

# 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.<sup>1</sup>

[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
```

<sup>1</sup>Basically, `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:

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

```
## [1] "Europe"
## [1] Monaco                Russian Federation      Poland
## [4] Lithuania             Czech Republic         Austria
## [7] San Marino            Denmark                TFYR Macedonia
## [10] Malta                 Bosnia and Herzegovina Montenegro
```

```
## [13] Greece                Switzerland          Germany
## [16] Belarus                Ukraine
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Americas"
## [1] Uruguay                Guyana
## [3] Saint Lucia            Saint Pierre and Miquelon
## [5] Guatemala              Belize
## [7] Costa Rica             Antigua and Barbuda
## [9] Honduras               Argentina
## [11] <NA>                   Jamaica
## [13] Montserrat             Turks and Caicos Islands
## [15] Aruba                  Anguilla
## [17] Guadeloupe
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Asia"
## [1] Iraq                   Jordan                Qatar
## [4] Republic of Korea      Turkey                 Armenia
## [7] Thailand               Israel                 Kazakhstan
## [10] Mongolia               Sri Lanka              <NA>
## [13] Brunei Darussalam      Oman                   Macau
## [16] Philippines            United Arab Emirates
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Oceania"
## [1] New Zealand <NA>        Australia   Fiji         Kiribati
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 5
##
## [1] "Africa"
## [1] South Africa           Mayotte              Reunion
## [4] Zimbabwe               Morocco              Mauritius
## [7] Egypt                  Seychelles           Tunisia
## [10] <NA>                   Sao Tome and Principe Cabo Verde
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 12
```

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

```
# Make singular list of countries
countries_to_test <- list()
library(rlist)
for (i in seq_along(samples_of_countries))
{
  current_samples <- samples_of_countries[[i]]
  # print(current_samples)
  append(countries_to_test, current_samples)
}

length(countries_to_test)
```

```
## [1] 0
for (i in seq_along(countries_to_test))
{
  print(countries_to_test[[i]])
}

# # Not run:
# x <- list(a=1,b=2,c=3)
# x
# list.append(x,d=4,e=5)
# list.append(x,d=4,f=c(2,3))
# x
# ## End(Not run)
```

#### 4. Interpretation of the results or discussion