

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] Switzerland  Romania      Czech Republic Ukraine
## [5] Luxembourg   Malta        San Marino   Iceland
```

```
## [9] Netherlands      Ireland      Lithuania    France
## [13] Belarus           Greece       Austria       Slovenia
## [17] TFYR Macedonia
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Americas"
## [1] Netherlands Antilles      Barbados
## [3] Guatemala                  Saint Vincent and Grenadines
## [5] Antigua and Barbuda        Venezuela (Bolivarian Republic of)
## [7] Jamaica                    Falkland Islands (Malvinas)
## [9] Honduras                  Montserrat
## [11] French Guiana             Bolivia
## [13] Uruguay                   El Salvador
## [15] Argentina                 Turks and Caicos Islands
## [17] Ecuador
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Asia"
## [1] Saudi Arabia      Tajikistan      United Arab Emirates
## [4] Bahrain           Jordan           Armenia
## [7] Thailand          Kyrgyzstan      Singapore
## [10] Iraq              Kuwait           Oman
## [13] Macau             Syrian Arab Republic Cyprus
## [16] Republic of Korea Qatar
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 17
##
## [1] "Oceania"
## [1] <NA>      Kiribati      New Zealand Australia      Fiji
## 141 Levels: Albania Anguilla Antigua and Barbuda Argentina ... Zimbabwe
## [1] 5
##
## [1] "Africa"
## [1] <NA>      Mauritius      Sao Tome and Principe
## [4] Reunion    Egypt          Zimbabwe
## [7] Tunisia    Mayotte        Seychelles
## [10] South Africa Morocco        Cabo Verde
## 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")
}

```

```
countries_to_test
```

```

## [[1]]
## [1] 104
##
## [[2]]
## [1] 32
##
## [[3]]
## [1] 133
##
## [[4]]
## [1] 71
##
## [[5]]
## [1] 75
##
## [[6]]
## [1] 110
##
## [[7]]
## [1] 56
##
## [[8]]
## [1] 85
##
## [[9]]
## [1] 59
##
## [[10]]
## [1] 70
##
## [[11]]
## [1] 43
##
## [[12]]
## [1] 13
##
## [[13]]
## [1] 47
##
## [[14]]

```



```
## [1] 8
##
## [[15]]
## [1] 117
##
## [[16]]
## [1] 126
##
## [[17]]
## [1] 86
##
## [[18]]
## [1] 12
##
## [[19]]
## [1] 50
##
## [[20]]
## [1] 109
##
## [[21]]
## [1] 3
##
## [[22]]
## [1] 139
##
## [[23]]
## [1] 62
##
## [[24]]
## [1] 40
##
## [[25]]
## [1] 53
##
## [[26]]
## [1] 83
##
## [[27]]
## [1] 44
##
## [[28]]
## [1] 17
##
## [[29]]
## [1] 137
##
## [[30]]
## [1] 38
##
## [[31]]
## [1] 4
##
## [[32]]
```

```
## [1] 132
##
## [[33]]
## [1] 36
##
## [[34]]
## [1] 112
##
## [[35]]
## [1] 125
##
## [[36]]
## [1] 134
##
## [[37]]
## [1] 11
##
## [[38]]
## [1] 64
##
## [[39]]
## [1] 5
##
## [[40]]
## [1] 127
##
## [[41]]
## [1] 68
##
## [[42]]
## [1] 115
##
## [[43]]
## [1] 58
##
## [[44]]
## [1] 67
##
## [[45]]
## [1] 91
##
## [[46]]
## [1] 72
##
## [[47]]
## [1] 124
##
## [[48]]
## [1] 31
##
## [[49]]
## [1] 100
##
## [[50]]
```

```
## [1] 99
##
## [[51]]
## [1] NA
##
## [[52]]
## [1] 66
##
## [[53]]
## [1] 87
##
## [[54]]
## [1] 7
##
## [[55]]
## [1] 41
##
## [[56]]
## [1] NA
##
## [[57]]
## [1] 77
##
## [[58]]
## [1] 111
##
## [[59]]
## [1] 102
##
## [[60]]
## [1] 37
##
## [[61]]
## [1] 141
##
## [[62]]
## [1] 129
##
## [[63]]
## [1] 78
##
## [[64]]
## [1] 114
##
## [[65]]
## [1] 118
##
## [[66]]
## [1] 84
##
## [[67]]
## [1] 23
```

4. Interpretation of the results or discussion