

STATS 205: Final Project Write-Up

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1. Background of the data and why it is interesting or important

The data we are using is the data from WHO suicide statistics from Kaggle. This gives population-based statistics on suicide rate...

2. Explanation of the method studied and its properties

3. Data analysis or simulation study

We will use the crude rate of suicide per 100,000 people.

This analysis provides information on age-standardized rates...

```
who_suicide_statistics_df <- read.csv("who_suicide_statistics.csv")
head(who_suicide_statistics_df)
```

```
##   country year    sex      age suicides_no population
## 1 Albania 1985 female 15-24 years         NA      277900
## 2 Albania 1985 female 25-34 years         NA      246800
## 3 Albania 1985 female 35-54 years         NA      267500
## 4 Albania 1985 female  5-14 years         NA      298300
## 5 Albania 1985 female 55-74 years         NA      138700
## 6 Albania 1985 female  75+ years         NA       34200
```

```
colnames(who_suicide_statistics_df)
```

```
## [1] "country"    "year"       "sex"        "age"        "suicides_no"
## [6] "population"
```

Filter and save countries with missing suicide rate.

```
library(tidyverse)
```

```
## Registered S3 methods overwritten by 'ggplot2':
```

```
##   method      from
## [.quosures   rlang
## c.quosures   rlang
## print.quosures rlang
```

```
## -- Attaching packages ----- tidyverse 1.2.1 --
```

```
## v ggplot2 3.1.1    v purrr   0.3.2
## v tibble  2.1.1    v dplyr   0.8.1
## v tidyr   0.8.3    v stringr 1.4.0
## v readr   1.3.1    v forcats 0.4.0
```

```
## -- Conflicts ----- tidyverse_conflicts() --
```

```
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
filtered_suicide_df <- drop_na(who_suicide_statistics_df, "suicides_no")
head(filtered_suicide_df)
```

```
##   country year    sex      age suicides_no population
## 25 Albania 1987 female 15-24 years         14    289700
## 26 Albania 1987 female 25-34 years          4    257200
## 27 Albania 1987 female 35-54 years          6    278800
## 28 Albania 1987 female  5-14 years          0    311000
## 29 Albania 1987 female 55-74 years          0    144600
## 30 Albania 1987 female  75+ years          1     35600
```

After filtering countries with missing suicide rate, take a random sample of 100 countries and make sure each continent has approximately equal countries.

Filter countries by continent:

```
library(countrycode)
filtered_suicide_df$continent <- countrycode(sourcevar = filtered_suicide_df[, "country"],
                                             origin = "country.name",
                                             destination = "continent")
```

```
## Warning in countrycode(sourcevar = filtered_suicide_df[, "country"], origin = "country.name", : Some
## Warning in countrycode(sourcevar = filtered_suicide_df[, "country"], origin = "country.name", : Some
head(filtered_suicide_df)
```

```
##   country year    sex      age suicides_no population continent
## 25 Albania 1987 female 15-24 years         14    289700    Europe
## 26 Albania 1987 female 25-34 years          4    257200    Europe
## 27 Albania 1987 female 35-54 years          6    278800    Europe
## 28 Albania 1987 female  5-14 years          0    311000    Europe
## 29 Albania 1987 female 55-74 years          0    144600    Europe
## 30 Albania 1987 female  75+ years          1     35600    Europe
```

```
write.csv(filtered_suicide_df, 'filtered_suicide.csv')
```

Let us find out which continents are counted:

```
# Get list of continents
list_of_continents <- unique(filtered_suicide_df$continent); list_of_continents
```

```
## [1] "Europe" "Americas" "Asia" "Oceania" "Africa" NA
```

Therefore,

$$\frac{100 \text{ countries}}{6 \text{ continents}} \approx 16 \text{ to } 17 \text{ countries per continent}$$

we should randomly sample 17 countries from each continent.

Notably, there are countries that are not on any of the listed continents. Let us see which ones those are:

```
not_in_a_continent = filtered_suicide_df[is.na(filtered_suicide_df$continent),]
write.csv(not_in_a_continent, 'not_in_a_continent.csv')
head(not_in_a_continent)
```

```
##   country year    sex      age suicides_no population continent
## 32317 Rodrigues 2001 female 15-24 years          0      NA      <NA>
## 32318 Rodrigues 2001 female 25-34 years          0      NA      <NA>
```

```
## 32319 Rodrigues 2001 female 35-54 years      0      NA      <NA>
## 32320 Rodrigues 2001 female  5-14 years      0      NA      <NA>
## 32321 Rodrigues 2001 female 55-74 years      0      NA      <NA>
## 32322 Rodrigues 2001 female  75+ years      0      NA      <NA>
```

```
unique(not_in_a_continent$country)
```

```
## [1] Rodrigues          Virgin Islands (USA)
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
```

Let us make the choice not to include these countries in the analysis, since there are only two countries.

```
# Take off `NA` from list of continents
list_of_continents <- list_of_continents[-length(list_of_continents)]
list_of_continents
```

```
## [1] "Europe"    "Americas"  "Asia"      "Oceania"   "Africa"
```

We will now create six dataframes, filtered by list of countries for each continent.

```
# library(rlist)
countries_per_continent <- list()

for (i in seq_along(list_of_continents))
{
  countries_per_continent[[i]] <- filtered_suicide_df[filtered_suicide_df$continent == list_of_continents[i]]
}

length(countries_per_continent)
```

```
## [1] 5
```

```
length(countries_per_continent)
```

```
## [1] 5
```

```
for (i in seq_along(countries_per_continent))
{
  print(head(countries_per_continent[[i]]))
  print(length(countries_per_continent[[i]]))
  cat("\n")
}
```

```
##      country year    sex      age suicides_no population continent
## 25 Albania 1987 female 15-24 years      14      289700    Europe
## 26 Albania 1987 female 25-34 years       4      257200    Europe
## 27 Albania 1987 female 35-54 years       6      278800    Europe
## 28 Albania 1987 female  5-14 years       0      311000    Europe
## 29 Albania 1987 female 55-74 years       0      144600    Europe
## 30 Albania 1987 female  75+ years       1       35600    Europe
## [1] 7
##
##      country year    sex      age suicides_no population continent
## 373 Anguilla 1983 female 15-24 years       0        NA  Americas
## 374 Anguilla 1983 female 25-34 years       0        NA  Americas
## 375 Anguilla 1983 female 35-54 years       0        NA  Americas
## 376 Anguilla 1983 female  5-14 years       0        NA  Americas
## 377 Anguilla 1983 female 55-74 years       0        NA  Americas
## 378 Anguilla 1983 female  75+ years       0        NA  Americas
```

```
## [1] 7
##
##      country year    sex      age suicides_no population continent
## 1501 Armenia 1981 female 15-24 years         5      348000      Asia
## 1502 Armenia 1981 female 25-34 years         6      242200      Asia
## 1503 Armenia 1981 female 35-54 years         6      333500      Asia
## 1504 Armenia 1981 female 5-14 years          0      295200      Asia
## 1505 Armenia 1981 female 55-74 years        10      164300      Asia
## 1506 Armenia 1981 female 75+ years          7       43100      Asia
## [1] 7
##
##      country year    sex      age suicides_no population continent
## 2161 Australia 1979 female 15-24 years        71     1236800     Oceania
## 2162 Australia 1979 female 25-34 years        86     1138500     Oceania
## 2163 Australia 1979 female 35-54 years       171     1572100     Oceania
## 2164 Australia 1979 female 5-14 years         1     1246500     Oceania
## 2165 Australia 1979 female 55-74 years       135     1137800     Oceania
## 2166 Australia 1979 female 75+ years         15       309900     Oceania
## [1] 7
##
##      country year    sex      age suicides_no population continent
## 7669 Cabo Verde 2011 female 15-24 years         1       56039      Africa
## 7670 Cabo Verde 2011 female 25-34 years         0       38528      Africa
## 7671 Cabo Verde 2011 female 35-54 years         2       49078      Africa
## 7672 Cabo Verde 2011 female 5-14 years          0       56558      Africa
## 7673 Cabo Verde 2011 female 55-74 years         2       19887      Africa
## 7674 Cabo Verde 2011 female 75+ years          0        7582      Africa
## [1] 7
```

This text links to very important information about why a `for` loop doesn't print anything.¹

[Link to Pandoc Markdown formatting](#)

Randomly sample 17 countries from each continent:

```
list_of_continents
```

```
## [1] "Europe" "Americas" "Asia" "Oceania" "Africa"
for (i in seq_along(countries_per_continent))
{
  print(list_of_continents[i])
  countries <- unique(countries_per_continent[[i]]$country)
  print(countries)
  print(length(countries))
  cat("\n")
}
```

```
## [1] "Europe"
## [1] Albania          Austria            Belarus
## [4] Belgium          Bosnia and Herzegovina Bulgaria
## [7] Croatia          Czech Republic    Denmark
## [10] Estonia          Finland           France
```

¹Basically, `for` loops are functions themselves. R prints out the result of a command automatically, but functions are not inherently a command, and since `for` loops are functions, nothing will be printed. The solution is to have `print(command())` within the `for` loop to get output for your `for` loop. You will never again spend hours trying to find out why a `for` loop doesn't print anything because you're no longer an R newbie.

| | | | |
|---------|---|------------------------------------|----------------|
| ## [13] | Germany | Greece | Hungary |
| ## [16] | Iceland | Ireland | Italy |
| ## [19] | Latvia | Lithuania | Luxembourg |
| ## [22] | Malta | Monaco | Montenegro |
| ## [25] | Netherlands | Norway | Poland |
| ## [28] | Portugal | Republic of Moldova | <NA> |
| ## [31] | Romania | Russian Federation | San Marino |
| ## [34] | Serbia | Slovakia | Slovenia |
| ## [37] | Spain | Sweden | Switzerland |
| ## [40] | TFYR Macedonia | Ukraine | United Kingdom |
| ## | 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe | | |
| ## | [1] 42 | | |
| ## | | | |
| ## | [1] "Americas" | | |
| ## | [1] Anguilla | Antigua and Barbuda | |
| ## | [3] Argentina | Aruba | |
| ## | [5] Bahamas | Barbados | |
| ## | [7] Belize | Bermuda | |
| ## | [9] Bolivia | Brazil | |
| ## | [11] British Virgin Islands | Canada | |
| ## | [13] Cayman Islands | Chile | |
| ## | [15] Colombia | Costa Rica | |
| ## | [17] Cuba | Dominica | |
| ## | [19] Dominican Republic | Ecuador | |
| ## | [21] El Salvador | Falkland Islands (Malvinas) | |
| ## | [23] French Guiana | Grenada | |
| ## | [25] Guadeloupe | Guatemala | |
| ## | [27] Guyana | Haiti | |
| ## | [29] Honduras | Jamaica | |
| ## | [31] Martinique | Mexico | |
| ## | [33] Montserrat | Netherlands Antilles | |
| ## | [35] Nicaragua | Panama | |
| ## | [37] Paraguay | Peru | |
| ## | [39] Puerto Rico | <NA> | |
| ## | [41] Saint Kitts and Nevis | Saint Lucia | |
| ## | [43] Saint Pierre and Miquelon | Saint Vincent and Grenadines | |
| ## | [45] Suriname | Trinidad and Tobago | |
| ## | [47] Turks and Caicos Islands | United States of America | |
| ## | [49] Uruguay | Venezuela (Bolivarian Republic of) | |
| ## | 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe | | |
| ## | [1] 50 | | |
| ## | | | |
| ## | [1] "Asia" | | |
| ## | [1] Armenia | Azerbaijan | |
| ## | [3] Bahrain | Brunei Darussalam | |
| ## | [5] Cyprus | Georgia | |
| ## | [7] Hong Kong SAR | Iran (Islamic Rep of) | |
| ## | [9] Iraq | Israel | |
| ## | [11] Japan | Jordan | |
| ## | [13] Kazakhstan | Kuwait | |
| ## | [15] Kyrgyzstan | Macau | |
| ## | [17] Malaysia | Maldives | |
| ## | [19] Mongolia | Occupied Palestinian Territory | |
| ## | [21] Oman | Philippines | |

```
## [23] Qatar                Republic of Korea
## [25] <NA>                  Saudi Arabia
## [27] Singapore             Sri Lanka
## [29] Syrian Arab Republic  Tajikistan
## [31] Thailand              Turkey
## [33] Turkmenistan          United Arab Emirates
## [35] Uzbekistan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 35
##
## [1] "Oceania"
## [1] Australia   Fiji           Kiribati      New Zealand <NA>
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 5
##
## [1] "Africa"
## [1] Cabo Verde      Egypt           Mauritius
## [4] Mayotte         Morocco         Reunion
## [7] <NA>            Sao Tome and Principe Seychelles
## [10] South Africa    Tunisia         Zimbabwe
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 12
```

Since there are only 5 countries in Oceania and 12 countries in Africa, we will use all 5 countries of Oceania and all 12 countries of Africa.

```
samples_of_countries <- list()
num_samples <- 17
for (i in seq_along(countries_per_continent))
{
  countries <- unique(countries_per_continent[[i]]$country)
  current_sample <- list()
  if (length(countries) >= num_samples)
  {
    current_sample <- sample(countries, 17)
  } else {
    current_sample <- sample(countries, length(countries))
  }
  samples_of_countries[[i]] <- current_sample
}
```

Let's see the countries that we will be sampling:

```
total <- 0
for (i in seq_along(samples_of_countries))
{
  print(list_of_continents[i])
  print(samples_of_countries[[i]])
  print(length(samples_of_countries[[i]]))
  total <- total + length(samples_of_countries[[i]])
  cat("\n")
}
```

```
## [1] "Europe"
## [1] Republic of Moldova <NA>          United Kingdom
## [4] Luxembourg           Malta                Spain
```

```
## [7] Serbia          Norway          Ukraine
## [10] Netherlands      Denmark         Switzerland
## [13] Poland           Monaco          Estonia
## [16] TFYR Macedonia   Greece
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Americas"
## [1] Aruba              Saint Vincent and Grenadines
## [3] Brazil             British Virgin Islands
## [5] Panama             Cayman Islands
## [7] Saint Kitts and Nevis <NA>
## [9] Cuba              Anguilla
## [11] Canada            Guyana
## [13] Saint Pierre and Miquelon Martinique
## [15] Jamaica           Dominican Republic
## [17] Costa Rica
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Asia"
## [1] Mongolia          Israel          Jordan
## [4] Kyrgyzstan        Turkey          Kuwait
## [7] Azerbaijan         Japan           Brunei Darussalam
## [10] Macau              Saudi Arabia    Armenia
## [13] Tajikistan         Uzbekistan      Maldives
## [16] Singapore          Turkmenistan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Oceania"
## [1] Kiribati <NA>      Fiji           Australia      New Zealand
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 5
##
## [1] "Africa"
## [1] Reunion           Mayotte         Sao Tome and Principe
## [4] Zimbabwe          South Africa     Cabo Verde
## [7] Morocco           Seychelles       Mauritius
## [10] <NA>              Tunisia          Egypt
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 12
```

```
total
```

```
## [1] 68
```

Let's filter the original dataframe only to include countries that we have sampled:

```
# countries_to_test <- list()
# a <- 0
for (i in seq_along(samples_of_countries))
{
  # find out a way to access each country name
  # print each country name
  for (j in seq_along(samples_of_countries[[i]]))
```

```

{
  # sample <- samples_of_countries[[i]]
  # for (k in seq_along(sample))
  # {
  #   print(sample[[k]])
  # }
  print(samples_of_countries[[i]][[j]])
  # countries_to_test[a] <- samples_of_countries[[i]][[j]]
  # a <- a + 1
}
cat("\n")
}

```

```

## [1] Republic of Moldova
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] <NA>
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] United Kingdom
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Luxembourg
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Malta
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Spain
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Serbia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Norway
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Ukraine
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Netherlands
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Denmark
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Switzerland
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Poland
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Monaco
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Estonia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] TFYR Macedonia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Greece
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
##
## [1] Aruba
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Saint Vincent and Grenadines
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Brazil
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe

```



```

## [1] British Virgin Islands
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Panama
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Cayman Islands
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Saint Kitts and Nevis
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] <NA>
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Cuba
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Anguilla
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Canada
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Guyana
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Saint Pierre and Miquelon
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Martinique
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Jamaica
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Dominican Republic
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Costa Rica
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
##
## [1] Mongolia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Israel
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Jordan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Kyrgyzstan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Turkey
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Kuwait
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Azerbaijan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Japan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Brunei Darussalam
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Macau
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Saudi Arabia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Armenia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Tajikistan

```

```

## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Uzbekistan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Maldives
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Singapore
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Turkmenistan
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
##
## [1] Kiribati
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] <NA>
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Fiji
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Australia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] New Zealand
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
##
## [1] Reunion
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Mayotte
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Sao Tome and Principe
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Zimbabwe
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] South Africa
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Cabo Verde
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Morocco
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Seychelles
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Mauritius
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] <NA>
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Tunisia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] Egypt
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe

# length(countries_to_test)
# countries_to_test

```

4. Interpretation of the results or discussion