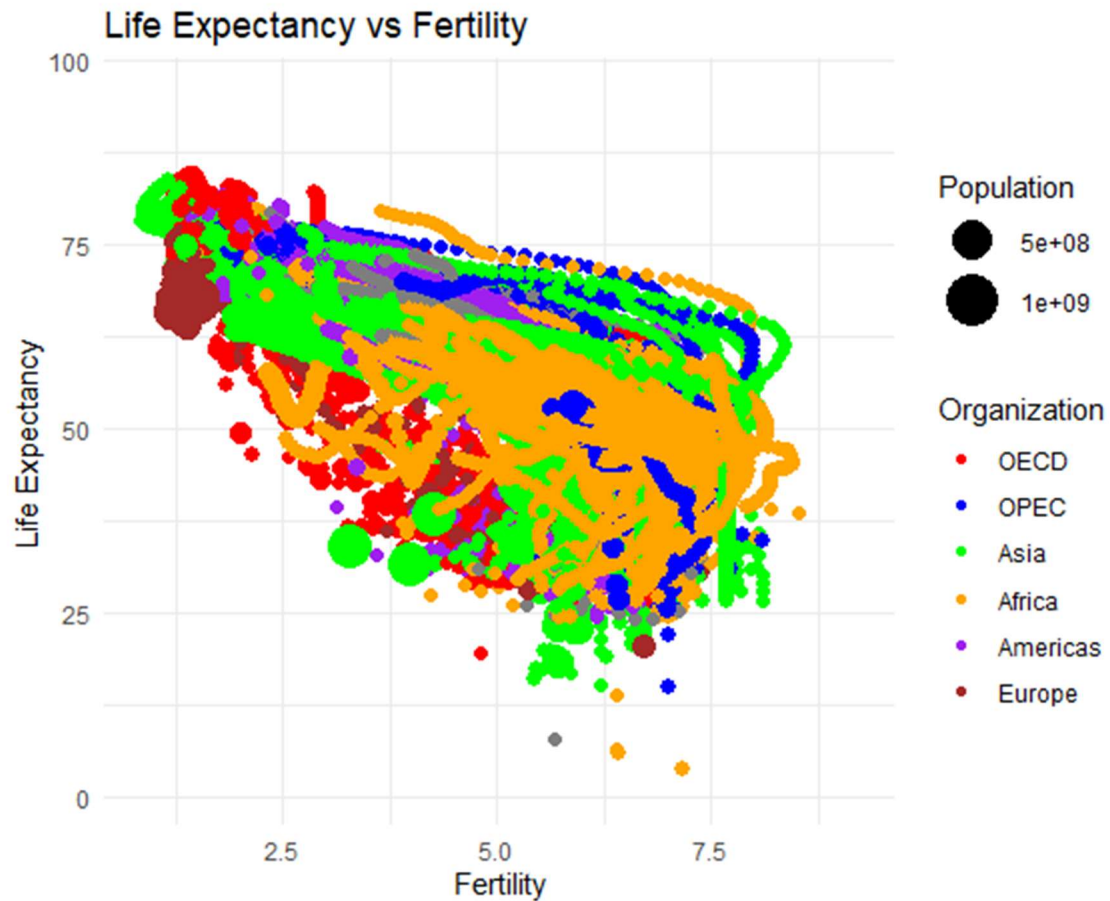
#9

```
generate_plot <- function(year) {
  subset_data <- Dataset %>%
    filter(Year == year)

  subset_data <- subset_data %>%
    mutate(Organization = case_when(
      Country %in% OECD ~ "OECD",
      Country %in% OPEC ~ "OPEC",
      TRUE ~ Continent
    ))
  plot <- ggplot(subset_data, aes(x = Fertility, y = LifeExpectancy,
```

```
                    color = Organization, size = Population)) +

    geom_point() +

    scale_size_continuous(range = c(2, 10)) +

    scale_color_manual(name = "Organization",

              values = c("OECD" = "red", "OPEC" = "blue", "Asia" = "green",

                    "Africa" = "orange", "Americas" = "purple", "Europe" = "brown")) +

    labs(title = paste("Life Expectancy vs Fertility (Year", year, ")"),

       x = "Fertility",

       y = "Life Expectancy",

       color = "Organization",

       size = "Population") +

    theme_minimal()


  return(plot)

}



gridExtra::grid.arrange(

  generate_plot("1800.0"),

  generate_plot("1870.0"),

  generate_plot("1940.0"),

  generate_plot("2015.0"),

  ncol = 2

)
```
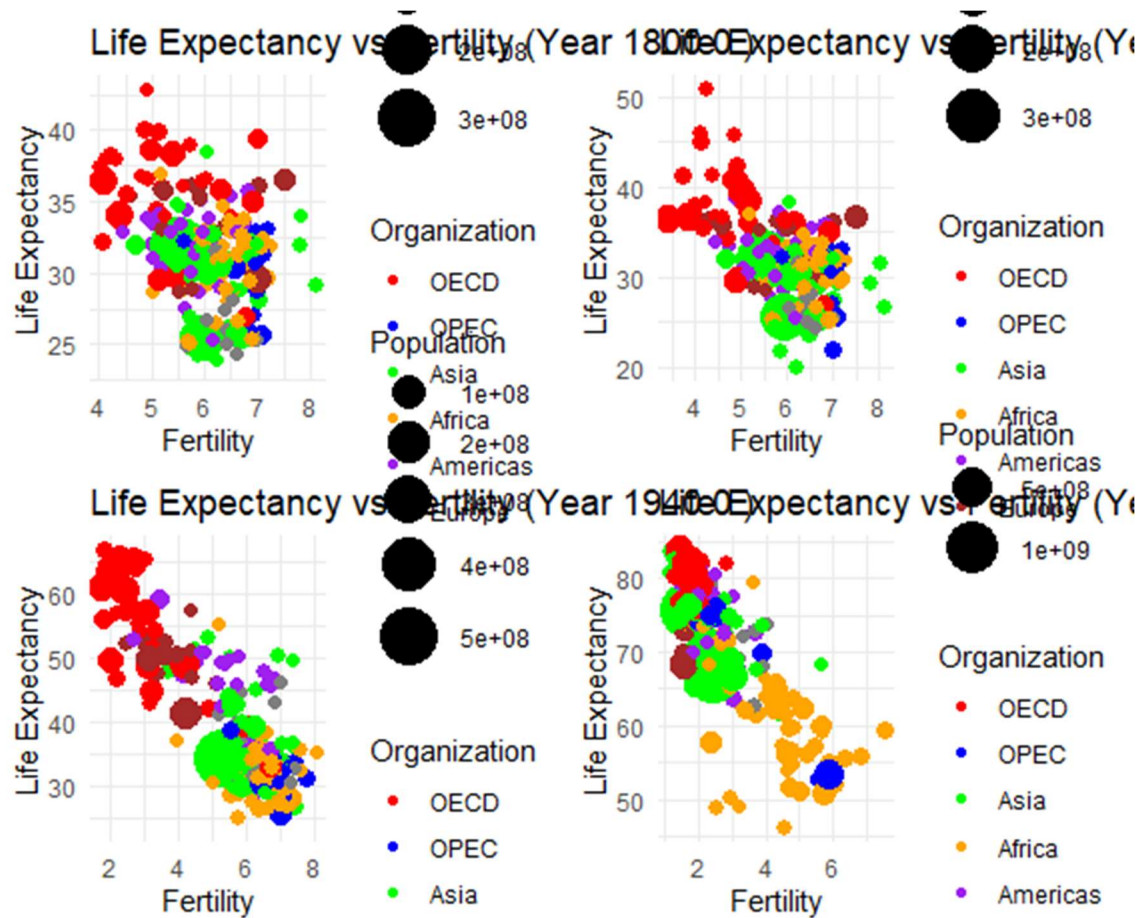
Life Expectancy vs Fertility (Year 1800)

Life Expectancy vs Fertility (Year ...)

Life Expectancy vs Fertility (Year 1940)

Life Expectancy vs Fertility (Year ...)

#10

```
France_Tunisa <- Dataset %>%
  filter(Country %in% c("France", "Tunisia"), Year >= (2022 - 60))

Fertility_Plot <- ggplot(France_Tunisa, aes(x = Year, y = Fertility, color = Country)) +
  geom_line() +
  labs(title = "Fertility Over Time (France vs Tunisia)",
       x = "Year",
       y = "Fertility",
       color = "Country") +
```
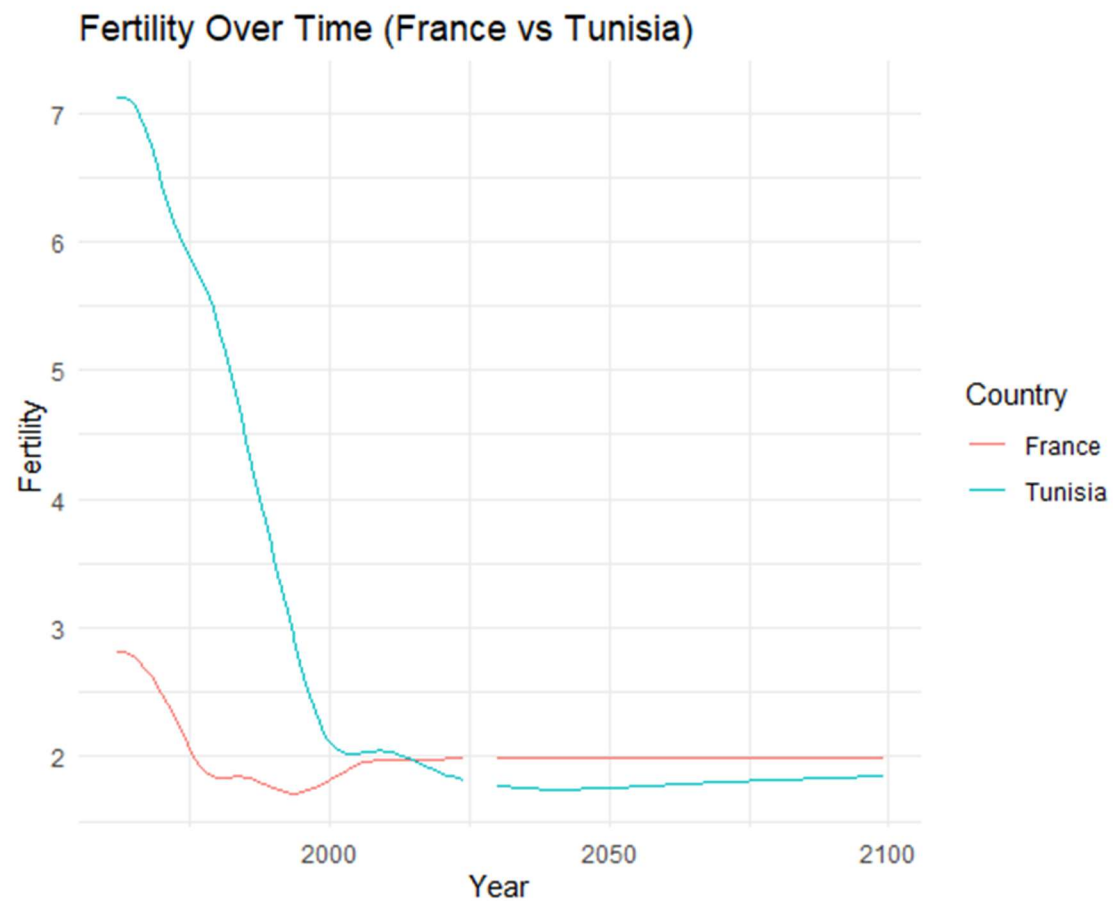
theme_minimal()

Fertility_Plot

Life_Expectancy_Plot <- ggplot(France_Tunisa, aes(x = Year, y = LifeExpectancy, color = Country)) +

 geom_line() +

 labs(title = "Life Expectancy Over Time (France vs Tunisia)",

    x = "Year",

    y = "Life Expectancy",

    color = "Country") +

 theme_minimal()

Life_Expectancy_Plot

Life Expectancy Over Time (France vs Tunisia)