

Understanding the key factors affecting the Life Expectancy of Countries

In this R task, we are going to use data from the world health organization to answer some important questions related to Life Expectancy, which are given below -

- Q1 - Does various predicting factors which has been chosen initially really affect the Life expectancy? Are are the predicting variables actually affecting the life expectancy?
- Q2 - Should a country having a lower life expectancy value(<65) increase its healthcare expenditure in order to improve its average lifespan?
- Q3 - How does Infant and Adult mortality rates affect life expectancy?
- Q4 - What is the impact of schooling on the lifespan of humans?
- Q5 - Does Life Expectancy have positive or negative relationship with drinking alcohol?
- Q6 - Do densely populated countries tend to have lower life expectancy?
- Q7 - What is the impact of Immunization coverage on life Expectancy?

Importing the dataset to use

```
data = read.csv('WHO.csv')
attach(data)
```

Understanding the data structure

```
library(tidyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
head(data)
```

```
##      Country Year      Status Lifeexpectancy AdultMortality infantdeaths
## 1 Afghanistan 2015 Developing           65.0             263           62
## 2 Afghanistan 2014 Developing           59.9             271           64
## 3 Afghanistan 2013 Developing           59.9             268           66
## 4 Afghanistan 2012 Developing           59.5             272           69
## 5 Afghanistan 2011 Developing           59.2             275           71
## 6 Afghanistan 2010 Developing           58.8             279           74
##  Alcohol percentageexpenditure HepatitisB Measles  BMI under.fivedeaths Polio
## 1      0.01              71.279624           65    1154 19.1             83      6
## 2      0.01              73.523582           62     492 18.6             86     58
## 3      0.01              73.219243           64     430 18.1             89     62
## 4      0.01              78.184215           67    2787 17.6             93     67
## 5      0.01              7.097109           68    3013 17.2             97     68
## 6      0.01              79.679367           66    1989 16.7            102     66
##  Totalexpenditure Diphtheria HIV.AIDS      GDP Population thinness1.19years
## 1              8.16           65      0.1 584.25921  33736494            17.2
## 2              8.18           62      0.1 612.69651   327582            17.5
```

```
## 3      8.13      64      0.1 631.74498 31731688      17.7
## 4      8.52      67      0.1 669.95900 3696958      17.9
## 5      7.87      68      0.1 63.53723 2978599      18.2
## 6      9.20      66      0.1 553.32894 2883167      18.4
## thinness5.9years Incomecompositionofresources Schooling
## 1      17.3      0.479      10.1
## 2      17.5      0.476      10.0
## 3      17.7      0.470      9.9
## 4      18.0      0.463      9.8
## 5      18.2      0.454      9.5
## 6      18.4      0.448      9.2
```

```
ncol(data)
```

```
## [1] 22
```

```
nrow(data)
```

```
## [1] 2938
```

```
colnames(data)
```

```
## [1] "Country"      "Year"
## [3] "Status"       "Lifeexpectancy"
## [5] "AdultMortality" "infantdeaths"
## [7] "Alcohol"      "percentageexpenditure"
## [9] "HepatitisB"   "Measles"
## [11] "BMI"          "under.fivedeaths"
## [13] "Polio"        "Totalexpenditure"
## [15] "Diphtheria"   "HIV.AIDS"
## [17] "GDP"          "Population"
## [19] "thinness1.19years" "thinness5.9years"
## [21] "Incomecompositionofresources" "Schooling"
```

Data Cleaning

```
str(data)
```

```
## 'data.frame': 2938 obs. of 22 variables:
## $ Country      : chr "Afghanistan" "Afghanistan" "Afghanistan" "Afghanistan" ...
## $ Year          : int 2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 ...
## $ Status        : chr "Developing" "Developing" "Developing" "Developing" ...
## $ Lifeexpectancy : num 65 59.9 59.9 59.5 59.2 58.8 58.6 58.1 57.5 57.3 ...
## $ AdultMortality : int 263 271 268 272 275 279 281 287 295 295 ...
## $ infantdeaths   : int 62 64 66 69 71 74 77 80 82 84 ...
## $ Alcohol        : num 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.03 0.02 0.03 ...
## $ percentageexpenditure : num 71.3 73.5 73.2 78.2 7.1 ...
## $ HepatitisB     : int 65 62 64 67 68 66 63 64 63 64 ...
## $ Measles        : int 1154 492 430 2787 3013 1989 2861 1599 1141 1990 ...
## $ BMI            : num 19.1 18.6 18.1 17.6 17.2 16.7 16.2 15.7 15.2 14.7 ...
## $ under.fivedeaths : int 83 86 89 93 97 102 106 110 113 116 ...
## $ Polio          : int 6 58 62 67 68 66 63 64 63 58 ...
## $ Totalexpenditure : num 8.16 8.18 8.13 8.52 7.87 9.2 9.42 8.33 6.73 7.43 ...
## $ Diphtheria     : int 65 62 64 67 68 66 63 64 63 58 ...
## $ HIV.AIDS       : num 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 ...
## $ GDP            : num 584.3 612.7 631.7 670 63.5 ...
## $ Population     : num 33736494 327582 31731688 3696958 2978599 ...
```

```
## $ thinness1.19years      : num  17.2 17.5 17.7 17.9 18.2 18.4 18.6 18.8 19 19.2 ...
## $ thinness5.9years      : num  17.3 17.5 17.7 18 18.2 18.4 18.7 18.9 19.1 19.3 ...
## $ Incomecompositionofresources: num  0.479 0.476 0.47 0.463 0.454 0.448 0.434 0.433 0.415 0.405 ...
## $ Schooling              : num  10.1 10 9.9 9.8 9.5 9.2 8.9 8.7 8.4 8.1 ...
```

From looking at the structure of the dataset we can conclude that some columns don't have the correct datatypes. The variables country and status should be categorical / factors rather than strings. And the year should be a factor too rather than an integer.

```
data$Country <- as.factor(data$Country)
data$Status <- as.factor(data$Status)
data$Year <- as.factor(as.character(data$Year))
```

```
str(data)
```

```
## 'data.frame': 2938 obs. of 22 variables:
## $ Country      : Factor w/ 193 levels "Afghanistan",...: 1 1 1 1 1 1 1 1 1 1 ...
## $ Year          : Factor w/ 16 levels "2000","2001",...: 16 15 14 13 12 11 10 9 8 7 ..
## $ Status       : Factor w/ 2 levels "Developed","Developing": 2 2 2 2 2 2 2 2 2 2 ...
## $ Lifeexpectancy : num  65 59.9 59.9 59.5 59.2 58.8 58.6 58.1 57.5 57.3 ...
## $ AdultMortality : int  263 271 268 272 275 279 281 287 295 295 ...
## $ infantdeaths   : int  62 64 66 69 71 74 77 80 82 84 ...
## $ Alcohol        : num  0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.03 0.02 0.03 ...
## $ percentageexpenditure : num  71.3 73.5 73.2 78.2 7.1 ...
## $ HepatitisB     : int  65 62 64 67 68 66 63 64 63 64 ...
## $ Measles        : int  1154 492 430 2787 3013 1989 2861 1599 1141 1990 ...
## $ BMI            : num  19.1 18.6 18.1 17.6 17.2 16.7 16.2 15.7 15.2 14.7 ...
## $ under.fivedeaths : int  83 86 89 93 97 102 106 110 113 116 ...
## $ Polio          : int  6 58 62 67 68 66 63 64 63 58 ...
## $ Totalexpenditure : num  8.16 8.18 8.13 8.52 7.87 9.2 9.42 8.33 6.73 7.43 ...
## $ Diphtheria     : int  65 62 64 67 68 66 63 64 63 58 ...
## $ HIV.AIDS       : num  0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 ...
## $ GDP            : num  584.3 612.7 631.7 670 63.5 ...
## $ Population     : num  33736494 327582 31731688 3696958 2978599 ...
## $ thinness1.19years : num  17.2 17.5 17.7 17.9 18.2 18.4 18.6 18.8 19 19.2 ...
## $ thinness5.9years : num  17.3 17.5 17.7 18 18.2 18.4 18.7 18.9 19.1 19.3 ...
## $ Incomecompositionofresources: num  0.479 0.476 0.47 0.463 0.454 0.448 0.434 0.433 0.415 0.405 ...
## $ Schooling      : num  10.1 10 9.9 9.8 9.5 9.2 8.9 8.7 8.4 8.1 ...
```

The datatypes of Country , Year and Status have been changed. However, lets check if the numbers of unique factors in each variable matches what the str() shows

```
for(i in c('Country','Status','Year')){
  print(c(unique(data[i])))
}
```

```
## $Country
## [1] Afghanistan
## [2] Albania
## [3] Algeria
## [4] Angola
## [5] AntiguaandBarbuda
## [6] Argentina
## [7] Armenia
## [8] Australia
## [9] Austria
## [10] Azerbaijan
```

[11] Bahamas
[12] Bahrain
[13] Bangladesh
[14] Barbados
[15] Belarus
[16] Belgium
[17] Belize
[18] Benin
[19] Bhutan
[20] Bolivia(PlurinationalStateof)
[21] BosniaandHerzegovina
[22] Botswana
[23] Brazil
[24] BruneiDarussalam
[25] Bulgaria
[26] BurkinaFaso
[27] Burundi
[28] CÃ´ted'Ivoire
[29] CaboVerde
[30] Cambodia
[31] Cameroon
[32] Canada
[33] CentralAfricanRepublic
[34] Chad
[35] Chile
[36] China
[37] Colombia
[38] Comoros
[39] Congo
[40] CookIslands
[41] CostaRica
[42] Croatia
[43] Cuba
[44] Cyprus
[45] Czechia
[46] DemocraticPeople'sRepublicofKorea
[47] DemocraticRepublicoftheCongo
[48] Denmark
[49] Djibouti
[50] Dominica
[51] DominicanRepublic
[52] Ecuador
[53] Egypt
[54] ElSalvador
[55] EquatorialGuinea
[56] Eritrea
[57] Estonia
[58] Ethiopia
[59] Fiji
[60] Finland
[61] France
[62] Gabon
[63] Gambia
[64] Georgia

[65] Germany
[66] Ghana
[67] Greece
[68] Grenada
[69] Guatemala
[70] Guinea
[71] Guinea-Bissau
[72] Guyana
[73] Haiti
[74] Honduras
[75] Hungary
[76] Iceland
[77] India
[78] Indonesia
[79] Iran(IslamicRepublicof)
[80] Iraq
[81] Ireland
[82] Israel
[83] Italy
[84] Jamaica
[85] Japan
[86] Jordan
[87] Kazakhstan
[88] Kenya
[89] Kiribati
[90] Kuwait
[91] Kyrgyzstan
[92] LaoPeople'sDemocraticRepublic
[93] Latvia
[94] Lebanon
[95] Lesotho
[96] Liberia
[97] Libya
[98] Lithuania
[99] Luxembourg
[100] Madagascar
[101] Malawi
[102] Malaysia
[103] Maldives
[104] Mali
[105] Malta
[106] MarshallIslands
[107] Mauritania
[108] Mauritius
[109] Mexico
[110] Micronesia(FederatedStatesof)
[111] Monaco
[112] Mongolia
[113] Montenegro
[114] Morocco
[115] Mozambique
[116] Myanmar
[117] Namibia
[118] Nauru

[119] Nepal
[120] Netherlands
[121] NewZealand
[122] Nicaragua
[123] Niger
[124] Nigeria
[125] Niue
[126] Norway
[127] Oman
[128] Pakistan
[129] Palau
[130] Panama
[131] PapuaNewGuinea
[132] Paraguay
[133] Peru
[134] Philippines
[135] Poland
[136] Portugal
[137] Qatar
[138] RepublicofKorea
[139] RepublicofMoldova
[140] Romania
[141] RussianFederation
[142] Rwanda
[143] SaintKittsandNevis
[144] SaintLucia
[145] SaintVincentandtheGrenadines
[146] Samoa
[147] SanMarino
[148] SaoTomeandPrincipe
[149] SaudiArabia
[150] Senegal
[151] Serbia
[152] Seychelles
[153] SierraLeone
[154] Singapore
[155] Slovakia
[156] Slovenia
[157] SolomonIslands
[158] Somalia
[159] SouthAfrica
[160] SouthSudan
[161] Spain
[162] SriLanka
[163] Sudan
[164] Suriname
[165] Swaziland
[166] Sweden
[167] Switzerland
[168] SyrianArabRepublic
[169] Tajikistan
[170] Thailand
[171] TheformerYugoslavrepublicofMacedonia
[172] Timor-Leste

```
## [173] Togo
## [174] Tonga
## [175] TrinidadandTobago
## [176] Tunisia
## [177] Turkey
## [178] Turkmenistan
## [179] Tuvalu
## [180] Uganda
## [181] Ukraine
## [182] UnitedArabEmirates
## [183] UnitedKingdomofGreatBritainandNorthernIreland
## [184] UnitedRepublicofTanzania
## [185] UnitedStatesofAmerica
## [186] Uruguay
## [187] Uzbekistan
## [188] Vanuatu
## [189] Venezuela(BolivarianRepublicof)
## [190] VietNam
## [191] Yemen
## [192] Zambia
## [193] Zimbabwe
## 193 Levels: Afghanistan Albania Algeria Angola AntiguaandBarbuda ... Zimbabwe
##
## $Status
## [1] Developing Developed
## Levels: Developed Developing
##
## $Year
## [1] 2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001
## [16] 2000
## 16 Levels: 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 ... 2015
```

We can conclude that we have the same number of unique values as stated by the str function and the categories are not ambiguous.

```
nrow(data[!complete.cases(data),])
```

```
## [1] 1289
```

40 % of the rows in our dataset have missing values, which makes our dataset very unusable at the moment. Lets check which variables in our dataset have missing values.

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i,'has',nrow(data[!complete.cases(data[i]),]),'missing values'))
    na_columns <- append(na_columns,i)
  }
}
```

```
## [1] "Lifeexpectancy has 10 missing values"
## [1] "AdultMortality has 10 missing values"
## [1] "Alcohol has 194 missing values"
## [1] "HepatitisB has 553 missing values"
## [1] "BMI has 34 missing values"
## [1] "Polio has 19 missing values"
```

```
## [1] "Totalexpenditure has 226 missing values"
## [1] "Diphtheria has 19 missing values"
## [1] "GDP has 448 missing values"
## [1] "Population has 652 missing values"
## [1] "thinness1.19years has 34 missing values"
## [1] "thinness5.9years has 34 missing values"
## [1] "Incomecompositionofresources has 167 missing values"
## [1] "Schooling has 163 missing values"
```

```
length(na_columns)
```

```
## [1] 14
```

On the whole, we have 14 columns out of the 22 in our dataset which have missing values. That requires a lot of cleaning

We are going to look at how much % of these 14 columns is filled with na

```
round((colSums(is.na(data[na_columns])) / colSums(count(data[na_columns]))),3)
```

##	Lifeexpectancy	AdultMortality
##	0.003	0.003
##	Alcohol	HepatitisB
##	0.066	0.188
##	BMI	Polio
##	0.012	0.006
##	Totalexpenditure	Diphtheria
##	0.077	0.006
##	GDP	Population
##	0.152	0.222
##	thinness1.19years	thinness5.9years
##	0.012	0.012
##	Incomecompositionofresources	Schooling
##	0.057	0.055

```
colSums(count(data[na_columns]))
```

```
##      n
## 2938
```

From the above, we can conclude that are HepatitisB, GDP and Population have between 400-700 missing values each.

However, based on our important study questions, we cannot afford to remove the columns of population and HepatitisB. However, we can remove columns such as thinness5.9 years, thinness1.19 years and IncomeComposition since they aren't seemingly very important to our study based on the questions to answer

```
data_backup <- data
data <- select(data,-c(Incomecompositionofresources,thinness5.9years,thinness1.19years))

na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i,'has',nrow(data[!complete.cases(data[i]),]),'missing values'))
    na_columns <- append(na_columns,i)
  }
}
```

```
## [1] "Lifeexpectancy has 10 missing values"
```



```
## [1] "AdultMortality has 10 missing values"
## [1] "Alcohol has 194 missing values"
## [1] "HepatitisB has 553 missing values"
## [1] "BMI has 34 missing values"
## [1] "Polio has 19 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "Diphtheria has 19 missing values"
## [1] "GDP has 448 missing values"
## [1] "Population has 652 missing values"
## [1] "Schooling has 163 missing values"
```

```
length(na_columns)
```

```
## [1] 11
```

```
countries_to_remove <- data[which(data$Status == 'Developing' & is.na(data$Lifeexpectancy)==TRUE), 'Country']
countries_to_remove
```

```
## [1] CookIslands      Dominica             MarshallIslands      Monaco
## [5] Nauru              Niue                 Palau                 SaintKittsandNevis
## [9] SanMarino          Tuvalu
## 193 Levels: Afghanistan Albania Algeria Angola AntiguaandBarbuda ... Zimbabwe
```

On scrutinising the aforementioned countries in the dataset, it is found that above countries only have one record for the year of 2013. They haven't been recorded in any other year. Furthermore, they contain missing values in Life expectancy, adult mortality and even in population, which are important variables in our study. Hence these values are being removed from the study.

```
for(i in countries_to_remove){
  data <- data[which(data$Country != i),]
}

na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
    na_columns <- append(na_columns, i)
  }
}
```

```
## [1] "Alcohol has 193 missing values"
## [1] "HepatitisB has 553 missing values"
## [1] "BMI has 32 missing values"
## [1] "Polio has 19 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "Diphtheria has 19 missing values"
## [1] "GDP has 443 missing values"
## [1] "Population has 644 missing values"
## [1] "Schooling has 160 missing values"
```

```
length(na_columns)
```

```
## [1] 9
```

```
colSums(is.na(data[na_columns]))
```

```
##      Alcohol      HepatitisB      BMI      Polio
##      193          553          32          19
```

```
## Totalexpenditure      Diphtheria      GDP      Population
##           226           19           443           644
##      Schooling
##           160
```

So now we are down to 9 columns with missing values

Next we will look at the Polio column -

```
data[!complete.cases(data$Polio),c('Country','Status','Year','Polio')]
```

```
##      Country      Status Year Polio
## 1743 Montenegro Developing 2005    NA
## 1744 Montenegro Developing 2004    NA
## 1745 Montenegro Developing 2003    NA
## 1746 Montenegro Developing 2002    NA
## 1747 Montenegro Developing 2001    NA
## 1748 Montenegro Developing 2000    NA
## 2415 SouthSudan Developing 2010    NA
## 2416 SouthSudan Developing 2009    NA
## 2417 SouthSudan Developing 2008    NA
## 2418 SouthSudan Developing 2007    NA
## 2419 SouthSudan Developing 2006    NA
## 2420 SouthSudan Developing 2005    NA
## 2421 SouthSudan Developing 2004    NA
## 2422 SouthSudan Developing 2003    NA
## 2423 SouthSudan Developing 2002    NA
## 2424 SouthSudan Developing 2001    NA
## 2425 SouthSudan Developing 2000    NA
## 2616 Timor-Leste Developing 2001    NA
## 2617 Timor-Leste Developing 2000    NA
```

From the view, we can also see that the 19 missing diphtheria cases also belong to the same instances of the missing polio values. Hence we will treat them both. We have three countries in this problem and belong to different years. Hence we will treat each country individually.

```
data[!complete.cases(data$Diphtheria),c("Country", "Year", "Polio", "Diphtheria")]
```

```
##      Country Year Polio Diphtheria
## 1743 Montenegro 2005    NA         NA
## 1744 Montenegro 2004    NA         NA
## 1745 Montenegro 2003    NA         NA
## 1746 Montenegro 2002    NA         NA
## 1747 Montenegro 2001    NA         NA
## 1748 Montenegro 2000    NA         NA
## 2415 SouthSudan 2010    NA         NA
## 2416 SouthSudan 2009    NA         NA
## 2417 SouthSudan 2008    NA         NA
## 2418 SouthSudan 2007    NA         NA
## 2419 SouthSudan 2006    NA         NA
## 2420 SouthSudan 2005    NA         NA
## 2421 SouthSudan 2004    NA         NA
## 2422 SouthSudan 2003    NA         NA
## 2423 SouthSudan 2002    NA         NA
## 2424 SouthSudan 2001    NA         NA
## 2425 SouthSudan 2000    NA         NA
## 2616 Timor-Leste 2001    NA         NA
```

```
## 2617 Timor-Leste 2000      NA      NA
```

Montenegro's Diphtheria and Polio missing instances will be filled using its following median year rates (due to a couple of unusual values)

```
data[which(data$Country == 'Montenegro'), 'Polio'][-1:-10] <- median(data[which(data$Country == 'Montenegro'), 'Polio'])
```

```
data[which(data$Country == 'Montenegro'), 'Diphtheria'][-1:-10] <- median(data[which(data$Country == 'Montenegro'), 'Diphtheria'])
```

Now we will solve south sudan cases data[which(data\$Country == 'SouthSudan'), c("Polio", "Diphtheria")]

Until 2010 south sudan and sudan were 1 country. Hence, we can use the polio and diphtheria values of Sudan for south sudan

```
data[which(data$Country == 'SouthSudan'), 'Polio'][6:16] <- data[which(data$Country == 'Sudan'), 'Polio']
data[which(data$Country == 'SouthSudan'), 'Diphtheria'][6:16] <- data[which(data$Country == 'Sudan'), 'Diphtheria']
```

Now we will look at Timor-Leste

```
mean(data[which(data$Country == 'Timor-Leste'), 'Polio'][13:16], na.rm = TRUE)
```

```
## [1] 46.5
```

It can be seen that there is a steady rise in immunization for diphtheria and polio from the year 2002. If we were to fill the missing values with median or mean values, it wouldn't be right as the figures would be larger than what it could have been. Instead we will simply copy the 2002 values for 2001 and 2000.

```
data[which(data$Country == 'Timor-Leste'), 'Polio'][15:16] <- data[which(data$Country == 'Timor-Leste'), 'Polio'][13]
data[which(data$Country == 'Timor-Leste'), 'Diphtheria'][15:16] <- data[which(data$Country == 'Timor-Leste'), 'Diphtheria'][13]
```

Lets look at the remaining columns

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),]) > 0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
    na_columns <- append(na_columns, i)
  }
}
```

```
## [1] "Alcohol has 193 missing values"
## [1] "HepatitisB has 553 missing values"
## [1] "BMI has 32 missing values"
## [1] "Total expenditure has 226 missing values"
## [1] "GDP has 443 missing values"
## [1] "Population has 644 missing values"
## [1] "Schooling has 160 missing values"
```

Now we look at incomplete cases for BMI -

```
data[!complete.cases(data$BMI), c("Country", "Year", "Status", "BMI")]
```

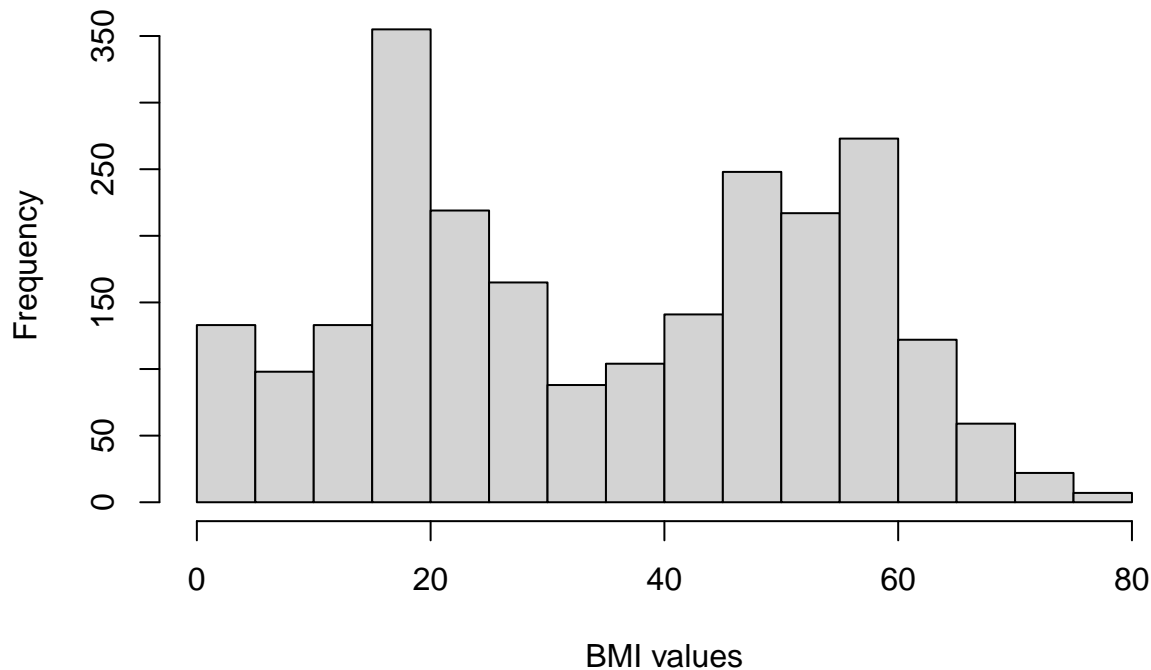
```
##      Country Year    Status BMI
## 2410 SouthSudan 2015 Developing  NA
## 2411 SouthSudan 2014 Developing  NA
## 2412 SouthSudan 2013 Developing  NA
## 2413 SouthSudan 2012 Developing  NA
## 2414 SouthSudan 2011 Developing  NA
## 2415 SouthSudan 2010 Developing  NA
## 2416 SouthSudan 2009 Developing  NA
## 2417 SouthSudan 2008 Developing  NA
```

```
## 2418 SouthSudan 2007 Developing NA
## 2419 SouthSudan 2006 Developing NA
## 2420 SouthSudan 2005 Developing NA
## 2421 SouthSudan 2004 Developing NA
## 2422 SouthSudan 2003 Developing NA
## 2423 SouthSudan 2002 Developing NA
## 2424 SouthSudan 2001 Developing NA
## 2425 SouthSudan 2000 Developing NA
## 2458      Sudan 2015 Developing NA
## 2459      Sudan 2014 Developing NA
## 2460      Sudan 2013 Developing NA
## 2461      Sudan 2012 Developing NA
## 2462      Sudan 2011 Developing NA
## 2463      Sudan 2010 Developing NA
## 2464      Sudan 2009 Developing NA
## 2465      Sudan 2008 Developing NA
## 2466      Sudan 2007 Developing NA
## 2467      Sudan 2006 Developing NA
## 2468      Sudan 2005 Developing NA
## 2469      Sudan 2004 Developing NA
## 2470      Sudan 2003 Developing NA
## 2471      Sudan 2002 Developing NA
## 2472      Sudan 2001 Developing NA
## 2473      Sudan 2000 Developing NA
```

From the data, we these missing instances are for Sudan and South Sudan. These countries have never probably had BMI measurements taken, hence BMI data is unavailable

```
hist(data[which(data$Status == 'Developing'),'BMI'],main = 'Distribution of BMI values',xlab = 'BMI val
```

Distribution of BMI values



We can see that the distribution of the BMI taken for developing countries follows a bimodal distribution. Taking a median of this kind of distribution doesn't seem right.

```
median(data[which(data$Status == 'Developing'),'BMI'],na.rm = TRUE)
```

```
## [1] 35.15
```

According to world data.com, Sudan male has an average bmi of 23.3 while females have an average bmi of 26. The average of these figures i.e 24.6 is what we will use. Since Sudan and South Sudan were the same country till 2010 and due to unavailability of data and uncertainty of data, we will use the same figure for both sudan and south sudan

```
data[which(data$Country == 'SouthSudan' | data$Country == 'Sudan'),'BMI'] <- 24.6
```

Lets look at the remaining columns

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i,'has',nrow(data[!complete.cases(data[i]),]),'missing values'))
    na_columns <- append(na_columns,i)
  }
}
```

```
## [1] "Alcohol has 193 missing values"
## [1] "HepatitisB has 553 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "GDP has 443 missing values"
## [1] "Population has 644 missing values"
```

```
## [1] "Schooling has 160 missing values"
```

Now we have 6 columns which large number of missing instances, First we will solve for alcohol

```
data[!complete.cases(data$Alcohol),c("Country","Status","Year","Alcohol")]
```

##		Country	Status	Year	Alcohol
## 33		Algeria	Developing	2015	NA
## 49		Angola	Developing	2015	NA
## 65		AntiguaandBarbuda	Developing	2015	NA
## 81		Argentina	Developing	2015	NA
## 97		Armenia	Developing	2015	NA
## 113		Australia	Developed	2015	NA
## 129		Austria	Developed	2015	NA
## 145		Azerbaijan	Developing	2015	NA
## 161		Bahamas	Developing	2015	NA
## 177		Bahrain	Developing	2015	NA
## 193		Bangladesh	Developing	2015	NA
## 209		Barbados	Developing	2015	NA
## 225		Belarus	Developing	2015	NA
## 241		Belgium	Developed	2015	NA
## 257		Belize	Developing	2015	NA
## 273		Benin	Developing	2015	NA
## 289		Bhutan	Developing	2015	NA
## 305		Bolivia(PlurinationalStateof)	Developing	2015	NA
## 321		BosniaandHerzegovina	Developing	2015	NA
## 337		Botswana	Developing	2015	NA
## 353		Brazil	Developing	2015	NA
## 369		BruneiDarussalam	Developing	2015	NA
## 385		Bulgaria	Developed	2015	NA
## 401		BurkinaFaso	Developing	2015	NA
## 417		Burundi	Developing	2015	NA
## 433		CÃ´ted'Ivoire	Developing	2015	NA
## 449		CaboVerde	Developing	2015	NA
## 465		Cambodia	Developing	2015	NA
## 481		Cameroon	Developing	2015	NA
## 497		Canada	Developing	2015	NA
## 513		CentralAfricanRepublic	Developing	2015	NA
## 529		Chad	Developing	2015	NA
## 545		Chile	Developing	2015	NA
## 561		China	Developing	2015	NA
## 577		Colombia	Developing	2015	NA
## 593		Comoros	Developing	2015	NA
## 609		Congo	Developing	2015	NA
## 626		CostaRica	Developing	2015	NA
## 642		Croatia	Developed	2015	NA
## 658		Cuba	Developing	2015	NA
## 674		Cyprus	Developed	2015	NA
## 690		Czechia	Developed	2015	NA
## 706		DemocraticPeople'sRepublicofKorea	Developing	2015	NA
## 722		DemocraticRepublicoftheCongo	Developing	2015	NA
## 738		Denmark	Developed	2015	NA
## 754		Djibouti	Developing	2015	NA
## 771		DominicanRepublic	Developing	2015	NA
## 787		Ecuador	Developing	2015	NA

## 803	Egypt	Developing	2015	NA
## 819	ElSalvador	Developing	2015	NA
## 835	EquatorialGuinea	Developing	2015	NA
## 851	Eritrea	Developing	2015	NA
## 867	Estonia	Developing	2015	NA
## 883	Ethiopia	Developing	2015	NA
## 899	Fiji	Developing	2015	NA
## 915	Finland	Developing	2015	NA
## 931	France	Developing	2015	NA
## 947	Gabon	Developing	2015	NA
## 963	Gambia	Developing	2015	NA
## 979	Georgia	Developing	2015	NA
## 995	Germany	Developed	2015	NA
## 1011	Ghana	Developing	2015	NA
## 1027	Greece	Developing	2015	NA
## 1043	Grenada	Developing	2015	NA
## 1059	Guatemala	Developing	2015	NA
## 1075	Guinea	Developing	2015	NA
## 1091	Guinea-Bissau	Developing	2015	NA
## 1107	Guyana	Developing	2015	NA
## 1123	Haiti	Developing	2015	NA
## 1139	Honduras	Developing	2015	NA
## 1155	Hungary	Developed	2015	NA
## 1171	Iceland	Developed	2015	NA
## 1187	India	Developing	2015	NA
## 1203	Indonesia	Developing	2015	NA
## 1219	Iran(IslamicRepublicof)	Developing	2015	NA
## 1235	Iraq	Developing	2015	NA
## 1251	Ireland	Developed	2015	NA
## 1267	Israel	Developing	2015	NA
## 1283	Italy	Developed	2015	NA
## 1299	Jamaica	Developing	2015	NA
## 1315	Japan	Developed	2015	NA
## 1331	Jordan	Developing	2015	NA
## 1347	Kazakhstan	Developing	2015	NA
## 1363	Kenya	Developing	2015	NA
## 1379	Kiribati	Developing	2015	NA
## 1395	Kuwait	Developing	2015	NA
## 1411	Kyrgyzstan	Developing	2015	NA
## 1427	LaoPeople'sDemocraticRepublic	Developing	2015	NA
## 1443	Latvia	Developed	2015	NA
## 1459	Lebanon	Developing	2015	NA
## 1475	Lesotho	Developing	2015	NA
## 1491	Liberia	Developing	2015	NA
## 1507	Libya	Developing	2015	NA
## 1523	Lithuania	Developed	2015	NA
## 1539	Luxembourg	Developed	2015	NA
## 1555	Madagascar	Developing	2015	NA
## 1571	Malawi	Developing	2015	NA
## 1587	Malaysia	Developing	2015	NA
## 1603	Maldives	Developing	2015	NA
## 1619	Mali	Developing	2015	NA
## 1635	Malta	Developed	2015	NA
## 1652	Mauritania	Developing	2015	NA

## 1668	Mauritius	Developing	2015	NA
## 1684	Mexico	Developing	2015	NA
## 1700	Micronesia(FederatedStatesof)	Developing	2015	NA
## 1717	Mongolia	Developing	2015	NA
## 1733	Montenegro	Developing	2015	NA
## 1743	Montenegro	Developing	2005	NA
## 1749	Morocco	Developing	2015	NA
## 1765	Mozambique	Developing	2015	NA
## 1781	Myanmar	Developing	2015	NA
## 1797	Namibia	Developing	2015	NA
## 1814	Nepal	Developing	2015	NA
## 1830	Netherlands	Developed	2015	NA
## 1862	Nicaragua	Developing	2015	NA
## 1878	Niger	Developing	2015	NA
## 1894	Nigeria	Developing	2015	NA
## 1927	Oman	Developing	2015	NA
## 1943	Pakistan	Developing	2015	NA
## 1960	Panama	Developing	2015	NA
## 1976	PapuaNewGuinea	Developing	2015	NA
## 1992	Paraguay	Developing	2015	NA
## 2008	Peru	Developing	2015	NA
## 2024	Philippines	Developing	2015	NA
## 2040	Poland	Developed	2015	NA
## 2056	Portugal	Developed	2015	NA
## 2072	Qatar	Developing	2015	NA
## 2088	RepublicofKorea	Developing	2015	NA
## 2104	RepublicofMoldova	Developing	2015	NA
## 2120	Romania	Developed	2015	NA
## 2136	RussianFederation	Developing	2015	NA
## 2152	Rwanda	Developing	2015	NA
## 2169	SaintLucia	Developing	2015	NA
## 2185	SaintVincentandtheGrenadines	Developing	2015	NA
## 2201	Samoa	Developing	2015	NA
## 2218	SaoTomeandPrincipe	Developing	2015	NA
## 2234	SaudiArabia	Developing	2015	NA
## 2250	Senegal	Developing	2015	NA
## 2266	Serbia	Developing	2015	NA
## 2282	Seychelles	Developing	2015	NA
## 2298	SierraLeone	Developing	2015	NA
## 2330	Slovakia	Developed	2015	NA
## 2346	Slovenia	Developed	2015	NA
## 2362	SolomonIslands	Developing	2015	NA
## 2378	Somalia	Developing	2015	NA
## 2394	SouthAfrica	Developing	2015	NA
## 2410	SouthSudan	Developing	2015	NA
## 2411	SouthSudan	Developing	2014	NA
## 2412	SouthSudan	Developing	2013	NA
## 2413	SouthSudan	Developing	2012	NA
## 2414	SouthSudan	Developing	2011	NA
## 2415	SouthSudan	Developing	2010	NA
## 2416	SouthSudan	Developing	2009	NA
## 2417	SouthSudan	Developing	2008	NA
## 2418	SouthSudan	Developing	2007	NA
## 2419	SouthSudan	Developing	2006	NA


```
## 2420 SouthSudan Developing 2005 NA
## 2421 SouthSudan Developing 2004 NA
## 2422 SouthSudan Developing 2003 NA
## 2423 SouthSudan Developing 2002 NA
## 2424 SouthSudan Developing 2001 NA
## 2425 SouthSudan Developing 2000 NA
## 2426 Spain Developed 2015 NA
## 2442 SriLanka Developing 2015 NA
## 2458 Sudan Developing 2015 NA
## 2474 Suriname Developing 2015 NA
## 2490 Swaziland Developing 2015 NA
## 2506 Sweden Developed 2015 NA
## 2522 Switzerland Developed 2015 NA
## 2538 SyrianArabRepublic Developing 2015 NA
## 2554 Tajikistan Developing 2015 NA
## 2570 Thailand Developing 2015 NA
## 2586 TheformerYugoslavrepublicofMacedonia Developing 2015 NA
## 2602 Timor-Leste Developing 2015 NA
## 2618 Togo Developing 2015 NA
## 2634 Tonga Developing 2015 NA
## 2650 TrinidadandTobago Developing 2015 NA
## 2666 Tunisia Developing 2015 NA
## 2682 Turkey Developing 2015 NA
## 2698 Turkmenistan Developing 2015 NA
## 2715 Uganda Developing 2015 NA
## 2731 Ukraine Developing 2015 NA
## 2747 UnitedArabEmirates Developing 2015 NA
## 2779 UnitedRepublicofTanzania Developing 2015 NA
## 2795 UnitedStatesofAmerica Developed 2015 NA
## 2811 Uruguay Developing 2015 NA
## 2827 Uzbekistan Developing 2015 NA
## 2843 Vanuatu Developing 2015 NA
## 2859 Venezuela(BolivarianRepublicof) Developing 2015 NA
## 2875 VietNam Developing 2015 NA
## 2891 Yemen Developing 2015 NA
## 2907 Zambia Developing 2015 NA
## 2923 Zimbabwe Developing 2015 NA
```

It appears as though the recording for alcohol consumption haven't been taken for 2015. Hence it can be solved by taking the average of alcohol consumption of each country from 2000-14.

```
for(i in unique(data$Country)){
  print(paste(i,':',median(data[which(data$Country == i),"Alcohol"],na.rm = TRUE)))
}
```

```
## [1] "Afghanistan : 0.01"
## [1] "Albania : 4.95"
## [1] "Algeria : 0.45"
## [1] "Angola : 6.35"
## [1] "AntiguaandBarbuda : 7.84"
## [1] "Argentina : 7.93"
## [1] "Armenia : 3.91"
## [1] "Australia : 10.17"
## [1] "Austria : 12.26"
## [1] "Azerbaijan : 0.73"
```

```

## [1] "Bahamas : 10.15"
## [1] "Bahrain : 1.99"
## [1] "Bangladesh : 0.01"
## [1] "Barbados : 8.41"
## [1] "Belarus : 13.94"
## [1] "Belgium : 11.01"
## [1] "Belize : 6.56"
## [1] "Benin : 1.19"
## [1] "Bhutan : 0.21"
## [1] "Bolivia(PlurinationalStateof) : 3.47"
## [1] "BosniaandHerzegovina : 4.54"
## [1] "Botswana : 5.51"
## [1] "Brazil : 7.21"
## [1] "BruneiDarussalam : 0.25"
## [1] "Bulgaria : 10.89"
## [1] "BurkinaFaso : 4.55"
## [1] "Burundi : 4.5"
## [1] "CÃ´ted'Ivoire : 3.12"
## [1] "CaboVerde : 4.16"
## [1] "Cambodia : 1.71"
## [1] "Cameroon : 4.71"
## [1] "Canada : 8.2"
## [1] "CentralAfricanRepublic : 1.5"
## [1] "Chad : 0.42"
## [1] "Chile : 7.2"
## [1] "China : 3.88"
## [1] "Colombia : 4.41"
## [1] "Comoros : 0.12"
## [1] "Congo : 2.45"
## [1] "CostaRica : 4.09"
## [1] "Croatia : 12.21"
## [1] "Cuba : 4.16"
## [1] "Cyprus : 10.8"
## [1] "Czechia : 13.19"
## [1] "DemocraticPeople'sRepublicofKorea : 3.16"
## [1] "DemocraticRepublicoftheCongo : 1.81"
## [1] "Denmark : 10.99"
## [1] "Djibouti : 0.53"
## [1] "DominicanRepublic : 6.05"
## [1] "Ecuador : 3.82"
## [1] "Egypt : 0.21"
## [1] "ElSalvador : 2.77"
## [1] "EquatorialGuinea : 7.19"
## [1] "Eritrea : 0.62"
## [1] "Estonia : 11.64"
## [1] "Ethiopia : 1.06"
## [1] "Fiji : 1.93"
## [1] "Finland : 9.72"
## [1] "France : 12.2"
## [1] "Gabon : 8.64"
## [1] "Gambia : 2.47"
## [1] "Georgia : 6.13"
## [1] "Germany : 11.5"
## [1] "Ghana : 1.53"

```

```

## [1] "Greece : 9"
## [1] "Grenada : 8.8"
## [1] "Guatemala : 2.35"
## [1] "Guinea : 0.18"
## [1] "Guinea-Bissau : 2.58"
## [1] "Guyana : 7.52"
## [1] "Haiti : 5.85"
## [1] "Honduras : 3.1"
## [1] "Hungary : 12.22"
## [1] "Iceland : 7.31"
## [1] "India : 1.59"
## [1] "Indonesia : 0.06"
## [1] "Iran(IslamicRepublicof) : 0.01"
## [1] "Iraq : 0.17"
## [1] "Ireland : 13.24"
## [1] "Israel : 2.53"
## [1] "Italy : 8.37"
## [1] "Jamaica : 3.63"
## [1] "Japan : 7.49"
## [1] "Jordan : 0.54"
## [1] "Kazakhstan : 6.63"
## [1] "Kenya : 1.73"
## [1] "Kiribati : 0.49"
## [1] "Kuwait : 0.01"
## [1] "Kyrgyzstan : 2.62"
## [1] "LaoPeople'sDemocraticRepublic : 3.68"
## [1] "Latvia : 9.85"
## [1] "Lebanon : 1.72"
## [1] "Lesotho : 2.67"
## [1] "Liberia : 4.03"
## [1] "Libya : 0.01"
## [1] "Lithuania : 12.66"
## [1] "Luxembourg : 11.75"
## [1] "Madagascar : 0.87"
## [1] "Malawi : 1.11"
## [1] "Malaysia : 0.49"
## [1] "Maldives : 1.75"
## [1] "Mali : 0.53"
## [1] "Malta : 7.14"
## [1] "Mauritania : 0.01"
## [1] "Mauritius : 3.24"
## [1] "Mexico : 5.21"
## [1] "Micronesia(FederatedStatesof) : 1.97"
## [1] "Mongolia : 2.75"
## [1] "Montenegro : 0.01"
## [1] "Morocco : 0.54"
## [1] "Mozambique : 1.19"
## [1] "Myanmar : 0.33"
## [1] "Namibia : 5.09"
## [1] "Nepal : 0.2"
## [1] "Netherlands : 9.56"
## [1] "NewZealand : 9.185"
## [1] "Nicaragua : 3.61"
## [1] "Niger : 0.11"

```

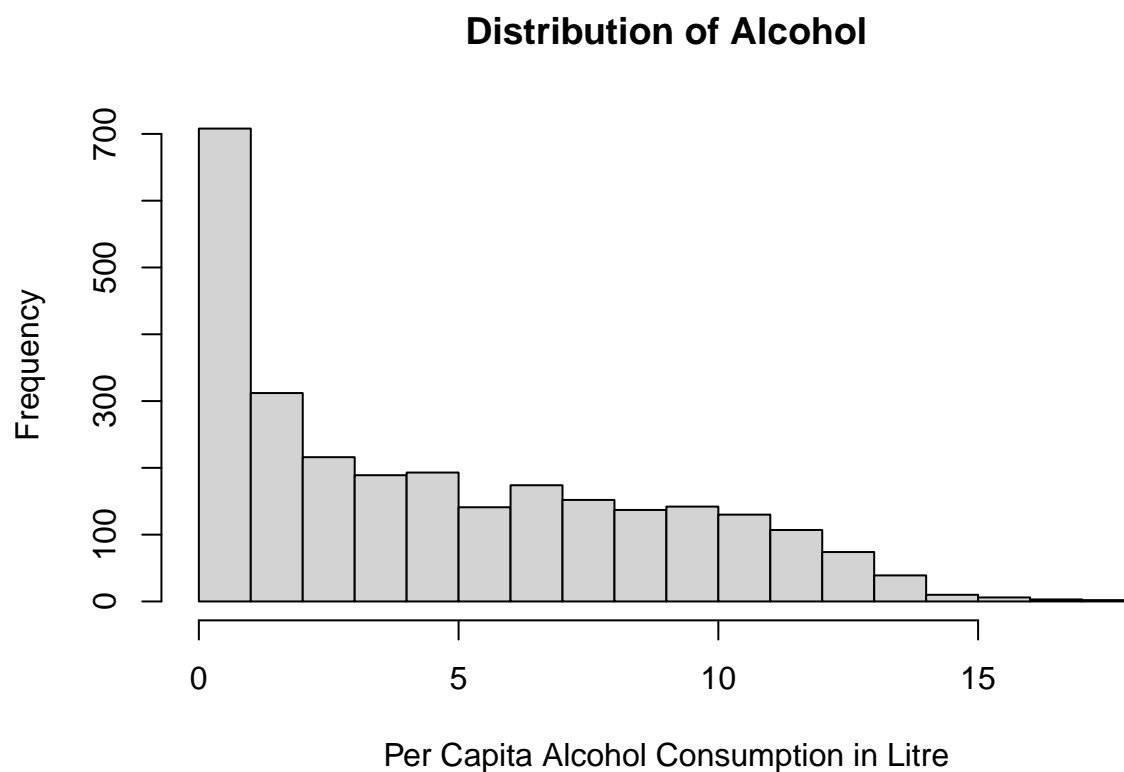
```

## [1] "Nigeria : 9.3"
## [1] "Norway : 6.215"
## [1] "Oman : 0.56"
## [1] "Pakistan : 0.03"
## [1] "Panama : 6.16"
## [1] "PapuaNewGuinea : 0.68"
## [1] "Paraguay : 5.66"
## [1] "Peru : 4.5"
## [1] "Philippines : 4.45"
## [1] "Poland : 10.59"
## [1] "Portugal : 12.22"
## [1] "Qatar : 1.15"
## [1] "RepublicofKorea : 9.31"
## [1] "RepublicofMoldova : 9.66"
## [1] "Romania : 9.59"
## [1] "RussianFederation : 11.05"
## [1] "Rwanda : 6.78"
## [1] "SaintLucia : 11.85"
## [1] "SaintVincentandtheGrenadines : 6.04"
## [1] "Samoa : 3.3"
## [1] "SaoTomeandPrincipe : 5.07"
## [1] "SaudiArabia : 0.09"
## [1] "Senegal : 0.32"
## [1] "Serbia : 9.16"
## [1] "Seychelles : 7.41"
## [1] "SierraLeone : 3.86"
## [1] "Singapore : 1.795"
## [1] "Slovakia : 10.58"
## [1] "Slovenia : 10.8"
## [1] "SolomonIslands : 0.99"
## [1] "Somalia : 0.01"
## [1] "SouthAfrica : 7.38"
## [1] "SouthSudan : NA"
## [1] "Spain : 10.24"
## [1] "SriLanka : 2.05"
## [1] "Sudan : 1.76"
## [1] "Suriname : 4.72"
## [1] "Swaziland : 5.2"
## [1] "Sweden : 6.9"
## [1] "Switzerland : 10.24"
## [1] "SyrianArabRepublic : 0.83"
## [1] "Tajikistan : 0.35"
## [1] "Thailand : 6.14"
## [1] "TheformerYugoslavrepublicofMacedonia : 1.75"
## [1] "Timor-Leste : 0.1"
## [1] "Togo : 1.1"
## [1] "Tonga : 1.24"
## [1] "TrinidadandTobago : 6.37"
## [1] "Tunisia : 1.3"
## [1] "Turkey : 1.42"
## [1] "Turkmenistan : 2.71"
## [1] "Uganda : 9.89"
## [1] "Ukraine : 8.06"
## [1] "UnitedArabEmirates : 1.74"

```

```
## [1] "UnitedKingdomofGreatBritainandNorthernIreland : 10.895"
## [1] "UnitedRepublicofTanzania : 3.97"
## [1] "UnitedStatesofAmerica : 8.63"
## [1] "Uruguay : 6.21"
## [1] "Uzbekistan : 1.6"
## [1] "Vanuatu : 0.91"
## [1] "Venezuela(BolivarianRepublicof) : 7.55"
## [1] "VietNam : 3.01"
## [1] "Yemen : 0.04"
## [1] "Zambia : 2.41"
## [1] "Zimbabwe : 4.43"
```

```
hist(data[complete.cases(data$Alcohol),"Alcohol"],main = 'Distribution of Alcohol',xlab = 'Per Capita A
```



```
for(i in unique(data$Country)){
  data[which(data$Country == i & data$Year == '2015'),'Alcohol' ] = median(data[which(data$Country == i
}]

data[!complete.cases(data$Alcohol),c("Country","Status","Year","Alcohol")]
```

```
##      Country      Status Year Alcohol
## 1743 Montenegro Developing 2005      NA
## 2410 SouthSudan Developing 2015      NA
## 2411 SouthSudan Developing 2014      NA
## 2412 SouthSudan Developing 2013      NA
## 2413 SouthSudan Developing 2012      NA
## 2414 SouthSudan Developing 2011      NA
```

```
## 2415 SouthSudan Developing 2010 NA
## 2416 SouthSudan Developing 2009 NA
## 2417 SouthSudan Developing 2008 NA
## 2418 SouthSudan Developing 2007 NA
## 2419 SouthSudan Developing 2006 NA
## 2420 SouthSudan Developing 2005 NA
## 2421 SouthSudan Developing 2004 NA
## 2422 SouthSudan Developing 2003 NA
## 2423 SouthSudan Developing 2002 NA
## 2424 SouthSudan Developing 2001 NA
## 2425 SouthSudan Developing 2000 NA
```

We need to replace the missing values of South Sudan and Montenegro

```
data[which(data$Country == 'SouthSudan'), 'Alcohol'] = median(data[which(data$Country == 'Sudan'), 'Alcohol'])
data[which(data$Country == 'SouthSudan'), 'Alcohol'] = median(data[which(data$Country == 'Sudan'), 'Alcohol'])

data[which(data$Country == 'Montenegro' & is.na(data$Alcohol)), 'Alcohol'] = median(data[which(data$Country == 'Montenegro'), 'Alcohol'])
```

Lets look at the remaining columns

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
    na_columns <- append(na_columns, i)
  }
}
```

```
## [1] "HepatitisB has 553 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "GDP has 443 missing values"
## [1] "Population has 644 missing values"
## [1] "Schooling has 160 missing values"
```

Now we move to the schooling column

```
data[!complete.cases(data$Schooling), c("Country", "Year", "Status", "Schooling")]
```

```
## Country Year Status Schooling
## 433 CÃted'Ivoire 2015 Developing NA
## 434 CÃted'Ivoire 2014 Developing NA
## 435 CÃted'Ivoire 2013 Developing NA
## 436 CÃted'Ivoire 2012 Developing NA
## 437 CÃted'Ivoire 2011 Developing NA
## 438 CÃted'Ivoire 2010 Developing NA
## 439 CÃted'Ivoire 2009 Developing NA
## 440 CÃted'Ivoire 2008 Developing NA
## 441 CÃted'Ivoire 2007 Developing NA
## 442 CÃted'Ivoire 2006 Developing NA
## 443 CÃted'Ivoire 2005 Developing NA
## 444 CÃted'Ivoire 2004 Developing NA
## 445 CÃted'Ivoire 2003 Developing NA
## 446 CÃted'Ivoire 2002 Developing NA
## 447 CÃted'Ivoire 2001 Developing NA
## 448 CÃted'Ivoire 2000 Developing NA
## 690 Czechia 2015 Developed NA
```

## 691	Czechia	2014	Developed	NA
## 692	Czechia	2013	Developed	NA
## 693	Czechia	2012	Developed	NA
## 694	Czechia	2011	Developed	NA
## 695	Czechia	2010	Developed	NA
## 696	Czechia	2009	Developed	NA
## 697	Czechia	2008	Developed	NA
## 698	Czechia	2007	Developed	NA
## 699	Czechia	2006	Developed	NA
## 700	Czechia	2005	Developed	NA
## 701	Czechia	2004	Developed	NA
## 702	Czechia	2003	Developed	NA
## 703	Czechia	2002	Developed	NA
## 704	Czechia	2001	Developed	NA
## 705	Czechia	2000	Developed	NA
## 706	DemocraticPeople'sRepublicofKorea	2015	Developing	NA
## 707	DemocraticPeople'sRepublicofKorea	2014	Developing	NA
## 708	DemocraticPeople'sRepublicofKorea	2013	Developing	NA
## 709	DemocraticPeople'sRepublicofKorea	2012	Developing	NA
## 710	DemocraticPeople'sRepublicofKorea	2011	Developing	NA
## 711	DemocraticPeople'sRepublicofKorea	2010	Developing	NA
## 712	DemocraticPeople'sRepublicofKorea	2009	Developing	NA
## 713	DemocraticPeople'sRepublicofKorea	2008	Developing	NA
## 714	DemocraticPeople'sRepublicofKorea	2007	Developing	NA
## 715	DemocraticPeople'sRepublicofKorea	2006	Developing	NA
## 716	DemocraticPeople'sRepublicofKorea	2005	Developing	NA
## 717	DemocraticPeople'sRepublicofKorea	2004	Developing	NA
## 718	DemocraticPeople'sRepublicofKorea	2003	Developing	NA
## 719	DemocraticPeople'sRepublicofKorea	2002	Developing	NA
## 720	DemocraticPeople'sRepublicofKorea	2001	Developing	NA
## 721	DemocraticPeople'sRepublicofKorea	2000	Developing	NA
## 722	DemocraticRepublicoftheCongo	2015	Developing	NA
## 723	DemocraticRepublicoftheCongo	2014	Developing	NA
## 724	DemocraticRepublicoftheCongo	2013	Developing	NA
## 725	DemocraticRepublicoftheCongo	2012	Developing	NA
## 726	DemocraticRepublicoftheCongo	2011	Developing	NA
## 727	DemocraticRepublicoftheCongo	2010	Developing	NA
## 728	DemocraticRepublicoftheCongo	2009	Developing	NA
## 729	DemocraticRepublicoftheCongo	2008	Developing	NA
## 730	DemocraticRepublicoftheCongo	2007	Developing	NA
## 731	DemocraticRepublicoftheCongo	2006	Developing	NA
## 732	DemocraticRepublicoftheCongo	2005	Developing	NA
## 733	DemocraticRepublicoftheCongo	2004	Developing	NA
## 734	DemocraticRepublicoftheCongo	2003	Developing	NA
## 735	DemocraticRepublicoftheCongo	2002	Developing	NA
## 736	DemocraticRepublicoftheCongo	2001	Developing	NA
## 737	DemocraticRepublicoftheCongo	2000	Developing	NA
## 2088	RepublicofKorea	2015	Developing	NA
## 2089	RepublicofKorea	2014	Developing	NA
## 2090	RepublicofKorea	2013	Developing	NA
## 2091	RepublicofKorea	2012	Developing	NA
## 2092	RepublicofKorea	2011	Developing	NA
## 2093	RepublicofKorea	2010	Developing	NA
## 2094	RepublicofKorea	2009	Developing	NA

## 2095	RepublicofKorea	2008	Developing	NA
## 2096	RepublicofKorea	2007	Developing	NA
## 2097	RepublicofKorea	2006	Developing	NA
## 2098	RepublicofKorea	2005	Developing	NA
## 2099	RepublicofKorea	2004	Developing	NA
## 2100	RepublicofKorea	2003	Developing	NA
## 2101	RepublicofKorea	2002	Developing	NA
## 2102	RepublicofKorea	2001	Developing	NA
## 2103	RepublicofKorea	2000	Developing	NA
## 2104	RepublicofMoldova	2015	Developing	NA
## 2105	RepublicofMoldova	2014	Developing	NA
## 2106	RepublicofMoldova	2013	Developing	NA
## 2107	RepublicofMoldova	2012	Developing	NA
## 2108	RepublicofMoldova	2011	Developing	NA
## 2109	RepublicofMoldova	2010	Developing	NA
## 2110	RepublicofMoldova	2009	Developing	NA
## 2111	RepublicofMoldova	2008	Developing	NA
## 2112	RepublicofMoldova	2007	Developing	NA
## 2113	RepublicofMoldova	2006	Developing	NA
## 2114	RepublicofMoldova	2005	Developing	NA
## 2115	RepublicofMoldova	2004	Developing	NA
## 2116	RepublicofMoldova	2003	Developing	NA
## 2117	RepublicofMoldova	2002	Developing	NA
## 2118	RepublicofMoldova	2001	Developing	NA
## 2119	RepublicofMoldova	2000	Developing	NA
## 2378	Somalia	2015	Developing	NA
## 2379	Somalia	2014	Developing	NA
## 2380	Somalia	2013	Developing	NA
## 2381	Somalia	2012	Developing	NA
## 2382	Somalia	2011	Developing	NA
## 2383	Somalia	2010	Developing	NA
## 2384	Somalia	2009	Developing	NA
## 2385	Somalia	2008	Developing	NA
## 2386	Somalia	2007	Developing	NA
## 2387	Somalia	2006	Developing	NA
## 2388	Somalia	2005	Developing	NA
## 2389	Somalia	2004	Developing	NA
## 2390	Somalia	2003	Developing	NA
## 2391	Somalia	2002	Developing	NA
## 2392	Somalia	2001	Developing	NA
## 2393	Somalia	2000	Developing	NA
## 2763	UnitedKingdomofGreatBritainandNorthernIreland	2015	Developed	NA
## 2764	UnitedKingdomofGreatBritainandNorthernIreland	2014	Developed	NA
## 2765	UnitedKingdomofGreatBritainandNorthernIreland	2013	Developed	NA
## 2766	UnitedKingdomofGreatBritainandNorthernIreland	2012	Developed	NA
## 2767	UnitedKingdomofGreatBritainandNorthernIreland	2011	Developed	NA
## 2768	UnitedKingdomofGreatBritainandNorthernIreland	2010	Developed	NA
## 2769	UnitedKingdomofGreatBritainandNorthernIreland	2009	Developed	NA
## 2770	UnitedKingdomofGreatBritainandNorthernIreland	2008	Developed	NA
## 2771	UnitedKingdomofGreatBritainandNorthernIreland	2007	Developed	NA
## 2772	UnitedKingdomofGreatBritainandNorthernIreland	2006	Developed	NA
## 2773	UnitedKingdomofGreatBritainandNorthernIreland	2005	Developed	NA
## 2774	UnitedKingdomofGreatBritainandNorthernIreland	2004	Developed	NA
## 2775	UnitedKingdomofGreatBritainandNorthernIreland	2003	Developed	NA


```
## 2776 UnitedKingdomofGreatBritainandNorthernIreland 2002 Developed NA
## 2777 UnitedKingdomofGreatBritainandNorthernIreland 2001 Developed NA
## 2778 UnitedKingdomofGreatBritainandNorthernIreland 2000 Developed NA
## 2779 UnitedRepublicofTanzania 2015 Developing NA
## 2780 UnitedRepublicofTanzania 2014 Developing NA
## 2781 UnitedRepublicofTanzania 2013 Developing NA
## 2782 UnitedRepublicofTanzania 2012 Developing NA
## 2783 UnitedRepublicofTanzania 2011 Developing NA
## 2784 UnitedRepublicofTanzania 2010 Developing NA
## 2785 UnitedRepublicofTanzania 2009 Developing NA
## 2786 UnitedRepublicofTanzania 2008 Developing NA
## 2787 UnitedRepublicofTanzania 2007 Developing NA
## 2788 UnitedRepublicofTanzania 2006 Developing NA
## 2789 UnitedRepublicofTanzania 2005 Developing NA
## 2790 UnitedRepublicofTanzania 2004 Developing NA
## 2791 UnitedRepublicofTanzania 2003 Developing NA
## 2792 UnitedRepublicofTanzania 2002 Developing NA
## 2793 UnitedRepublicofTanzania 2001 Developing NA
## 2794 UnitedRepublicofTanzania 2000 Developing NA
## 2795 UnitedStatesofAmerica 2015 Developed NA
## 2796 UnitedStatesofAmerica 2014 Developed NA
## 2797 UnitedStatesofAmerica 2013 Developed NA
## 2798 UnitedStatesofAmerica 2012 Developed NA
## 2799 UnitedStatesofAmerica 2011 Developed NA
## 2800 UnitedStatesofAmerica 2010 Developed NA
## 2801 UnitedStatesofAmerica 2009 Developed NA
## 2802 UnitedStatesofAmerica 2008 Developed NA
## 2803 UnitedStatesofAmerica 2007 Developed NA
## 2804 UnitedStatesofAmerica 2006 Developed NA
## 2805 UnitedStatesofAmerica 2005 Developed NA
## 2806 UnitedStatesofAmerica 2004 Developed NA
## 2807 UnitedStatesofAmerica 2003 Developed NA
## 2808 UnitedStatesofAmerica 2002 Developed NA
## 2809 UnitedStatesofAmerica 2001 Developed NA
## 2810 UnitedStatesofAmerica 2000 Developed NA
```

Now with several countries not having any schooling values for any years, we are going to try to assign them values based on their status and year. First we will need to check if the schooling data for developed and developing nations is normal so that we can take average across all other nations for a given year.

```
for(i in unique(data$Year)){
  print(paste("Year :",i,"- p value :",shapiro.test(data[which(data$Status == 'Developed' & data$Year
}]
```

```
## [1] "Year : 2015 - p value : 0.295451415893467"
## [1] "Year : 2014 - p value : 0.338213837511792"
## [1] "Year : 2013 - p value : 0.177087838340299"
## [1] "Year : 2012 - p value : 0.226609824484554"
## [1] "Year : 2011 - p value : 0.192033189124809"
## [1] "Year : 2010 - p value : 0.141210058308648"
## [1] "Year : 2009 - p value : 0.466189620002401"
## [1] "Year : 2008 - p value : 0.402505560453726"
## [1] "Year : 2007 - p value : 0.318805933750593"
## [1] "Year : 2006 - p value : 0.181577794271046"
## [1] "Year : 2005 - p value : 0.310613862191847"
```

```
## [1] "Year : 2004 - p value : 0.368774274062041"
## [1] "Year : 2003 - p value : 0.323518165145959"
## [1] "Year : 2002 - p value : 0.625610573384895"
## [1] "Year : 2001 - p value : 0.741180776305096"
## [1] "Year : 2000 - p value : 0.7061800259549"
```

From the above test, we have found that the schooling data for developed nations is normal for all given years. Hence we can take an average of schooling data for a given year and assign it to developed nations with schooling values.

```
for(i in unique(data$Year)){
  print(paste("Year :",i,"- p value :",shapiro.test(data[which(data$Status == 'Developing' & data$Year == i)$Schooling])$p.value))
}
```

```
## [1] "Year : 2015 - p value : 0.0381200243013292"
## [1] "Year : 2014 - p value : 0.0321265453662696"
## [1] "Year : 2013 - p value : 0.0213725972147635"
## [1] "Year : 2012 - p value : 0.0288516622509633"
## [1] "Year : 2011 - p value : 0.0224684718947566"
## [1] "Year : 2010 - p value : 0.00156172890342206"
## [1] "Year : 2009 - p value : 0.0035617428667024"
## [1] "Year : 2008 - p value : 0.00363067825442432"
## [1] "Year : 2007 - p value : 0.00587548034911597"
## [1] "Year : 2006 - p value : 0.00776996108520268"
## [1] "Year : 2005 - p value : 0.000529554104783199"
## [1] "Year : 2004 - p value : 0.00137762373640685"
## [1] "Year : 2003 - p value : 0.000450615444844568"
## [1] "Year : 2002 - p value : 0.000520312213275169"
## [1] "Year : 2001 - p value : 0.000522379183097746"
## [1] "Year : 2000 - p value : 7.1405099261662e-06"
```

From the above test for developing nations, we found that the schooling mean over the years is significantly different from a normal distribution. Therefore we would use median to fill the values

```
for(i in unique(data$Year)){
  data[which(data$Status == 'Developed' & data$Year == i & is.na(data$Schooling)), 'Schooling'] = mean(data[which(data$Status == 'Developed' & data$Year == i & !is.na(data$Schooling)), 'Schooling'])
  data[which(data$Status == 'Developing' & data$Year == i & is.na(data$Schooling)), 'Schooling'] = median(data[which(data$Status == 'Developing' & data$Year == i & !is.na(data$Schooling)), 'Schooling'])
}
```

Lets look at the remaining columns

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
    na_columns <- append(na_columns, i)
  }
}
```

```
## [1] "HepatitisB has 553 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "GDP has 443 missing values"
## [1] "Population has 644 missing values"
```

Now we will look at GDP

```
data[!complete.cases(data$GDP), c("Country", "Status", "Year", "GDP")]
```

```
##           Country      Status Year GDP
```

## 161	Bahamas	Developing	2015	NA
## 162	Bahamas	Developing	2014	NA
## 163	Bahamas	Developing	2013	NA
## 164	Bahamas	Developing	2012	NA
## 165	Bahamas	Developing	2011	NA
## 166	Bahamas	Developing	2010	NA
## 167	Bahamas	Developing	2009	NA
## 168	Bahamas	Developing	2008	NA
## 169	Bahamas	Developing	2007	NA
## 170	Bahamas	Developing	2006	NA
## 171	Bahamas	Developing	2005	NA
## 172	Bahamas	Developing	2004	NA
## 173	Bahamas	Developing	2003	NA
## 174	Bahamas	Developing	2002	NA
## 175	Bahamas	Developing	2001	NA
## 176	Bahamas	Developing	2000	NA
## 305	Bolivia(PlurinationalStateof)	Developing	2015	NA
## 306	Bolivia(PlurinationalStateof)	Developing	2014	NA
## 307	Bolivia(PlurinationalStateof)	Developing	2013	NA
## 308	Bolivia(PlurinationalStateof)	Developing	2012	NA
## 309	Bolivia(PlurinationalStateof)	Developing	2011	NA
## 310	Bolivia(PlurinationalStateof)	Developing	2010	NA
## 311	Bolivia(PlurinationalStateof)	Developing	2009	NA
## 312	Bolivia(PlurinationalStateof)	Developing	2008	NA
## 313	Bolivia(PlurinationalStateof)	Developing	2007	NA
## 314	Bolivia(PlurinationalStateof)	Developing	2006	NA
## 315	Bolivia(PlurinationalStateof)	Developing	2005	NA
## 316	Bolivia(PlurinationalStateof)	Developing	2004	NA
## 317	Bolivia(PlurinationalStateof)	Developing	2003	NA
## 318	Bolivia(PlurinationalStateof)	Developing	2002	NA
## 319	Bolivia(PlurinationalStateof)	Developing	2001	NA
## 320	Bolivia(PlurinationalStateof)	Developing	2000	NA
## 433	CÃ´ted'Ivoire	Developing	2015	NA
## 434	CÃ´ted'Ivoire	Developing	2014	NA
## 435	CÃ´ted'Ivoire	Developing	2013	NA
## 436	CÃ´ted'Ivoire	Developing	2012	NA
## 437	CÃ´ted'Ivoire	Developing	2011	NA
## 438	CÃ´ted'Ivoire	Developing	2010	NA
## 439	CÃ´ted'Ivoire	Developing	2009	NA
## 440	CÃ´ted'Ivoire	Developing	2008	NA
## 441	CÃ´ted'Ivoire	Developing	2007	NA
## 442	CÃ´ted'Ivoire	Developing	2006	NA
## 443	CÃ´ted'Ivoire	Developing	2005	NA
## 444	CÃ´ted'Ivoire	Developing	2004	NA
## 445	CÃ´ted'Ivoire	Developing	2003	NA
## 446	CÃ´ted'Ivoire	Developing	2002	NA
## 447	CÃ´ted'Ivoire	Developing	2001	NA
## 448	CÃ´ted'Ivoire	Developing	2000	NA
## 609	Congo	Developing	2015	NA
## 610	Congo	Developing	2014	NA
## 611	Congo	Developing	2013	NA
## 612	Congo	Developing	2012	NA
## 613	Congo	Developing	2011	NA
## 614	Congo	Developing	2010	NA

## 615	Congo	Developing	2009	NA
## 616	Congo	Developing	2008	NA
## 617	Congo	Developing	2007	NA
## 618	Congo	Developing	2006	NA
## 619	Congo	Developing	2005	NA
## 620	Congo	Developing	2004	NA
## 621	Congo	Developing	2003	NA
## 622	Congo	Developing	2002	NA
## 623	Congo	Developing	2001	NA
## 624	Congo	Developing	2000	NA
## 690	Czechia	Developed	2015	NA
## 691	Czechia	Developed	2014	NA
## 692	Czechia	Developed	2013	NA
## 693	Czechia	Developed	2012	NA
## 694	Czechia	Developed	2011	NA
## 695	Czechia	Developed	2010	NA
## 696	Czechia	Developed	2009	NA
## 697	Czechia	Developed	2008	NA
## 698	Czechia	Developed	2007	NA
## 699	Czechia	Developed	2006	NA
## 700	Czechia	Developed	2005	NA
## 701	Czechia	Developed	2004	NA
## 702	Czechia	Developed	2003	NA
## 703	Czechia	Developed	2002	NA
## 704	Czechia	Developed	2001	NA
## 705	Czechia	Developed	2000	NA
## 706	DemocraticPeople'sRepublicofKorea	Developing	2015	NA
## 707	DemocraticPeople'sRepublicofKorea	Developing	2014	NA
## 708	DemocraticPeople'sRepublicofKorea	Developing	2013	NA
## 709	DemocraticPeople'sRepublicofKorea	Developing	2012	NA
## 710	DemocraticPeople'sRepublicofKorea	Developing	2011	NA
## 711	DemocraticPeople'sRepublicofKorea	Developing	2010	NA
## 712	DemocraticPeople'sRepublicofKorea	Developing	2009	NA
## 713	DemocraticPeople'sRepublicofKorea	Developing	2008	NA
## 714	DemocraticPeople'sRepublicofKorea	Developing	2007	NA
## 715	DemocraticPeople'sRepublicofKorea	Developing	2006	NA
## 716	DemocraticPeople'sRepublicofKorea	Developing	2005	NA
## 717	DemocraticPeople'sRepublicofKorea	Developing	2004	NA
## 718	DemocraticPeople'sRepublicofKorea	Developing	2003	NA
## 719	DemocraticPeople'sRepublicofKorea	Developing	2002	NA
## 720	DemocraticPeople'sRepublicofKorea	Developing	2001	NA
## 721	DemocraticPeople'sRepublicofKorea	Developing	2000	NA
## 722	DemocraticRepublicoftheCongo	Developing	2015	NA
## 723	DemocraticRepublicoftheCongo	Developing	2014	NA
## 724	DemocraticRepublicoftheCongo	Developing	2013	NA
## 725	DemocraticRepublicoftheCongo	Developing	2012	NA
## 726	DemocraticRepublicoftheCongo	Developing	2011	NA
## 727	DemocraticRepublicoftheCongo	Developing	2010	NA
## 728	DemocraticRepublicoftheCongo	Developing	2009	NA
## 729	DemocraticRepublicoftheCongo	Developing	2008	NA
## 730	DemocraticRepublicoftheCongo	Developing	2007	NA
## 731	DemocraticRepublicoftheCongo	Developing	2006	NA
## 732	DemocraticRepublicoftheCongo	Developing	2005	NA
## 733	DemocraticRepublicoftheCongo	Developing	2004	NA

## 734	DemocraticRepublicoftheCongo	Developing	2003	NA
## 735	DemocraticRepublicoftheCongo	Developing	2002	NA
## 736	DemocraticRepublicoftheCongo	Developing	2001	NA
## 737	DemocraticRepublicoftheCongo	Developing	2000	NA
## 803	Egypt	Developing	2015	NA
## 804	Egypt	Developing	2014	NA
## 805	Egypt	Developing	2013	NA
## 806	Egypt	Developing	2012	NA
## 807	Egypt	Developing	2011	NA
## 808	Egypt	Developing	2010	NA
## 809	Egypt	Developing	2009	NA
## 810	Egypt	Developing	2008	NA
## 811	Egypt	Developing	2007	NA
## 812	Egypt	Developing	2006	NA
## 813	Egypt	Developing	2005	NA
## 814	Egypt	Developing	2004	NA
## 815	Egypt	Developing	2003	NA
## 816	Egypt	Developing	2002	NA
## 817	Egypt	Developing	2001	NA
## 818	Egypt	Developing	2000	NA
## 851	Eritrea	Developing	2015	NA
## 852	Eritrea	Developing	2014	NA
## 853	Eritrea	Developing	2013	NA
## 854	Eritrea	Developing	2012	NA
## 963	Gambia	Developing	2015	NA
## 964	Gambia	Developing	2014	NA
## 965	Gambia	Developing	2013	NA
## 966	Gambia	Developing	2012	NA
## 967	Gambia	Developing	2011	NA
## 968	Gambia	Developing	2010	NA
## 969	Gambia	Developing	2009	NA
## 970	Gambia	Developing	2008	NA
## 971	Gambia	Developing	2007	NA
## 972	Gambia	Developing	2006	NA
## 973	Gambia	Developing	2005	NA
## 974	Gambia	Developing	2004	NA
## 975	Gambia	Developing	2003	NA
## 976	Gambia	Developing	2002	NA
## 977	Gambia	Developing	2001	NA
## 978	Gambia	Developing	2000	NA
## 1219	Iran(IslamicRepublicof)	Developing	2015	NA
## 1220	Iran(IslamicRepublicof)	Developing	2014	NA
## 1221	Iran(IslamicRepublicof)	Developing	2013	NA
## 1222	Iran(IslamicRepublicof)	Developing	2012	NA
## 1223	Iran(IslamicRepublicof)	Developing	2011	NA
## 1224	Iran(IslamicRepublicof)	Developing	2010	NA
## 1225	Iran(IslamicRepublicof)	Developing	2009	NA
## 1226	Iran(IslamicRepublicof)	Developing	2008	NA
## 1227	Iran(IslamicRepublicof)	Developing	2007	NA
## 1228	Iran(IslamicRepublicof)	Developing	2006	NA
## 1229	Iran(IslamicRepublicof)	Developing	2005	NA
## 1230	Iran(IslamicRepublicof)	Developing	2004	NA
## 1231	Iran(IslamicRepublicof)	Developing	2003	NA
## 1232	Iran(IslamicRepublicof)	Developing	2002	NA

## 1233	Iran(IslamicRepublicof)	Developing	2001	NA
## 1234	Iran(IslamicRepublicof)	Developing	2000	NA
## 1247	Iraq	Developing	2003	NA
## 1248	Iraq	Developing	2002	NA
## 1249	Iraq	Developing	2001	NA
## 1250	Iraq	Developing	2000	NA
## 1411	Kyrgyzstan	Developing	2015	NA
## 1412	Kyrgyzstan	Developing	2014	NA
## 1413	Kyrgyzstan	Developing	2013	NA
## 1414	Kyrgyzstan	Developing	2012	NA
## 1415	Kyrgyzstan	Developing	2011	NA
## 1416	Kyrgyzstan	Developing	2010	NA
## 1417	Kyrgyzstan	Developing	2009	NA
## 1418	Kyrgyzstan	Developing	2008	NA
## 1419	Kyrgyzstan	Developing	2007	NA
## 1420	Kyrgyzstan	Developing	2006	NA
## 1421	Kyrgyzstan	Developing	2005	NA
## 1422	Kyrgyzstan	Developing	2004	NA
## 1423	Kyrgyzstan	Developing	2003	NA
## 1424	Kyrgyzstan	Developing	2002	NA
## 1425	Kyrgyzstan	Developing	2001	NA
## 1426	Kyrgyzstan	Developing	2000	NA
## 1427	LaoPeople'sDemocraticRepublic	Developing	2015	NA
## 1428	LaoPeople'sDemocraticRepublic	Developing	2014	NA
## 1429	LaoPeople'sDemocraticRepublic	Developing	2013	NA
## 1430	LaoPeople'sDemocraticRepublic	Developing	2012	NA
## 1431	LaoPeople'sDemocraticRepublic	Developing	2011	NA
## 1432	LaoPeople'sDemocraticRepublic	Developing	2010	NA
## 1433	LaoPeople'sDemocraticRepublic	Developing	2009	NA
## 1434	LaoPeople'sDemocraticRepublic	Developing	2008	NA
## 1435	LaoPeople'sDemocraticRepublic	Developing	2007	NA
## 1436	LaoPeople'sDemocraticRepublic	Developing	2006	NA
## 1437	LaoPeople'sDemocraticRepublic	Developing	2005	NA
## 1438	LaoPeople'sDemocraticRepublic	Developing	2004	NA
## 1439	LaoPeople'sDemocraticRepublic	Developing	2003	NA
## 1440	LaoPeople'sDemocraticRepublic	Developing	2002	NA
## 1441	LaoPeople'sDemocraticRepublic	Developing	2001	NA
## 1442	LaoPeople'sDemocraticRepublic	Developing	2000	NA
## 1507	Libya	Developing	2015	NA
## 1508	Libya	Developing	2014	NA
## 1509	Libya	Developing	2013	NA
## 1510	Libya	Developing	2012	NA
## 1700	Micronesia(FederatedStatesof)	Developing	2015	NA
## 1701	Micronesia(FederatedStatesof)	Developing	2014	NA
## 1702	Micronesia(FederatedStatesof)	Developing	2013	NA
## 1703	Micronesia(FederatedStatesof)	Developing	2012	NA
## 1704	Micronesia(FederatedStatesof)	Developing	2011	NA
## 1705	Micronesia(FederatedStatesof)	Developing	2010	NA
## 1706	Micronesia(FederatedStatesof)	Developing	2009	NA
## 1707	Micronesia(FederatedStatesof)	Developing	2008	NA
## 1708	Micronesia(FederatedStatesof)	Developing	2007	NA
## 1709	Micronesia(FederatedStatesof)	Developing	2006	NA
## 1710	Micronesia(FederatedStatesof)	Developing	2005	NA
## 1711	Micronesia(FederatedStatesof)	Developing	2004	NA

## 1712	Micronesia(FederatedStatesof)	Developing	2003	NA
## 1713	Micronesia(FederatedStatesof)	Developing	2002	NA
## 1714	Micronesia(FederatedStatesof)	Developing	2001	NA
## 1715	Micronesia(FederatedStatesof)	Developing	2000	NA
## 1976	PapuaNewGuinea	Developing	2015	NA
## 2088	RepublicofKorea	Developing	2015	NA
## 2089	RepublicofKorea	Developing	2014	NA
## 2090	RepublicofKorea	Developing	2013	NA
## 2091	RepublicofKorea	Developing	2012	NA
## 2092	RepublicofKorea	Developing	2011	NA
## 2093	RepublicofKorea	Developing	2010	NA
## 2094	RepublicofKorea	Developing	2009	NA
## 2095	RepublicofKorea	Developing	2008	NA
## 2096	RepublicofKorea	Developing	2007	NA
## 2097	RepublicofKorea	Developing	2006	NA
## 2098	RepublicofKorea	Developing	2005	NA
## 2099	RepublicofKorea	Developing	2004	NA
## 2100	RepublicofKorea	Developing	2003	NA
## 2101	RepublicofKorea	Developing	2002	NA
## 2102	RepublicofKorea	Developing	2001	NA
## 2103	RepublicofKorea	Developing	2000	NA
## 2104	RepublicofMoldova	Developing	2015	NA
## 2105	RepublicofMoldova	Developing	2014	NA
## 2106	RepublicofMoldova	Developing	2013	NA
## 2107	RepublicofMoldova	Developing	2012	NA
## 2108	RepublicofMoldova	Developing	2011	NA
## 2109	RepublicofMoldova	Developing	2010	NA
## 2110	RepublicofMoldova	Developing	2009	NA
## 2111	RepublicofMoldova	Developing	2008	NA
## 2112	RepublicofMoldova	Developing	2007	NA
## 2113	RepublicofMoldova	Developing	2006	NA
## 2114	RepublicofMoldova	Developing	2005	NA
## 2115	RepublicofMoldova	Developing	2004	NA
## 2116	RepublicofMoldova	Developing	2003	NA
## 2117	RepublicofMoldova	Developing	2002	NA
## 2118	RepublicofMoldova	Developing	2001	NA
## 2119	RepublicofMoldova	Developing	2000	NA
## 2169	SaintLucia	Developing	2015	NA
## 2170	SaintLucia	Developing	2014	NA
## 2171	SaintLucia	Developing	2013	NA
## 2172	SaintLucia	Developing	2012	NA
## 2173	SaintLucia	Developing	2011	NA
## 2174	SaintLucia	Developing	2010	NA
## 2175	SaintLucia	Developing	2009	NA
## 2176	SaintLucia	Developing	2008	NA
## 2177	SaintLucia	Developing	2007	NA
## 2178	SaintLucia	Developing	2006	NA
## 2179	SaintLucia	Developing	2005	NA
## 2180	SaintLucia	Developing	2004	NA
## 2181	SaintLucia	Developing	2003	NA
## 2182	SaintLucia	Developing	2002	NA
## 2183	SaintLucia	Developing	2001	NA
## 2184	SaintLucia	Developing	2000	NA
## 2185	SaintVincentandtheGrenadines	Developing	2015	NA

##	2186	SaintVincentandtheGrenadines	Developing	2014	NA
##	2187	SaintVincentandtheGrenadines	Developing	2013	NA
##	2188	SaintVincentandtheGrenadines	Developing	2012	NA
##	2189	SaintVincentandtheGrenadines	Developing	2011	NA
##	2190	SaintVincentandtheGrenadines	Developing	2010	NA
##	2191	SaintVincentandtheGrenadines	Developing	2009	NA
##	2192	SaintVincentandtheGrenadines	Developing	2008	NA
##	2193	SaintVincentandtheGrenadines	Developing	2007	NA
##	2194	SaintVincentandtheGrenadines	Developing	2006	NA
##	2195	SaintVincentandtheGrenadines	Developing	2005	NA
##	2196	SaintVincentandtheGrenadines	Developing	2004	NA
##	2197	SaintVincentandtheGrenadines	Developing	2003	NA
##	2198	SaintVincentandtheGrenadines	Developing	2002	NA
##	2199	SaintVincentandtheGrenadines	Developing	2001	NA
##	2200	SaintVincentandtheGrenadines	Developing	2000	NA
##	2233	SaoTomeandPrincipe	Developing	2000	NA
##	2330	Slovakia	Developed	2015	NA
##	2331	Slovakia	Developed	2014	NA
##	2332	Slovakia	Developed	2013	NA
##	2333	Slovakia	Developed	2012	NA
##	2334	Slovakia	Developed	2011	NA
##	2335	Slovakia	Developed	2010	NA
##	2336	Slovakia	Developed	2009	NA
##	2337	Slovakia	Developed	2008	NA
##	2338	Slovakia	Developed	2007	NA
##	2339	Slovakia	Developed	2006	NA
##	2340	Slovakia	Developed	2005	NA
##	2341	Slovakia	Developed	2004	NA
##	2342	Slovakia	Developed	2003	NA
##	2343	Slovakia	Developed	2002	NA
##	2344	Slovakia	Developed	2001	NA
##	2345	Slovakia	Developed	2000	NA
##	2381	Somalia	Developing	2012	NA
##	2382	Somalia	Developing	2011	NA
##	2383	Somalia	Developing	2010	NA
##	2384	Somalia	Developing	2009	NA
##	2385	Somalia	Developing	2008	NA
##	2386	Somalia	Developing	2007	NA
##	2387	Somalia	Developing	2006	NA
##	2388	Somalia	Developing	2005	NA
##	2389	Somalia	Developing	2004	NA
##	2390	Somalia	Developing	2003	NA
##	2391	Somalia	Developing	2002	NA
##	2392	Somalia	Developing	2001	NA
##	2393	Somalia	Developing	2000	NA
##	2418	SouthSudan	Developing	2007	NA
##	2419	SouthSudan	Developing	2006	NA
##	2420	SouthSudan	Developing	2005	NA
##	2421	SouthSudan	Developing	2004	NA
##	2422	SouthSudan	Developing	2003	NA
##	2423	SouthSudan	Developing	2002	NA
##	2424	SouthSudan	Developing	2001	NA
##	2425	SouthSudan	Developing	2000	NA
##	2538	SyrianArabRepublic	Developing	2015	NA

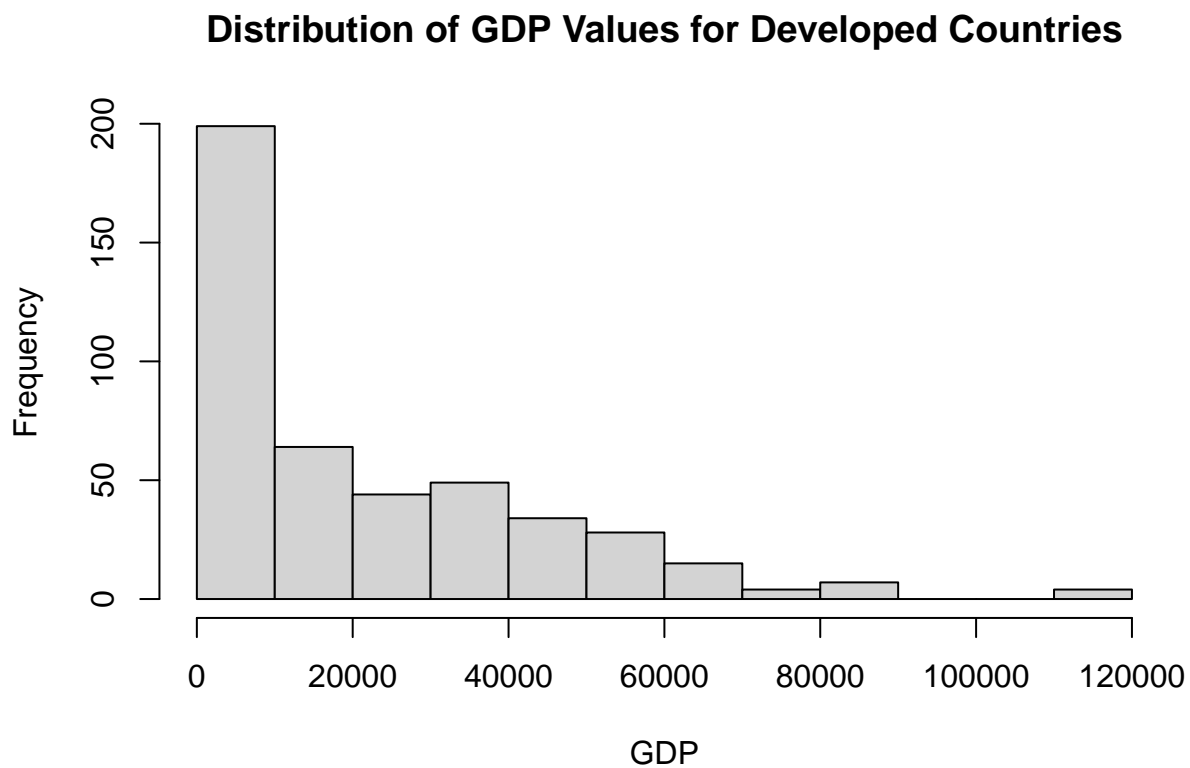
##	2539	SyrianArabRepublic	Developing	2014	NA
##	2540	SyrianArabRepublic	Developing	2013	NA
##	2541	SyrianArabRepublic	Developing	2012	NA
##	2542	SyrianArabRepublic	Developing	2011	NA
##	2543	SyrianArabRepublic	Developing	2010	NA
##	2544	SyrianArabRepublic	Developing	2009	NA
##	2545	SyrianArabRepublic	Developing	2008	NA
##	2586	TheformerYugoslavrepublicofMacedonia	Developing	2015	NA
##	2587	TheformerYugoslavrepublicofMacedonia	Developing	2014	NA
##	2588	TheformerYugoslavrepublicofMacedonia	Developing	2013	NA
##	2589	TheformerYugoslavrepublicofMacedonia	Developing	2012	NA
##	2590	TheformerYugoslavrepublicofMacedonia	Developing	2011	NA
##	2591	TheformerYugoslavrepublicofMacedonia	Developing	2010	NA
##	2592	TheformerYugoslavrepublicofMacedonia	Developing	2009	NA
##	2593	TheformerYugoslavrepublicofMacedonia	Developing	2008	NA
##	2594	TheformerYugoslavrepublicofMacedonia	Developing	2007	NA
##	2595	TheformerYugoslavrepublicofMacedonia	Developing	2006	NA
##	2596	TheformerYugoslavrepublicofMacedonia	Developing	2005	NA
##	2597	TheformerYugoslavrepublicofMacedonia	Developing	2004	NA
##	2598	TheformerYugoslavrepublicofMacedonia	Developing	2003	NA
##	2599	TheformerYugoslavrepublicofMacedonia	Developing	2002	NA
##	2600	TheformerYugoslavrepublicofMacedonia	Developing	2001	NA
##	2601	TheformerYugoslavrepublicofMacedonia	Developing	2000	NA
##	2763	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2015	NA
##	2764	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2014	NA
##	2765	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2013	NA
##	2766	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2012	NA
##	2767	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2011	NA
##	2768	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2010	NA
##	2769	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2009	NA
##	2770	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2008	NA
##	2771	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2007	NA
##	2772	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2006	NA
##	2773	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2005	NA
##	2774	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2004	NA
##	2775	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2003	NA
##	2776	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2002	NA
##	2777	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2001	NA
##	2778	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2000	NA
##	2779	UnitedRepublicofTanzania	Developing	2015	NA
##	2780	UnitedRepublicofTanzania	Developing	2014	NA
##	2781	UnitedRepublicofTanzania	Developing	2013	NA
##	2782	UnitedRepublicofTanzania	Developing	2012	NA
##	2783	UnitedRepublicofTanzania	Developing	2011	NA
##	2784	UnitedRepublicofTanzania	Developing	2010	NA
##	2785	UnitedRepublicofTanzania	Developing	2009	NA
##	2786	UnitedRepublicofTanzania	Developing	2008	NA
##	2787	UnitedRepublicofTanzania	Developing	2007	NA
##	2788	UnitedRepublicofTanzania	Developing	2006	NA
##	2789	UnitedRepublicofTanzania	Developing	2005	NA
##	2790	UnitedRepublicofTanzania	Developing	2004	NA
##	2791	UnitedRepublicofTanzania	Developing	2003	NA
##	2792	UnitedRepublicofTanzania	Developing	2002	NA
##	2793	UnitedRepublicofTanzania	Developing	2001	NA

## 2794	UnitedRepublicofTanzania	Developing	2000	NA
## 2795	UnitedStatesofAmerica	Developed	2015	NA
## 2796	UnitedStatesofAmerica	Developed	2014	NA
## 2797	UnitedStatesofAmerica	Developed	2013	NA
## 2798	UnitedStatesofAmerica	Developed	2012	NA
## 2799	UnitedStatesofAmerica	Developed	2011	NA
## 2800	UnitedStatesofAmerica	Developed	2010	NA
## 2801	UnitedStatesofAmerica	Developed	2009	NA
## 2802	UnitedStatesofAmerica	Developed	2008	NA
## 2803	UnitedStatesofAmerica	Developed	2007	NA
## 2804	UnitedStatesofAmerica	Developed	2006	NA
## 2805	UnitedStatesofAmerica	Developed	2005	NA
## 2806	UnitedStatesofAmerica	Developed	2004	NA
## 2807	UnitedStatesofAmerica	Developed	2003	NA
## 2808	UnitedStatesofAmerica	Developed	2002	NA
## 2809	UnitedStatesofAmerica	Developed	2001	NA
## 2810	UnitedStatesofAmerica	Developed	2000	NA
## 2859	Venezuela(BolivarianRepublicof)	Developing	2015	NA
## 2860	Venezuela(BolivarianRepublicof)	Developing	2014	NA
## 2861	Venezuela(BolivarianRepublicof)	Developing	2013	NA
## 2862	Venezuela(BolivarianRepublicof)	Developing	2012	NA
## 2863	Venezuela(BolivarianRepublicof)	Developing	2011	NA
## 2864	Venezuela(BolivarianRepublicof)	Developing	2010	NA
## 2865	Venezuela(BolivarianRepublicof)	Developing	2009	NA
## 2866	Venezuela(BolivarianRepublicof)	Developing	2008	NA
## 2867	Venezuela(BolivarianRepublicof)	Developing	2007	NA
## 2868	Venezuela(BolivarianRepublicof)	Developing	2006	NA
## 2869	Venezuela(BolivarianRepublicof)	Developing	2005	NA
## 2870	Venezuela(BolivarianRepublicof)	Developing	2004	NA
## 2871	Venezuela(BolivarianRepublicof)	Developing	2003	NA
## 2872	Venezuela(BolivarianRepublicof)	Developing	2002	NA
## 2873	Venezuela(BolivarianRepublicof)	Developing	2001	NA
## 2874	Venezuela(BolivarianRepublicof)	Developing	2000	NA
## 2875	VietNam	Developing	2015	NA
## 2876	VietNam	Developing	2014	NA
## 2877	VietNam	Developing	2013	NA
## 2878	VietNam	Developing	2012	NA
## 2879	VietNam	Developing	2011	NA
## 2880	VietNam	Developing	2010	NA
## 2881	VietNam	Developing	2009	NA
## 2882	VietNam	Developing	2008	NA
## 2883	VietNam	Developing	2007	NA
## 2884	VietNam	Developing	2006	NA
## 2885	VietNam	Developing	2005	NA
## 2886	VietNam	Developing	2004	NA
## 2887	VietNam	Developing	2003	NA
## 2888	VietNam	Developing	2002	NA
## 2889	VietNam	Developing	2001	NA
## 2890	VietNam	Developing	2000	NA
## 2891	Yemen	Developing	2015	NA
## 2892	Yemen	Developing	2014	NA
## 2893	Yemen	Developing	2013	NA
## 2894	Yemen	Developing	2012	NA
## 2895	Yemen	Developing	2011	NA

```
## 2896 Yemen Developing 2010 NA
## 2897 Yemen Developing 2009 NA
## 2898 Yemen Developing 2008 NA
## 2899 Yemen Developing 2007 NA
## 2900 Yemen Developing 2006 NA
## 2901 Yemen Developing 2005 NA
## 2902 Yemen Developing 2004 NA
## 2903 Yemen Developing 2003 NA
## 2904 Yemen Developing 2002 NA
## 2905 Yemen Developing 2001 NA
## 2906 Yemen Developing 2000 NA
```

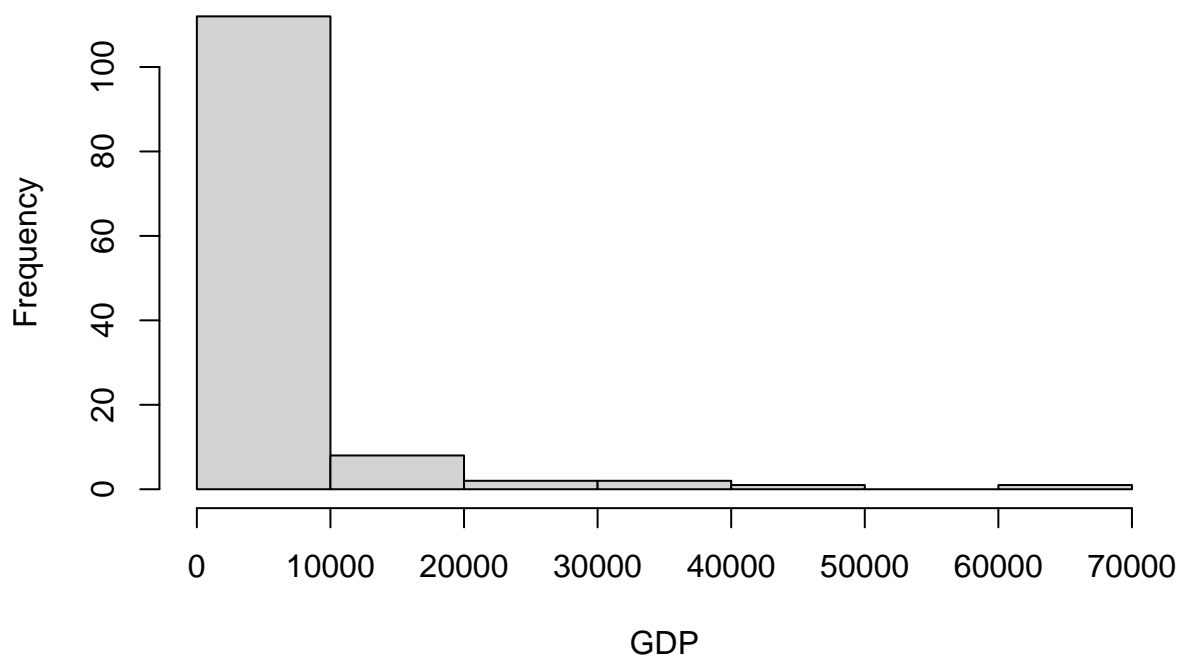
We can see that we have a couple of countries that do not have any GDP values provided. Most of these countries are developing countries. We will try to apply the same method that we used for filling the missing values

```
hist(data[which(data$Status == 'Developed' & !is.na(data$GDP)), "GDP"], main = 'Distribution of GDP Values
```



```
hist(data[which(data$Status == 'Developing' & data$Year=="2015" & !is.na(data$GDP)), "GDP"], main = 'Distr
```

Distribution of GDP Values for Developed Countries



On the whole, we can see that our GDP values for developed and developing countries do not follow a normal distribution. Hence if we wish to fill these values, we need to use the median. However, we will check the GDP for these countries year wise to check if we still get a non-normal distribution

```
for(i in unique(data$Year)){
  print(paste("Year :",i,"- p value :",shapiro.test(data[which(data$Status == 'Developed' & data$Year ==
```

```
## [1] "Year : 2015 - p value : 0.000108509616714546"
## [1] "Year : 2014 - p value : 0.000121102564407865"
## [1] "Year : 2013 - p value : 1.2344288972463e-06"
## [1] "Year : 2012 - p value : 0.00181391101075269"
## [1] "Year : 2011 - p value : 0.0072983905919662"
## [1] "Year : 2010 - p value : 0.000578086305749418"
## [1] "Year : 2009 - p value : 0.000672352407588833"
## [1] "Year : 2008 - p value : 0.0393025948631268"
## [1] "Year : 2007 - p value : 0.00932510886314166"
## [1] "Year : 2006 - p value : 0.00917650044572379"
## [1] "Year : 2005 - p value : 0.00627374054114069"
## [1] "Year : 2004 - p value : 0.00139742438262007"
## [1] "Year : 2003 - p value : 1.5182105501921e-05"
## [1] "Year : 2002 - p value : 0.00097976630009033"
## [1] "Year : 2001 - p value : 0.00978611985336714"
## [1] "Year : 2000 - p value : 0.00134577509907917"
```

According to the tests done on the GDP of developed countries for different years, the distribution of gdp values is not normal. Hence, we will use median as our central measure of tendency.

```
for(i in unique(data$Year)){
  print(paste("Year :",i,"- p value :",shapiro.test(data[which(data$Status == 'Developing' & data$Year == i])$stat.pvalue))
}
```

```
## [1] "Year : 2015 - p value : 3.75457379671937e-18"
## [1] "Year : 2014 - p value : 3.45312587067937e-18"
## [1] "Year : 2013 - p value : 1.28652438550043e-17"
## [1] "Year : 2012 - p value : 5.10982490974131e-18"
## [1] "Year : 2011 - p value : 1.12201796587688e-19"
## [1] "Year : 2010 - p value : 1.50404324349824e-18"
## [1] "Year : 2009 - p value : 3.78774134193904e-19"
## [1] "Year : 2008 - p value : 1.36223091583058e-19"
## [1] "Year : 2007 - p value : 2.54667895975296e-19"
## [1] "Year : 2006 - p value : 1.48912437626583e-19"
## [1] "Year : 2005 - p value : 3.20192707794672e-19"
## [1] "Year : 2004 - p value : 2.39342121618938e-19"
## [1] "Year : 2003 - p value : 6.35985282485179e-19"
## [1] "Year : 2002 - p value : 3.2880353754962e-19"
## [1] "Year : 2001 - p value : 4.54040738777004e-18"
## [1] "Year : 2000 - p value : 3.57292762900164e-19"
```

According to the tests done on the GPD of developing countries for different years, the distribution of gdp values is not normal. Hence, we will use median as our central measure of tendency.

```
for(i in unique(data$Year)){
  data[which(data$Status == 'Developed' & data$Year == i & is.na(data$GDP)), 'GDP'] = median(data[which(data$Status == 'Developed' & data$Year == i & is.na(data$GDP)), 'GDP'])
  data[which(data$Status == 'Developing' & data$Year == i & is.na(data$GDP)), 'GDP'] = median(data[which(data$Status == 'Developing' & data$Year == i & is.na(data$GDP)), 'GDP'])
}
```

Lets look at the remaining columns

```
na_columns <- c()
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
    na_columns <- append(na_columns, i)
  }
}
```

```
## [1] "HepatitisB has 553 missing values"
## [1] "Totalexpenditure has 226 missing values"
## [1] "Population has 644 missing values"
```

Now we will look at Total Expenditure

```
data[!complete.cases(data$Totalexpenditure), c("Country", "Status", "Year", "Totalexpenditure")]
```

```
##           Country      Status Year
## 33      Algeria Developing 2015
## 49      Angola  Developing 2015
## 65 AntiguaandBarbuda Developing 2015
## 81      Argentina Developing 2015
## 97      Armenia  Developing 2015
## 113     Australia  Developed 2015
## 129     Austria   Developed 2015
## 145     Azerbaijan Developing 2015
## 161     Bahamas  Developing 2015
```

## 177	Bahrain	Developing	2015
## 193	Bangladesh	Developing	2015
## 209	Barbados	Developing	2015
## 225	Belarus	Developing	2015
## 241	Belgium	Developed	2015
## 257	Belize	Developing	2015
## 273	Benin	Developing	2015
## 289	Bhutan	Developing	2015
## 305	Bolivia(PlurinationalStateof)	Developing	2015
## 321	BosniaandHerzegovina	Developing	2015
## 337	Botswana	Developing	2015
## 353	Brazil	Developing	2015
## 369	BruneiDarussalam	Developing	2015
## 385	Bulgaria	Developed	2015
## 401	BurkinaFaso	Developing	2015
## 417	Burundi	Developing	2015
## 433	CÃ´ted'Ivoire	Developing	2015
## 449	CaboVerde	Developing	2015
## 465	Cambodia	Developing	2015
## 481	Cameroon	Developing	2015
## 497	Canada	Developing	2015
## 513	CentralAfricanRepublic	Developing	2015
## 529	Chad	Developing	2015
## 545	Chile	Developing	2015
## 561	China	Developing	2015
## 577	Colombia	Developing	2015
## 593	Comoros	Developing	2015
## 609	Congo	Developing	2015
## 626	CostaRica	Developing	2015
## 642	Croatia	Developed	2015
## 658	Cuba	Developing	2015
## 674	Cyprus	Developed	2015
## 690	Czechia	Developed	2015
## 706	DemocraticPeople'sRepublicofKorea	Developing	2015
## 707	DemocraticPeople'sRepublicofKorea	Developing	2014
## 708	DemocraticPeople'sRepublicofKorea	Developing	2013
## 709	DemocraticPeople'sRepublicofKorea	Developing	2012
## 710	DemocraticPeople'sRepublicofKorea	Developing	2011
## 711	DemocraticPeople'sRepublicofKorea	Developing	2010
## 712	DemocraticPeople'sRepublicofKorea	Developing	2009
## 713	DemocraticPeople'sRepublicofKorea	Developing	2008
## 714	DemocraticPeople'sRepublicofKorea	Developing	2007
## 715	DemocraticPeople'sRepublicofKorea	Developing	2006
## 716	DemocraticPeople'sRepublicofKorea	Developing	2005
## 717	DemocraticPeople'sRepublicofKorea	Developing	2004
## 718	DemocraticPeople'sRepublicofKorea	Developing	2003
## 719	DemocraticPeople'sRepublicofKorea	Developing	2002
## 720	DemocraticPeople'sRepublicofKorea	Developing	2001
## 721	DemocraticPeople'sRepublicofKorea	Developing	2000
## 722	DemocraticRepublicoftheCongo	Developing	2015
## 738	Denmark	Developed	2015
## 754	Djibouti	Developing	2015
## 771	DominicanRepublic	Developing	2015
## 787	Ecuador	Developing	2015

## 803	Egypt	Developing	2015
## 819	ElSalvador	Developing	2015
## 835	EquatorialGuinea	Developing	2015
## 851	Eritrea	Developing	2015
## 867	Estonia	Developing	2015
## 883	Ethiopia	Developing	2015
## 899	Fiji	Developing	2015
## 915	Finland	Developing	2015
## 931	France	Developing	2015
## 947	Gabon	Developing	2015
## 963	Gambia	Developing	2015
## 979	Georgia	Developing	2015
## 995	Germany	Developed	2015
## 1011	Ghana	Developing	2015
## 1027	Greece	Developing	2015
## 1043	Grenada	Developing	2015
## 1059	Guatemala	Developing	2015
## 1075	Guinea	Developing	2015
## 1091	Guinea-Bissau	Developing	2015
## 1107	Guyana	Developing	2015
## 1123	Haiti	Developing	2015
## 1139	Honduras	Developing	2015
## 1155	Hungary	Developed	2015
## 1171	Iceland	Developed	2015
## 1187	India	Developing	2015
## 1203	Indonesia	Developing	2015
## 1219	Iran(IslamicRepublicof)	Developing	2015
## 1235	Iraq	Developing	2015
## 1248	Iraq	Developing	2002
## 1249	Iraq	Developing	2001
## 1250	Iraq	Developing	2000
## 1251	Ireland	Developed	2015
## 1267	Israel	Developing	2015
## 1283	Italy	Developed	2015
## 1299	Jamaica	Developing	2015
## 1315	Japan	Developed	2015
## 1331	Jordan	Developing	2015
## 1347	Kazakhstan	Developing	2015
## 1363	Kenya	Developing	2015
## 1379	Kiribati	Developing	2015
## 1395	Kuwait	Developing	2015
## 1411	Kyrgyzstan	Developing	2015
## 1427	LaoPeople'sDemocraticRepublic	Developing	2015
## 1443	Latvia	Developed	2015
## 1459	Lebanon	Developing	2015
## 1475	Lesotho	Developing	2015
## 1491	Liberia	Developing	2015
## 1507	Libya	Developing	2015
## 1523	Lithuania	Developed	2015
## 1539	Luxembourg	Developed	2015
## 1555	Madagascar	Developing	2015
## 1571	Malawi	Developing	2015
## 1587	Malaysia	Developing	2015
## 1603	Maldives	Developing	2015

## 1619	Mali	Developing	2015
## 1635	Malta	Developed	2015
## 1652	Mauritania	Developing	2015
## 1668	Mauritius	Developing	2015
## 1684	Mexico	Developing	2015
## 1700	Micronesia(FederatedStatesof)	Developing	2015
## 1717	Mongolia	Developing	2015
## 1733	Montenegro	Developing	2015
## 1749	Morocco	Developing	2015
## 1765	Mozambique	Developing	2015
## 1781	Myanmar	Developing	2015
## 1797	Namibia	Developing	2015
## 1814	Nepal	Developing	2015
## 1830	Netherlands	Developed	2015
## 1846	NewZealand	Developed	2015
## 1862	Nicaragua	Developing	2015
## 1878	Niger	Developing	2015
## 1894	Nigeria	Developing	2015
## 1911	Norway	Developed	2015
## 1927	Oman	Developing	2015
## 1943	Pakistan	Developing	2015
## 1960	Panama	Developing	2015
## 1976	PapuaNewGuinea	Developing	2015
## 1992	Paraguay	Developing	2015
## 2008	Peru	Developing	2015
## 2024	Philippines	Developing	2015
## 2040	Poland	Developed	2015
## 2056	Portugal	Developed	2015
## 2072	Qatar	Developing	2015
## 2088	RepublicofKorea	Developing	2015
## 2104	RepublicofMoldova	Developing	2015
## 2120	Romania	Developed	2015
## 2136	RussianFederation	Developing	2015
## 2152	Rwanda	Developing	2015
## 2169	SaintLucia	Developing	2015
## 2185	SaintVincentandtheGrenadines	Developing	2015
## 2201	Samoa	Developing	2015
## 2218	SaoTomeandPrincipe	Developing	2015
## 2234	SaudiArabia	Developing	2015
## 2250	Senegal	Developing	2015
## 2266	Serbia	Developing	2015
## 2282	Seychelles	Developing	2015
## 2298	SierraLeone	Developing	2015
## 2314	Singapore	Developed	2015
## 2330	Slovakia	Developed	2015
## 2346	Slovenia	Developed	2015
## 2362	SolomonIslands	Developing	2015
## 2378	Somalia	Developing	2015
## 2379	Somalia	Developing	2014
## 2380	Somalia	Developing	2013
## 2381	Somalia	Developing	2012
## 2382	Somalia	Developing	2011
## 2383	Somalia	Developing	2010
## 2384	Somalia	Developing	2009

##	2385	Somalia	Developing	2008
##	2386	Somalia	Developing	2007
##	2387	Somalia	Developing	2006
##	2388	Somalia	Developing	2005
##	2389	Somalia	Developing	2004
##	2390	Somalia	Developing	2003
##	2391	Somalia	Developing	2002
##	2392	Somalia	Developing	2001
##	2393	Somalia	Developing	2000
##	2394	SouthAfrica	Developing	2015
##	2410	SouthSudan	Developing	2015
##	2414	SouthSudan	Developing	2011
##	2415	SouthSudan	Developing	2010
##	2416	SouthSudan	Developing	2009
##	2417	SouthSudan	Developing	2008
##	2418	SouthSudan	Developing	2007
##	2419	SouthSudan	Developing	2006
##	2420	SouthSudan	Developing	2005
##	2421	SouthSudan	Developing	2004
##	2422	SouthSudan	Developing	2003
##	2423	SouthSudan	Developing	2002
##	2424	SouthSudan	Developing	2001
##	2425	SouthSudan	Developing	2000
##	2426	Spain	Developed	2015
##	2442	SriLanka	Developing	2015
##	2458	Sudan	Developing	2015
##	2474	Suriname	Developing	2015
##	2490	Swaziland	Developing	2015
##	2506	Sweden	Developed	2015
##	2522	Switzerland	Developed	2015
##	2538	SyrianArabRepublic	Developing	2015
##	2554	Tajikistan	Developing	2015
##	2570	Thailand	Developing	2015
##	2586	TheformerYugoslavrepublicofMacedonia	Developing	2015
##	2602	Timor-Leste	Developing	2015
##	2618	Togo	Developing	2015
##	2634	Tonga	Developing	2015
##	2650	TrinidadandTobago	Developing	2015
##	2666	Tunisia	Developing	2015
##	2682	Turkey	Developing	2015
##	2698	Turkmenistan	Developing	2015
##	2715	Uganda	Developing	2015
##	2731	Ukraine	Developing	2015
##	2747	UnitedArabEmirates	Developing	2015
##	2763	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2015
##	2779	UnitedRepublicofTanzania	Developing	2015
##	2795	UnitedStatesofAmerica	Developed	2015
##	2811	Uruguay	Developing	2015
##	2827	Uzbekistan	Developing	2015
##	2843	Vanuatu	Developing	2015
##	2859	Venezuela(BolivarianRepublicof)	Developing	2015
##	2875	VietNam	Developing	2015
##	2891	Yemen	Developing	2015
##	2907	Zambia	Developing	2015

## 2923		Zimbabwe Developing 2015
##	Totalexpenditure	
## 33	NA	
## 49	NA	
## 65	NA	
## 81	NA	
## 97	NA	
## 113	NA	
## 129	NA	
## 145	NA	
## 161	NA	
## 177	NA	
## 193	NA	
## 209	NA	
## 225	NA	
## 241	NA	
## 257	NA	
## 273	NA	
## 289	NA	
## 305	NA	
## 321	NA	
## 337	NA	
## 353	NA	
## 369	NA	
## 385	NA	
## 401	NA	
## 417	NA	
## 433	NA	
## 449	NA	
## 465	NA	
## 481	NA	
## 497	NA	
## 513	NA	
## 529	NA	
## 545	NA	
## 561	NA	
## 577	NA	
## 593	NA	
## 609	NA	
## 626	NA	
## 642	NA	
## 658	NA	
## 674	NA	
## 690	NA	
## 706	NA	
## 707	NA	
## 708	NA	
## 709	NA	
## 710	NA	
## 711	NA	
## 712	NA	
## 713	NA	
## 714	NA	
## 715	NA	

## 716	NA
## 717	NA
## 718	NA
## 719	NA
## 720	NA
## 721	NA
## 722	NA
## 738	NA
## 754	NA
## 771	NA
## 787	NA
## 803	NA
## 819	NA
## 835	NA
## 851	NA
## 867	NA
## 883	NA
## 899	NA
## 915	NA
## 931	NA
## 947	NA
## 963	NA
## 979	NA
## 995	NA
## 1011	NA
## 1027	NA
## 1043	NA
## 1059	NA
## 1075	NA
## 1091	NA
## 1107	NA
## 1123	NA
## 1139	NA
## 1155	NA
## 1171	NA
## 1187	NA
## 1203	NA
## 1219	NA
## 1235	NA
## 1248	NA
## 1249	NA
## 1250	NA
## 1251	NA
## 1267	NA
## 1283	NA
## 1299	NA
## 1315	NA
## 1331	NA
## 1347	NA
## 1363	NA
## 1379	NA
## 1395	NA
## 1411	NA
## 1427	NA

## 1443	NA
## 1459	NA
## 1475	NA
## 1491	NA
## 1507	NA
## 1523	NA
## 1539	NA
## 1555	NA
## 1571	NA
## 1587	NA
## 1603	NA
## 1619	NA
## 1635	NA
## 1652	NA
## 1668	NA
## 1684	NA
## 1700	NA
## 1717	NA
## 1733	NA
## 1749	NA
## 1765	NA
## 1781	NA
## 1797	NA
## 1814	NA
## 1830	NA
## 1846	NA
## 1862	NA
## 1878	NA
## 1894	NA
## 1911	NA
## 1927	NA
## 1943	NA
## 1960	NA
## 1976	NA
## 1992	NA
## 2008	NA
## 2024	NA
## 2040	NA
## 2056	NA
## 2072	NA
## 2088	NA
## 2104	NA
## 2120	NA
## 2136	NA
## 2152	NA
## 2169	NA
## 2185	NA
## 2201	NA
## 2218	NA
## 2234	NA
## 2250	NA
## 2266	NA
## 2282	NA
## 2298	NA

## 2314	NA
## 2330	NA
## 2346	NA
## 2362	NA
## 2378	NA
## 2379	NA
## 2380	NA
## 2381	NA
## 2382	NA
## 2383	NA
## 2384	NA
## 2385	NA
## 2386	NA
## 2387	NA
## 2388	NA
## 2389	NA
## 2390	NA
## 2391	NA
## 2392	NA
## 2393	NA
## 2394	NA
## 2410	NA
## 2414	NA
## 2415	NA
## 2416	NA
## 2417	NA
## 2418	NA
## 2419	NA
## 2420	NA
## 2421	NA
## 2422	NA
## 2423	NA
## 2424	NA
## 2425	NA
## 2426	NA
## 2442	NA
## 2458	NA
## 2474	NA
## 2490	NA
## 2506	NA
## 2522	NA
## 2538	NA
## 2554	NA
## 2570	NA
## 2586	NA
## 2602	NA
## 2618	NA
## 2634	NA
## 2650	NA
## 2666	NA
## 2682	NA
## 2698	NA
## 2715	NA
## 2731	NA

```
## 2747      NA
## 2763      NA
## 2779      NA
## 2795      NA
## 2811      NA
## 2827      NA
## 2843      NA
## 2859      NA
## 2875      NA
## 2891      NA
## 2907      NA
## 2923      NA
```

We can see that the predominant share of missing values relate to the year 2015.

```
median(data[which(data$Country == 'UnitedStatesofAmerica'),'Totalexpenditure'],na.rm = TRUE)
```

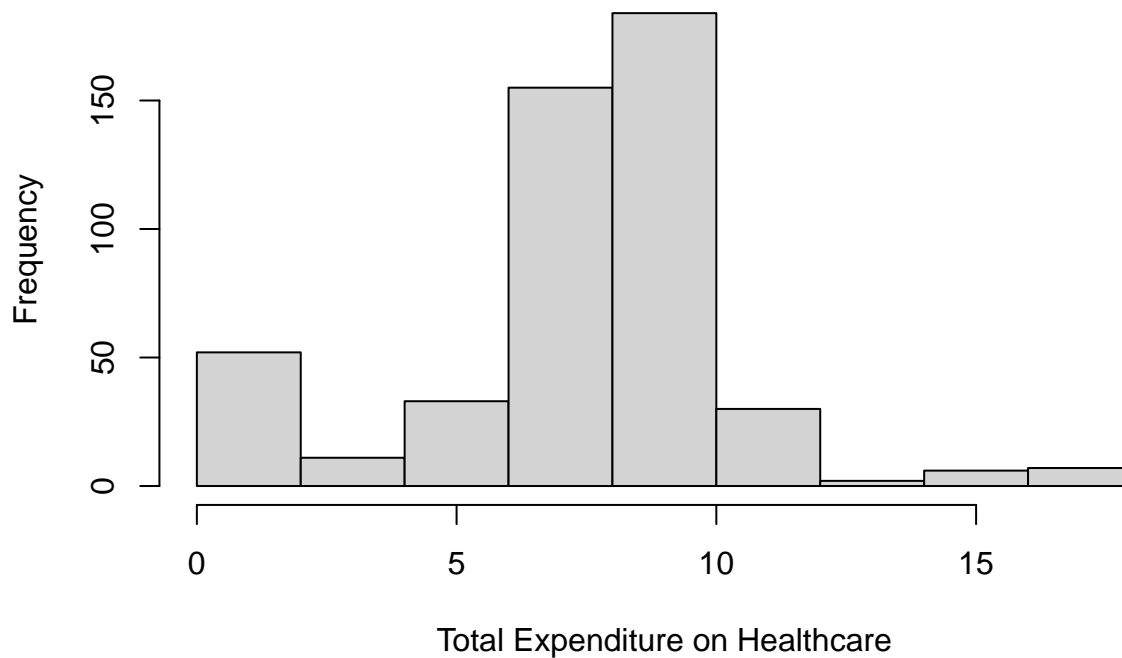
```
## [1] 15.6
```

```
countries_to_separate <- c("DemocraticPeople'sRepublicofKorea",'Iraq','Somalia')
countries_to_separate
```

```
## [1] "DemocraticPeople'sRepublicofKorea" "Iraq"
## [3] "Somalia"
```

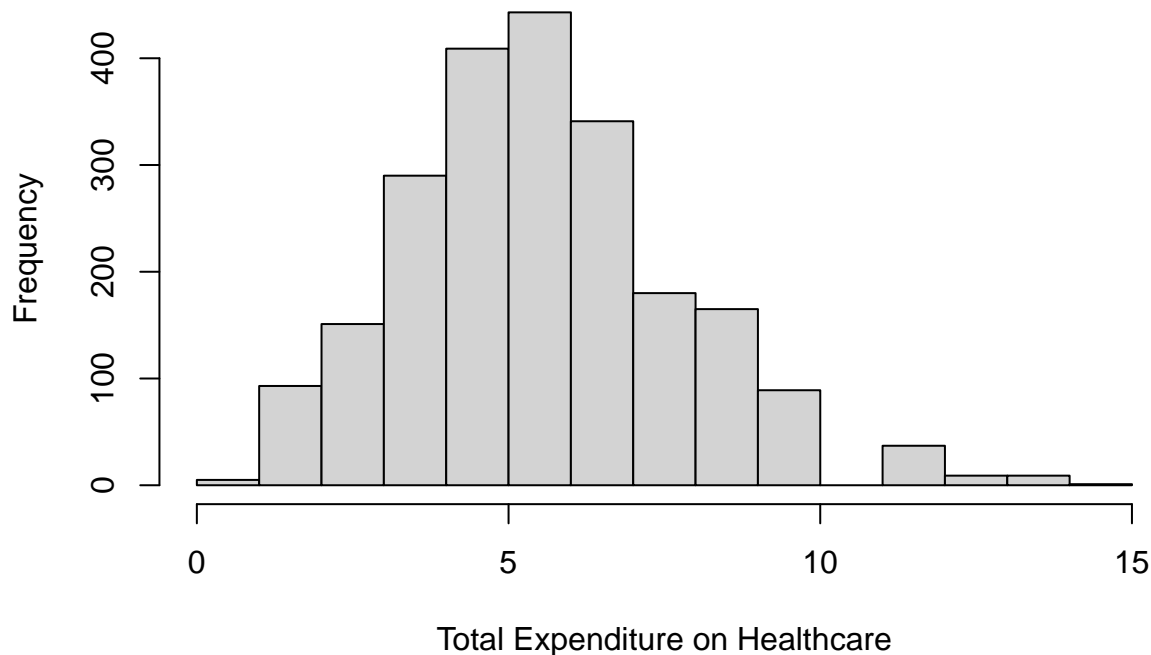
```
hist(data[which(data$Status == 'Developed'),'Totalexpenditure'],main = 'Distribution of Total Expenditure on Healthcare for Developed Countries')
```

Distribution of Total Expenditure Values for Developed Countries



```
hist(data[which(data$Status == 'Developing'),'Totalexpenditure'],main = 'Distribution of Total Expenditure on Healthcare for Developing Countries')
```

Distribution of Total Expenditure Values for Developed Countries



```
summary(data[which(data$Status == 'Developed'),'Totalexpenditure'])
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's
##      1.100  6.407   7.895   7.554  9.213  17.600       32
```

```
summary(data[which(data$Status == 'Developing'),'Totalexpenditure'])
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's
##      0.370  4.140   5.400   5.579  6.830  14.390      194
```

```
for(i in unique(data[which(data$Status == 'Developed' & data$Country != "DemocraticPeople'sRepublicofKor
  print(paste("Country :",i,"- p value :",shapiro.test(data[which(data$Country == i & data$Status == 'D
})
```

```
## [1] "Country : Australia - p value : 0.0875473405119973"
## [1] "Country : Austria - p value : 5.40206308415831e-05"
## [1] "Country : Belgium - p value : 0.000315135530872177"
## [1] "Country : Bulgaria - p value : 0.55601628763009"
## [1] "Country : Croatia - p value : 0.191906172240753"
## [1] "Country : Cyprus - p value : 0.110688651771408"
## [1] "Country : Czechia - p value : 0.521221646975219"
## [1] "Country : Denmark - p value : 0.00108835348799314"
## [1] "Country : Germany - p value : 3.11383556044096e-05"
## [1] "Country : Hungary - p value : 0.286893260262662"
## [1] "Country : Iceland - p value : 1.42859073860093e-06"
## [1] "Country : Ireland - p value : 0.990773972514196"
## [1] "Country : Italy - p value : 0.137186938673442"
## [1] "Country : Japan - p value : 0.000349115186908941"
```

```
## [1] "Country : Latvia - p value : 0.968808211809154"
## [1] "Country : Lithuania - p value : 0.112345915219341"
## [1] "Country : Luxembourg - p value : 0.809105188526545"
## [1] "Country : Malta - p value : 0.435492402877774"
## [1] "Country : Netherlands - p value : 0.00424276371938674"
## [1] "Country : NewZealand - p value : 0.00350263387074808"
## [1] "Country : Norway - p value : 0.36511929304307"
## [1] "Country : Poland - p value : 0.704702201493705"
## [1] "Country : Portugal - p value : 1.48791662596106e-05"
## [1] "Country : Romania - p value : 0.00266997332635428"
## [1] "Country : Singapore - p value : 0.957800573246036"
## [1] "Country : Slovakia - p value : 0.0551086180836208"
## [1] "Country : Slovenia - p value : 0.225504123424096"
## [1] "Country : Spain - p value : 0.0845387842540514"
## [1] "Country : Sweden - p value : 0.0135083008103122"
## [1] "Country : Switzerland - p value : 0.000291949749293316"
## [1] "Country : UnitedKingdomofGreatBritainandNorthernIreland - p value : 0.516542408444354"
## [1] "Country : UnitedStatesofAmerica - p value : 0.17836937000375"
```

According to the tests done on the total expenditure of developed countries for different years, majority of the expenditures indicate normal. Hence, we will use mean as our central measure of tendency.

```
for(i in unique(data[which(data$Status == 'Developing' & data$Country != "DemocraticPeople'sRepublicofKor
  print(paste("Country :",i,"- p value :",shapiro.test(data[which(data$Country == i),'Total'expenditure'
})
```

```
## [1] "Country : Afghanistan - p value : 0.934528573612463"
## [1] "Country : Albania - p value : 0.851711256159574"
## [1] "Country : Algeria - p value : 0.0144226412893623"
## [1] "Country : Angola - p value : 0.585114939789359"
## [1] "Country : AntiguaandBarbuda - p value : 0.02457732105638"
## [1] "Country : Argentina - p value : 0.461383413102695"
## [1] "Country : Armenia - p value : 0.318213748243121"
## [1] "Country : Azerbaijan - p value : 0.0970203515958121"
## [1] "Country : Bahamas - p value : 0.0103937325274767"
## [1] "Country : Bahrain - p value : 0.0735432629655138"
## [1] "Country : Bangladesh - p value : 0.0409280345540064"
## [1] "Country : Barbados - p value : 0.0419138826934562"
## [1] "Country : Belarus - p value : 0.0766178513244042"
## [1] "Country : Belize - p value : 0.00978076674722632"
## [1] "Country : Benin - p value : 0.366808529591222"
## [1] "Country : Bhutan - p value : 0.864526383004874"
## [1] "Country : Bolivia(PlurinationalStateof) - p value : 0.442170216454805"
## [1] "Country : BosniaandHerzegovina - p value : 0.101142655684704"
## [1] "Country : Botswana - p value : 0.329129136671444"
## [1] "Country : Brazil - p value : 0.0364825031014662"
## [1] "Country : BruneiDarussalam - p value : 0.0723846291063655"
## [1] "Country : BurkinaFaso - p value : 0.280899571433479"
## [1] "Country : Burundi - p value : 0.578883624172695"
## [1] "Country : CÃ´ted'Ivoire - p value : 0.0644737769559513"
## [1] "Country : CaboVerde - p value : 0.959752860323671"
## [1] "Country : Cambodia - p value : 0.0107241689385436"
## [1] "Country : Cameroon - p value : 0.908218760699376"
## [1] "Country : Canada - p value : 0.00064949353418675"
## [1] "Country : CentralAfricanRepublic - p value : 0.315625955528883"
```



```

## [1] "Country : Chad - p value : 0.00392435001583329"
## [1] "Country : Chile - p value : 0.812806900265984"
## [1] "Country : China - p value : 0.164174999751255"
## [1] "Country : Colombia - p value : 0.495967610326764"
## [1] "Country : Comoros - p value : 0.39901371816391"
## [1] "Country : Congo - p value : 0.000169729778148853"
## [1] "Country : CostaRica - p value : 0.0836983715741051"
## [1] "Country : Cuba - p value : 0.125111693623576"
## [1] "Country : DemocraticRepublicoftheCongo - p value : 0.861072258054947"
## [1] "Country : Djibouti - p value : 0.0233610477547825"
## [1] "Country : DominicanRepublic - p value : 0.000524292651893206"
## [1] "Country : Ecuador - p value : 0.129246326491181"
## [1] "Country : Egypt - p value : 0.948406508565398"
## [1] "Country : ElSalvador - p value : 0.196514910727556"
## [1] "Country : EquatorialGuinea - p value : 0.132050130920829"
## [1] "Country : Eritrea - p value : 0.0811164517486756"
## [1] "Country : Estonia - p value : 0.0335052779114933"
## [1] "Country : Ethiopia - p value : 0.00207376213905838"
## [1] "Country : Fiji - p value : 0.533873215422748"
## [1] "Country : Finland - p value : 0.458268500191911"
## [1] "Country : France - p value : 0.000273395152690608"
## [1] "Country : Gabon - p value : 0.772571674952511"
## [1] "Country : Gambia - p value : 0.267902233157793"
## [1] "Country : Georgia - p value : 8.56816321926221e-05"
## [1] "Country : Ghana - p value : 0.161449178434137"
## [1] "Country : Greece - p value : 0.205078058558617"
## [1] "Country : Grenada - p value : 0.325180486200147"
## [1] "Country : Guatemala - p value : 0.0300364712631306"
## [1] "Country : Guinea - p value : 0.06103774330461"
## [1] "Country : Guinea-Bissau - p value : 0.77662255006457"
## [1] "Country : Guyana - p value : 0.761477130431212"
## [1] "Country : Haiti - p value : 0.265087157243781"
## [1] "Country : Honduras - p value : 0.994709089313269"
## [1] "Country : India - p value : 0.0417973731028866"
## [1] "Country : Indonesia - p value : 0.105037607371614"
## [1] "Country : Iran(IslamicRepublicof) - p value : 0.999596300800565"
## [1] "Country : Israel - p value : 0.126435429039737"
## [1] "Country : Jamaica - p value : 0.931659317951984"
## [1] "Country : Jordan - p value : 0.450343076069816"
## [1] "Country : Kazakhstan - p value : 0.724117966864244"
## [1] "Country : Kenya - p value : 0.177923618794231"
## [1] "Country : Kiribati - p value : 0.00270535442651798"
## [1] "Country : Kuwait - p value : 0.357397232918794"
## [1] "Country : Kyrgyzstan - p value : 0.0352854552777738"
## [1] "Country : LaoPeople'sDemocraticRepublic - p value : 0.069572393480732"
## [1] "Country : Lebanon - p value : 0.00233178147752355"
## [1] "Country : Lesotho - p value : 0.0926814430861191"
## [1] "Country : Liberia - p value : 0.271976753819508"
## [1] "Country : Libya - p value : 0.0891429538424441"
## [1] "Country : Madagascar - p value : 0.314111602316601"
## [1] "Country : Malawi - p value : 0.307027512200425"
## [1] "Country : Malaysia - p value : 0.198693911907259"
## [1] "Country : Maldives - p value : 0.0963501979371161"
## [1] "Country : Mali - p value : 0.0925986458684594"

```

```

## [1] "Country : Mauritania - p value : 0.274604543606329"
## [1] "Country : Mauritius - p value : 0.874424831143605"
## [1] "Country : Mexico - p value : 0.0534752299761347"
## [1] "Country : Micronesia(FederatedStatesof) - p value : 0.00259190680829109"
## [1] "Country : Mongolia - p value : 0.304257565543134"
## [1] "Country : Montenegro - p value : 0.15519380087761"
## [1] "Country : Morocco - p value : 0.086979957367645"
## [1] "Country : Mozambique - p value : 0.924568249526389"
## [1] "Country : Myanmar - p value : 0.052937921138938"
## [1] "Country : Namibia - p value : 0.135201239449028"
## [1] "Country : Nepal - p value : 0.0670165623892193"
## [1] "Country : Nicaragua - p value : 0.0700745417951665"
## [1] "Country : Niger - p value : 0.807133724563057"
## [1] "Country : Nigeria - p value : 0.534355184682105"
## [1] "Country : Oman - p value : 0.493669710046261"
## [1] "Country : Pakistan - p value : 0.0914172827504255"
## [1] "Country : Panama - p value : 0.767207429467459"
## [1] "Country : PapuaNewGuinea - p value : 0.0282763741107389"
## [1] "Country : Paraguay - p value : 0.0236617518047123"
## [1] "Country : Peru - p value : 0.438613725738123"
## [1] "Country : Philippines - p value : 0.0666804578922737"
## [1] "Country : Qatar - p value : 0.066447233452739"
## [1] "Country : RepublicofKorea - p value : 0.259400483787322"
## [1] "Country : RepublicofMoldova - p value : 0.0333030478801757"
## [1] "Country : RussianFederation - p value : 0.0764527642615802"
## [1] "Country : Rwanda - p value : 0.0087731244329302"
## [1] "Country : SaintLucia - p value : 0.153249744646783"
## [1] "Country : SaintVincentandtheGrenadines - p value : 0.000228251967952365"
## [1] "Country : Samoa - p value : 0.0240381573772573"
## [1] "Country : SaoTomeandPrincipe - p value : 0.122485247148653"
## [1] "Country : SaudiArabia - p value : 0.525840307956393"
## [1] "Country : Senegal - p value : 0.207804179648277"
## [1] "Country : Serbia - p value : 0.00294262218556315"
## [1] "Country : Seychelles - p value : 0.475589396272715"
## [1] "Country : SierraLeone - p value : 0.00012065928152468"
## [1] "Country : SolomonIslands - p value : 0.593618552145097"
## [1] "Country : SouthAfrica - p value : 0.0922407623051467"
## [1] "Country : SriLanka - p value : 0.135345438704396"
## [1] "Country : Sudan - p value : 0.000734132279813766"
## [1] "Country : Suriname - p value : 0.0024030455294812"
## [1] "Country : Swaziland - p value : 0.134434114683985"
## [1] "Country : SyrianArabRepublic - p value : 0.00900027188408763"
## [1] "Country : Tajikistan - p value : 0.224171735173998"
## [1] "Country : Thailand - p value : 0.113855331890776"
## [1] "Country : TheformerYugoslavrepublicofMacedonia - p value : 0.0186577533501331"
## [1] "Country : Timor-Leste - p value : 0.0102592073815883"
## [1] "Country : Togo - p value : 0.339026022387482"
## [1] "Country : Tonga - p value : 0.237731590447461"
## [1] "Country : TrinidadandTobago - p value : 0.826755886255957"
## [1] "Country : Tunisia - p value : 0.00543555184223461"
## [1] "Country : Turkey - p value : 0.00437835812645356"
## [1] "Country : Turkmenistan - p value : 0.021170499207272"
## [1] "Country : Uganda - p value : 0.295773272178873"
## [1] "Country : Ukraine - p value : 0.464242043522061"

```

```
## [1] "Country : UnitedArabEmirates - p value : 0.0518171579356933"
## [1] "Country : UnitedRepublicofTanzania - p value : 0.967381511330845"
## [1] "Country : Uruguay - p value : 0.0389763442799193"
## [1] "Country : Uzbekistan - p value : 0.118816653009785"
## [1] "Country : Vanuatu - p value : 0.064875603695332"
## [1] "Country : Venezuela(BolivarianRepublicof) - p value : 0.202946213104588"
## [1] "Country : VietNam - p value : 0.599433225525069"
## [1] "Country : Yemen - p value : 0.622723412131566"
## [1] "Country : Zambia - p value : 0.0521006843374514"
## [1] "Country : Zimbabwe - p value : 0.0668673878965573"
```

According to the tests done on the total expenditure of developing countries for different years, majority of the expenditures values are normal. Hence, we will use mean as our central measure of tendency.

Before proceeding, we will first sort out the instances for SouthSudan

```
data[which(data$Country == 'SouthSudan'),'Totalexpenditure'][5:16] <- data[which(data$Country == 'Sudan'
for(i in unique(data[which(data$Status == 'Developed'& data$Country != "DemocraticPeople'sRepublicofKor
data[which(data$Country == i & data$Year == "2015"),'Totalexpenditure'] <- mean(data[which(data$Count
})

for(i in unique(data[which(data$Status == 'Developing'& data$Country != "DemocraticPeople'sRepublicofKor
data[which(data$Country == i & data$Year == "2015"),'Totalexpenditure'] <- mean(data[which(data$Count
})

data[!complete.cases(data$Totalexpenditure),c("Country","Status","Year","Totalexpenditure")]

##           Country      Status Year Totalexpenditure
## 706 DemocraticPeople'sRepublicofKorea Developing 2015          NA
## 707 DemocraticPeople'sRepublicofKorea Developing 2014          NA
## 708 DemocraticPeople'sRepublicofKorea Developing 2013          NA
## 709 DemocraticPeople'sRepublicofKorea Developing 2012          NA
## 710 DemocraticPeople'sRepublicofKorea Developing 2011          NA
## 711 DemocraticPeople'sRepublicofKorea Developing 2010          NA
## 712 DemocraticPeople'sRepublicofKorea Developing 2009          NA
## 713 DemocraticPeople'sRepublicofKorea Developing 2008          NA
## 714 DemocraticPeople'sRepublicofKorea Developing 2007          NA
## 715 DemocraticPeople'sRepublicofKorea Developing 2006          NA
## 716 DemocraticPeople'sRepublicofKorea Developing 2005          NA
## 717 DemocraticPeople'sRepublicofKorea Developing 2004          NA
## 718 DemocraticPeople'sRepublicofKorea Developing 2003          NA
## 719 DemocraticPeople'sRepublicofKorea Developing 2002          NA
## 720 DemocraticPeople'sRepublicofKorea Developing 2001          NA
## 721 DemocraticPeople'sRepublicofKorea Developing 2000          NA
## 1235                Iraq Developing 2015          NA
## 1248                Iraq Developing 2002          NA
## 1249                Iraq Developing 2001          NA
## 1250                Iraq Developing 2000          NA
## 2378                Somalia Developing 2015          NA
## 2379                Somalia Developing 2014          NA
## 2380                Somalia Developing 2013          NA
## 2381                Somalia Developing 2012          NA
```

```
## 2382          Somalia Developing 2011          NA
## 2383          Somalia Developing 2010          NA
## 2384          Somalia Developing 2009          NA
## 2385          Somalia Developing 2008          NA
## 2386          Somalia Developing 2007          NA
## 2387          Somalia Developing 2006          NA
## 2388          Somalia Developing 2005          NA
## 2389          Somalia Developing 2004          NA
## 2390          Somalia Developing 2003          NA
## 2391          Somalia Developing 2002          NA
## 2392          Somalia Developing 2001          NA
## 2393          Somalia Developing 2000          NA
```

Lets look at the remaining columns

```
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
  }
}
```

```
## [1] "HepatitisB has 553 missing values"
## [1] "Totalexpenditure has 36 missing values"
## [1] "Population has 644 missing values"
```

```
data[which(data$Country=='Iraq'), 'Totalexpenditure'][14:16] <- mean(data[which(data$Country=='Iraq'), 'Totalexpenditure'])
data[which(data$Country=='Iraq'), 'Totalexpenditure'][1] <- mean(data[which(data$Country=='Iraq'), 'Totalexpenditure'])
```

```
for(i in unique(data$Year)){
  data[which(data$Year == i & is.na(data$Totalexpenditure)), "Totalexpenditure"] <- mean(data[which(data$Year == i & is.na(data$Totalexpenditure)), "Totalexpenditure"])
}
```

Lets look at the remaining columns

```
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
  }
}
```

```
## [1] "HepatitisB has 553 missing values"
## [1] "Population has 644 missing values"
```

We need to check the Hepatitis B immunizations column

```
data[!complete.cases(data$HepatitisB), c("Country", "Status", "Year", "HepatitisB")]
```

```
##          Country      Status Year HepatitisB
## 45      Algeria Developing 2003          NA
## 46      Algeria Developing 2002          NA
## 47      Algeria Developing 2001          NA
## 48      Algeria Developing 2000          NA
## 58      Angola Developing 2006          NA
## 59      Angola Developing 2005          NA
## 60      Angola Developing 2004          NA
## 61      Angola Developing 2003          NA
## 62      Angola Developing 2002          NA
## 63      Angola Developing 2001          NA
```

## 64	Angola	Developing	2000	NA
## 80	AntiguaandBarbuda	Developing	2000	NA
## 95	Argentina	Developing	2001	NA
## 96	Argentina	Developing	2000	NA
## 128	Australia	Developed	2000	NA
## 159	Azerbaijan	Developing	2001	NA
## 160	Azerbaijan	Developing	2000	NA
## 176	Bahamas	Developing	2000	NA
## 206	Bangladesh	Developing	2002	NA
## 207	Bangladesh	Developing	2001	NA
## 208	Bangladesh	Developing	2000	NA
## 224	Barbados	Developing	2000	NA
## 287	Benin	Developing	2001	NA
## 288	Benin	Developing	2000	NA
## 333	BosniaandHerzegovina	Developing	2003	NA
## 334	BosniaandHerzegovina	Developing	2002	NA
## 335	BosniaandHerzegovina	Developing	2001	NA
## 336	BosniaandHerzegovina	Developing	2000	NA
## 411	BurkinaFaso	Developing	2005	NA
## 412	BurkinaFaso	Developing	2004	NA
## 413	BurkinaFaso	Developing	2003	NA
## 414	BurkinaFaso	Developing	2002	NA
## 415	BurkinaFaso	Developing	2001	NA
## 416	BurkinaFaso	Developing	2000	NA
## 429	Burundi	Developing	2003	NA
## 430	Burundi	Developing	2002	NA
## 431	Burundi	Developing	2001	NA
## 432	Burundi	Developing	2000	NA
## 448	CÃ´ted'Ivoire	Developing	2000	NA
## 463	CaboVerde	Developing	2001	NA
## 464	CaboVerde	Developing	2000	NA
## 475	Cambodia	Developing	2005	NA
## 476	Cambodia	Developing	2004	NA
## 477	Cambodia	Developing	2003	NA
## 478	Cambodia	Developing	2002	NA
## 479	Cambodia	Developing	2001	NA
## 480	Cambodia	Developing	2000	NA
## 492	Cameroon	Developing	2004	NA
## 493	Cameroon	Developing	2003	NA
## 494	Cameroon	Developing	2002	NA
## 495	Cameroon	Developing	2001	NA
## 496	Cameroon	Developing	2000	NA
## 510	Canada	Developing	2002	NA
## 511	Canada	Developing	2001	NA
## 512	Canada	Developing	2000	NA
## 520	CentralAfricanRepublic	Developing	2008	NA
## 521	CentralAfricanRepublic	Developing	2007	NA
## 522	CentralAfricanRepublic	Developing	2006	NA
## 523	CentralAfricanRepublic	Developing	2005	NA
## 524	CentralAfricanRepublic	Developing	2004	NA
## 525	CentralAfricanRepublic	Developing	2003	NA
## 526	CentralAfricanRepublic	Developing	2002	NA
## 527	CentralAfricanRepublic	Developing	2001	NA
## 528	CentralAfricanRepublic	Developing	2000	NA

## 537	Chad	Developing	2007	NA
## 538	Chad	Developing	2006	NA
## 539	Chad	Developing	2005	NA
## 540	Chad	Developing	2004	NA
## 541	Chad	Developing	2003	NA
## 542	Chad	Developing	2002	NA
## 543	Chad	Developing	2001	NA
## 544	Chad	Developing	2000	NA
## 555	Chile	Developing	2005	NA
## 556	Chile	Developing	2004	NA
## 557	Chile	Developing	2003	NA
## 558	Chile	Developing	2002	NA
## 559	Chile	Developing	2001	NA
## 560	Chile	Developing	2000	NA
## 606	Comoros	Developing	2002	NA
## 607	Comoros	Developing	2001	NA
## 608	Comoros	Developing	2000	NA
## 618	Congo	Developing	2006	NA
## 619	Congo	Developing	2005	NA
## 620	Congo	Developing	2004	NA
## 621	Congo	Developing	2003	NA
## 622	Congo	Developing	2002	NA
## 623	Congo	Developing	2001	NA
## 624	Congo	Developing	2000	NA
## 651	Croatia	Developed	2006	NA
## 652	Croatia	Developed	2005	NA
## 653	Croatia	Developed	2004	NA
## 654	Croatia	Developed	2003	NA
## 655	Croatia	Developed	2002	NA
## 656	Croatia	Developed	2001	NA
## 657	Croatia	Developed	2000	NA
## 704	Czechia	Developed	2001	NA
## 705	Czechia	Developed	2000	NA
## 719	DemocraticPeople'sRepublicofKorea	Developing	2002	NA
## 720	DemocraticPeople'sRepublicofKorea	Developing	2001	NA
## 721	DemocraticPeople'sRepublicofKorea	Developing	2000	NA
## 731	DemocraticRepublicoftheCongo	Developing	2006	NA
## 732	DemocraticRepublicoftheCongo	Developing	2005	NA
## 733	DemocraticRepublicoftheCongo	Developing	2004	NA
## 734	DemocraticRepublicoftheCongo	Developing	2003	NA
## 735	DemocraticRepublicoftheCongo	Developing	2002	NA
## 736	DemocraticRepublicoftheCongo	Developing	2001	NA
## 737	DemocraticRepublicoftheCongo	Developing	2000	NA
## 738	Denmark	Developed	2015	NA
## 739	Denmark	Developed	2014	NA
## 740	Denmark	Developed	2013	NA
## 741	Denmark	Developed	2012	NA
## 742	Denmark	Developed	2011	NA
## 743	Denmark	Developed	2010	NA
## 744	Denmark	Developed	2009	NA
## 745	Denmark	Developed	2008	NA
## 746	Denmark	Developed	2007	NA
## 747	Denmark	Developed	2006	NA
## 748	Denmark	Developed	2005	NA

## 749	Denmark	Developed	2004	NA
## 750	Denmark	Developed	2003	NA
## 751	Denmark	Developed	2002	NA
## 752	Denmark	Developed	2001	NA
## 753	Denmark	Developed	2000	NA
## 763	Djibouti	Developing	2006	NA
## 764	Djibouti	Developing	2005	NA
## 765	Djibouti	Developing	2004	NA
## 766	Djibouti	Developing	2003	NA
## 767	Djibouti	Developing	2002	NA
## 768	Djibouti	Developing	2001	NA
## 769	Djibouti	Developing	2000	NA
## 837	EquatorialGuinea	Developing	2013	NA
## 838	EquatorialGuinea	Developing	2012	NA
## 839	EquatorialGuinea	Developing	2011	NA
## 840	EquatorialGuinea	Developing	2010	NA
## 841	EquatorialGuinea	Developing	2009	NA
## 842	EquatorialGuinea	Developing	2008	NA
## 843	EquatorialGuinea	Developing	2007	NA
## 844	EquatorialGuinea	Developing	2006	NA
## 845	EquatorialGuinea	Developing	2005	NA
## 846	EquatorialGuinea	Developing	2004	NA
## 847	EquatorialGuinea	Developing	2003	NA
## 848	EquatorialGuinea	Developing	2002	NA
## 849	EquatorialGuinea	Developing	2001	NA
## 850	EquatorialGuinea	Developing	2000	NA
## 865	Eritrea	Developing	2001	NA
## 866	Eritrea	Developing	2000	NA
## 879	Estonia	Developing	2003	NA
## 880	Estonia	Developing	2002	NA
## 881	Estonia	Developing	2001	NA
## 882	Estonia	Developing	2000	NA
## 892	Ethiopia	Developing	2006	NA
## 893	Ethiopia	Developing	2005	NA
## 894	Ethiopia	Developing	2004	NA
## 895	Ethiopia	Developing	2003	NA
## 896	Ethiopia	Developing	2002	NA
## 897	Ethiopia	Developing	2001	NA
## 898	Ethiopia	Developing	2000	NA
## 915	Finland	Developing	2015	NA
## 916	Finland	Developing	2014	NA
## 917	Finland	Developing	2013	NA
## 918	Finland	Developing	2012	NA
## 919	Finland	Developing	2011	NA
## 920	Finland	Developing	2010	NA
## 921	Finland	Developing	2009	NA
## 922	Finland	Developing	2008	NA
## 923	Finland	Developing	2007	NA
## 924	Finland	Developing	2006	NA
## 925	Finland	Developing	2005	NA
## 926	Finland	Developing	2004	NA
## 927	Finland	Developing	2003	NA
## 928	Finland	Developing	2002	NA
## 929	Finland	Developing	2001	NA

## 930	Finland	Developing	2000	NA
## 958	Gabon	Developing	2004	NA
## 959	Gabon	Developing	2003	NA
## 960	Gabon	Developing	2002	NA
## 961	Gabon	Developing	2001	NA
## 962	Gabon	Developing	2000	NA
## 1025	Ghana	Developing	2001	NA
## 1026	Ghana	Developing	2000	NA
## 1058	Grenada	Developing	2000	NA
## 1070	Guatemala	Developing	2004	NA
## 1071	Guatemala	Developing	2003	NA
## 1072	Guatemala	Developing	2002	NA
## 1073	Guatemala	Developing	2001	NA
## 1074	Guatemala	Developing	2000	NA
## 1084	Guinea	Developing	2006	NA
## 1085	Guinea	Developing	2005	NA
## 1086	Guinea	Developing	2004	NA
## 1087	Guinea	Developing	2003	NA
## 1088	Guinea	Developing	2002	NA
## 1089	Guinea	Developing	2001	NA
## 1090	Guinea	Developing	2000	NA
## 1098	Guinea-Bissau	Developing	2008	NA
## 1099	Guinea-Bissau	Developing	2007	NA
## 1100	Guinea-Bissau	Developing	2006	NA
## 1101	Guinea-Bissau	Developing	2005	NA
## 1102	Guinea-Bissau	Developing	2004	NA
## 1103	Guinea-Bissau	Developing	2003	NA
## 1104	Guinea-Bissau	Developing	2002	NA
## 1105	Guinea-Bissau	Developing	2001	NA
## 1106	Guinea-Bissau	Developing	2000	NA
## 1122	Guyana	Developing	2000	NA
## 1126	Haiti	Developing	2012	NA
## 1127	Haiti	Developing	2011	NA
## 1128	Haiti	Developing	2010	NA
## 1129	Haiti	Developing	2009	NA
## 1130	Haiti	Developing	2008	NA
## 1131	Haiti	Developing	2007	NA
## 1132	Haiti	Developing	2006	NA
## 1133	Haiti	Developing	2005	NA
## 1134	Haiti	Developing	2004	NA
## 1135	Haiti	Developing	2003	NA
## 1136	Haiti	Developing	2002	NA
## 1137	Haiti	Developing	2001	NA
## 1138	Haiti	Developing	2000	NA
## 1155	Hungary	Developed	2015	NA
## 1156	Hungary	Developed	2014	NA
## 1157	Hungary	Developed	2013	NA
## 1158	Hungary	Developed	2012	NA
## 1159	Hungary	Developed	2011	NA
## 1160	Hungary	Developed	2010	NA
## 1161	Hungary	Developed	2009	NA
## 1162	Hungary	Developed	2008	NA
## 1163	Hungary	Developed	2007	NA
## 1164	Hungary	Developed	2006	NA

## 1165	Hungary	Developed	2005	NA
## 1166	Hungary	Developed	2004	NA
## 1167	Hungary	Developed	2003	NA
## 1168	Hungary	Developed	2002	NA
## 1169	Hungary	Developed	2001	NA
## 1170	Hungary	Developed	2000	NA
## 1171	Iceland	Developed	2015	NA
## 1172	Iceland	Developed	2014	NA
## 1173	Iceland	Developed	2013	NA
## 1174	Iceland	Developed	2012	NA
## 1175	Iceland	Developed	2011	NA
## 1176	Iceland	Developed	2010	NA
## 1177	Iceland	Developed	2009	NA
## 1178	Iceland	Developed	2008	NA
## 1179	Iceland	Developed	2007	NA
## 1180	Iceland	Developed	2006	NA
## 1181	Iceland	Developed	2005	NA
## 1182	Iceland	Developed	2004	NA
## 1183	Iceland	Developed	2003	NA
## 1184	Iceland	Developed	2002	NA
## 1185	Iceland	Developed	2001	NA
## 1186	Iceland	Developed	2000	NA
## 1199	India	Developing	2003	NA
## 1200	India	Developing	2002	NA
## 1201	India	Developing	2001	NA
## 1202	India	Developing	2000	NA
## 1257	Ireland	Developed	2009	NA
## 1258	Ireland	Developed	2008	NA
## 1259	Ireland	Developed	2007	NA
## 1260	Ireland	Developed	2006	NA
## 1261	Ireland	Developed	2005	NA
## 1262	Ireland	Developed	2004	NA
## 1263	Ireland	Developed	2003	NA
## 1264	Ireland	Developed	2002	NA
## 1265	Ireland	Developed	2001	NA
## 1266	Ireland	Developed	2000	NA
## 1312	Jamaica	Developing	2002	NA
## 1313	Jamaica	Developing	2001	NA
## 1314	Jamaica	Developing	2000	NA
## 1315	Japan	Developed	2015	NA
## 1316	Japan	Developed	2014	NA
## 1317	Japan	Developed	2013	NA
## 1318	Japan	Developed	2012	NA
## 1319	Japan	Developed	2011	NA
## 1320	Japan	Developed	2010	NA
## 1321	Japan	Developed	2009	NA
## 1322	Japan	Developed	2008	NA
## 1323	Japan	Developed	2007	NA
## 1324	Japan	Developed	2006	NA
## 1325	Japan	Developed	2005	NA
## 1326	Japan	Developed	2004	NA
## 1327	Japan	Developed	2003	NA
## 1328	Japan	Developed	2002	NA
## 1329	Japan	Developed	2001	NA

## 1330	Japan	Developed	2000	NA
## 1377	Kenya	Developing	2001	NA
## 1378	Kenya	Developing	2000	NA
## 1440	LaoPeople'sDemocraticRepublic	Developing	2002	NA
## 1441	LaoPeople'sDemocraticRepublic	Developing	2001	NA
## 1442	LaoPeople'sDemocraticRepublic	Developing	2000	NA
## 1488	Lesotho	Developing	2002	NA
## 1489	Lesotho	Developing	2001	NA
## 1490	Lesotho	Developing	2000	NA
## 1499	Liberia	Developing	2007	NA
## 1500	Liberia	Developing	2006	NA
## 1501	Liberia	Developing	2005	NA
## 1502	Liberia	Developing	2004	NA
## 1503	Liberia	Developing	2003	NA
## 1504	Liberia	Developing	2002	NA
## 1505	Liberia	Developing	2001	NA
## 1506	Liberia	Developing	2000	NA
## 1569	Madagascar	Developing	2001	NA
## 1570	Madagascar	Developing	2000	NA
## 1585	Malawi	Developing	2001	NA
## 1586	Malawi	Developing	2000	NA
## 1632	Mali	Developing	2002	NA
## 1633	Mali	Developing	2001	NA
## 1634	Mali	Developing	2000	NA
## 1648	Malta	Developed	2002	NA
## 1649	Malta	Developed	2001	NA
## 1650	Malta	Developed	2000	NA
## 1663	Mauritania	Developing	2004	NA
## 1664	Mauritania	Developing	2003	NA
## 1665	Mauritania	Developing	2002	NA
## 1666	Mauritania	Developing	2001	NA
## 1667	Mauritania	Developing	2000	NA
## 1743	Montenegro	Developing	2005	NA
## 1744	Montenegro	Developing	2004	NA
## 1745	Montenegro	Developing	2003	NA
## 1746	Montenegro	Developing	2002	NA
## 1747	Montenegro	Developing	2001	NA
## 1748	Montenegro	Developing	2000	NA
## 1780	Mozambique	Developing	2000	NA
## 1794	Myanmar	Developing	2002	NA
## 1795	Myanmar	Developing	2001	NA
## 1796	Myanmar	Developing	2000	NA
## 1803	Namibia	Developing	2009	NA
## 1804	Namibia	Developing	2008	NA
## 1805	Namibia	Developing	2007	NA
## 1806	Namibia	Developing	2006	NA
## 1807	Namibia	Developing	2005	NA
## 1808	Namibia	Developing	2004	NA
## 1809	Namibia	Developing	2003	NA
## 1810	Namibia	Developing	2002	NA
## 1811	Namibia	Developing	2001	NA
## 1812	Namibia	Developing	2000	NA
## 1827	Nepal	Developing	2002	NA
## 1828	Nepal	Developing	2001	NA

## 1829	Nepal	Developing	2000	NA
## 1835	Netherlands	Developed	2010	NA
## 1836	Netherlands	Developed	2009	NA
## 1837	Netherlands	Developed	2008	NA
## 1838	Netherlands	Developed	2007	NA
## 1839	Netherlands	Developed	2006	NA
## 1840	Netherlands	Developed	2005	NA
## 1841	Netherlands	Developed	2004	NA
## 1842	Netherlands	Developed	2003	NA
## 1843	Netherlands	Developed	2002	NA
## 1844	Netherlands	Developed	2001	NA
## 1845	Netherlands	Developed	2000	NA
## 1885	Niger	Developing	2008	NA
## 1886	Niger	Developing	2007	NA
## 1887	Niger	Developing	2006	NA
## 1888	Niger	Developing	2005	NA
## 1889	Niger	Developing	2004	NA
## 1890	Niger	Developing	2003	NA
## 1891	Niger	Developing	2002	NA
## 1892	Niger	Developing	2001	NA
## 1893	Niger	Developing	2000	NA
## 1905	Nigeria	Developing	2004	NA
## 1906	Nigeria	Developing	2003	NA
## 1907	Nigeria	Developing	2002	NA
## 1908	Nigeria	Developing	2001	NA
## 1909	Nigeria	Developing	2000	NA
## 1911	Norway	Developed	2015	NA
## 1912	Norway	Developed	2014	NA
## 1913	Norway	Developed	2013	NA
## 1914	Norway	Developed	2012	NA
## 1915	Norway	Developed	2011	NA
## 1916	Norway	Developed	2010	NA
## 1917	Norway	Developed	2009	NA
## 1918	Norway	Developed	2008	NA
## 1919	Norway	Developed	2007	NA
## 1920	Norway	Developed	2006	NA
## 1921	Norway	Developed	2005	NA
## 1922	Norway	Developed	2004	NA
## 1923	Norway	Developed	2003	NA
## 1924	Norway	Developed	2002	NA
## 1925	Norway	Developed	2001	NA
## 1926	Norway	Developed	2000	NA
## 1956	Pakistan	Developing	2002	NA
## 1957	Pakistan	Developing	2001	NA
## 1958	Pakistan	Developing	2000	NA
## 1975	Panama	Developing	2000	NA
## 2005	Paraguay	Developing	2002	NA
## 2006	Paraguay	Developing	2001	NA
## 2007	Paraguay	Developing	2000	NA
## 2021	Peru	Developing	2002	NA
## 2022	Peru	Developing	2001	NA
## 2023	Peru	Developing	2000	NA
## 2151	RussianFederation	Developing	2000	NA
## 2166	Rwanda	Developing	2001	NA

##	2167	Rwanda	Developing	2000	NA
##	2183	SaintLucia	Developing	2001	NA
##	2184	SaintLucia	Developing	2000	NA
##	2198	SaintVincentandtheGrenadines	Developing	2002	NA
##	2199	SaintVincentandtheGrenadines	Developing	2001	NA
##	2200	SaintVincentandtheGrenadines	Developing	2000	NA
##	2231	SaoTomeandPrincipe	Developing	2002	NA
##	2232	SaoTomeandPrincipe	Developing	2001	NA
##	2233	SaoTomeandPrincipe	Developing	2000	NA
##	2262	Senegal	Developing	2003	NA
##	2263	Senegal	Developing	2002	NA
##	2264	Senegal	Developing	2001	NA
##	2265	Senegal	Developing	2000	NA
##	2278	Serbia	Developing	2003	NA
##	2279	Serbia	Developing	2002	NA
##	2280	Serbia	Developing	2001	NA
##	2281	Serbia	Developing	2000	NA
##	2307	SierraLeone	Developing	2006	NA
##	2308	SierraLeone	Developing	2005	NA
##	2309	SierraLeone	Developing	2004	NA
##	2310	SierraLeone	Developing	2003	NA
##	2311	SierraLeone	Developing	2002	NA
##	2312	SierraLeone	Developing	2001	NA
##	2313	SierraLeone	Developing	2000	NA
##	2346	Slovenia	Developed	2015	NA
##	2347	Slovenia	Developed	2014	NA
##	2348	Slovenia	Developed	2013	NA
##	2349	Slovenia	Developed	2012	NA
##	2350	Slovenia	Developed	2011	NA
##	2351	Slovenia	Developed	2010	NA
##	2352	Slovenia	Developed	2009	NA
##	2353	Slovenia	Developed	2008	NA
##	2354	Slovenia	Developed	2007	NA
##	2355	Slovenia	Developed	2006	NA
##	2356	Slovenia	Developed	2005	NA
##	2357	Slovenia	Developed	2004	NA
##	2358	Slovenia	Developed	2003	NA
##	2359	Slovenia	Developed	2002	NA
##	2360	Slovenia	Developed	2001	NA
##	2361	Slovenia	Developed	2000	NA
##	2381	Somalia	Developing	2012	NA
##	2382	Somalia	Developing	2011	NA
##	2383	Somalia	Developing	2010	NA
##	2384	Somalia	Developing	2009	NA
##	2385	Somalia	Developing	2008	NA
##	2386	Somalia	Developing	2007	NA
##	2387	Somalia	Developing	2006	NA
##	2388	Somalia	Developing	2005	NA
##	2389	Somalia	Developing	2004	NA
##	2390	Somalia	Developing	2003	NA
##	2391	Somalia	Developing	2002	NA
##	2392	Somalia	Developing	2001	NA
##	2393	Somalia	Developing	2000	NA
##	2411	SouthSudan	Developing	2014	NA

## 2412	SouthSudan	Developing	2013	NA
## 2413	SouthSudan	Developing	2012	NA
## 2414	SouthSudan	Developing	2011	NA
## 2415	SouthSudan	Developing	2010	NA
## 2416	SouthSudan	Developing	2009	NA
## 2417	SouthSudan	Developing	2008	NA
## 2418	SouthSudan	Developing	2007	NA
## 2419	SouthSudan	Developing	2006	NA
## 2420	SouthSudan	Developing	2005	NA
## 2421	SouthSudan	Developing	2004	NA
## 2422	SouthSudan	Developing	2003	NA
## 2423	SouthSudan	Developing	2002	NA
## 2424	SouthSudan	Developing	2001	NA
## 2425	SouthSudan	Developing	2000	NA
## 2455	SriLanka	Developing	2002	NA
## 2456	SriLanka	Developing	2001	NA
## 2457	SriLanka	Developing	2000	NA
## 2469	Sudan	Developing	2004	NA
## 2470	Sudan	Developing	2003	NA
## 2471	Sudan	Developing	2002	NA
## 2472	Sudan	Developing	2001	NA
## 2473	Sudan	Developing	2000	NA
## 2485	Suriname	Developing	2004	NA
## 2486	Suriname	Developing	2003	NA
## 2487	Suriname	Developing	2002	NA
## 2488	Suriname	Developing	2001	NA
## 2489	Suriname	Developing	2000	NA
## 2511	Sweden	Developed	2010	NA
## 2512	Sweden	Developed	2009	NA
## 2513	Sweden	Developed	2008	NA
## 2514	Sweden	Developed	2007	NA
## 2515	Sweden	Developed	2006	NA
## 2516	Sweden	Developed	2005	NA
## 2517	Sweden	Developed	2004	NA
## 2518	Sweden	Developed	2003	NA
## 2519	Sweden	Developed	2002	NA
## 2520	Sweden	Developed	2001	NA
## 2521	Sweden	Developed	2000	NA
## 2522	Switzerland	Developed	2015	NA
## 2523	Switzerland	Developed	2014	NA
## 2524	Switzerland	Developed	2013	NA
## 2525	Switzerland	Developed	2012	NA
## 2526	Switzerland	Developed	2011	NA
## 2527	Switzerland	Developed	2010	NA
## 2528	Switzerland	Developed	2009	NA
## 2529	Switzerland	Developed	2008	NA
## 2530	Switzerland	Developed	2007	NA
## 2531	Switzerland	Developed	2006	NA
## 2532	Switzerland	Developed	2005	NA
## 2533	Switzerland	Developed	2004	NA
## 2534	Switzerland	Developed	2003	NA
## 2535	Switzerland	Developed	2002	NA
## 2536	Switzerland	Developed	2001	NA
## 2537	Switzerland	Developed	2000	NA

## 2568	Tajikistan	Developing	2001	NA
## 2569	Tajikistan	Developing	2000	NA
## 2597	TheformerYugoslavrepublicofMacedonia	Developing	2004	NA
## 2598	TheformerYugoslavrepublicofMacedonia	Developing	2003	NA
## 2599	TheformerYugoslavrepublicofMacedonia	Developing	2002	NA
## 2600	TheformerYugoslavrepublicofMacedonia	Developing	2001	NA
## 2601	TheformerYugoslavrepublicofMacedonia	Developing	2000	NA
## 2610	Timor-Leste	Developing	2007	NA
## 2611	Timor-Leste	Developing	2006	NA
## 2612	Timor-Leste	Developing	2005	NA
## 2613	Timor-Leste	Developing	2004	NA
## 2614	Timor-Leste	Developing	2003	NA
## 2615	Timor-Leste	Developing	2002	NA
## 2616	Timor-Leste	Developing	2001	NA
## 2617	Timor-Leste	Developing	2000	NA
## 2626	Togo	Developing	2007	NA
## 2627	Togo	Developing	2006	NA
## 2628	Togo	Developing	2005	NA
## 2629	Togo	Developing	2004	NA
## 2630	Togo	Developing	2003	NA
## 2631	Togo	Developing	2002	NA
## 2632	Togo	Developing	2001	NA
## 2633	Togo	Developing	2000	NA
## 2664	TrinidadandTobago	Developing	2001	NA
## 2665	TrinidadandTobago	Developing	2000	NA
## 2712	Turkmenistan	Developing	2001	NA
## 2713	Turkmenistan	Developing	2000	NA
## 2729	Uganda	Developing	2001	NA
## 2730	Uganda	Developing	2000	NA
## 2763	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2015	NA
## 2764	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2014	NA
## 2765	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2013	NA
## 2766	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2012	NA
## 2767	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2011	NA
## 2768	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2010	NA
## 2769	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2009	NA
## 2770	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2008	NA
## 2771	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2007	NA
## 2772	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2006	NA
## 2773	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2005	NA
## 2774	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2004	NA
## 2775	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2003	NA
## 2776	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2002	NA
## 2777	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2001	NA
## 2778	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2000	NA
## 2793	UnitedRepublicofTanzania	Developing	2001	NA
## 2794	UnitedRepublicofTanzania	Developing	2000	NA
## 2841	Uzbekistan	Developing	2001	NA
## 2842	Uzbekistan	Developing	2000	NA
## 2888	VietNam	Developing	2002	NA
## 2889	VietNam	Developing	2001	NA
## 2890	VietNam	Developing	2000	NA
## 2918	Zambia	Developing	2004	NA
## 2919	Zambia	Developing	2003	NA

```

## 2920                Zambia Developing 2002                NA
## 2921                Zambia Developing 2001                NA
## 2922                Zambia Developing 2000                NA

for(i in unique(data[!complete.cases(data$HepatitisB),"Country"])){
  print(paste(i,'has',nrow(data[which(data$Country == i & is.na(data$HepatitisB)),]),'rows'))
}

## [1] "Algeria has 4 rows"
## [1] "Angola has 7 rows"
## [1] "AntiguaandBarbuda has 1 rows"
## [1] "Argentina has 2 rows"
## [1] "Australia has 1 rows"
## [1] "Azerbaijan has 2 rows"
## [1] "Bahamas has 1 rows"
## [1] "Bangladesh has 3 rows"
## [1] "Barbados has 1 rows"
## [1] "Benin has 2 rows"
## [1] "BosniaandHerzegovina has 4 rows"
## [1] "BurkinaFaso has 6 rows"
## [1] "Burundi has 4 rows"
## [1] "CÃ´ted'Ivoire has 1 rows"
## [1] "CaboVerde has 2 rows"
## [1] "Cambodia has 6 rows"
## [1] "Cameroon has 5 rows"
## [1] "Canada has 3 rows"
## [1] "CentralAfricanRepublic has 9 rows"
## [1] "Chad has 8 rows"
## [1] "Chile has 6 rows"
## [1] "Comoros has 3 rows"
## [1] "Congo has 7 rows"
## [1] "Croatia has 7 rows"
## [1] "Czechia has 2 rows"
## [1] "DemocraticPeople'sRepublicofKorea has 3 rows"
## [1] "DemocraticRepublicoftheCongo has 7 rows"
## [1] "Denmark has 16 rows"
## [1] "Djibouti has 7 rows"
## [1] "EquatorialGuinea has 14 rows"
## [1] "Eritrea has 2 rows"
## [1] "Estonia has 4 rows"
## [1] "Ethiopia has 7 rows"
## [1] "Finland has 16 rows"
## [1] "Gabon has 5 rows"
## [1] "Ghana has 2 rows"
## [1] "Grenada has 1 rows"
## [1] "Guatemala has 5 rows"
## [1] "Guinea has 7 rows"
## [1] "Guinea-Bissau has 9 rows"
## [1] "Guyana has 1 rows"
## [1] "Haiti has 13 rows"
## [1] "Hungary has 16 rows"
## [1] "Iceland has 16 rows"
## [1] "India has 4 rows"
## [1] "Ireland has 10 rows"
## [1] "Jamaica has 3 rows"

```

```
## [1] "Japan has 16 rows"
## [1] "Kenya has 2 rows"
## [1] "LaoPeople'sDemocraticRepublic has 3 rows"
## [1] "Lesotho has 3 rows"
## [1] "Liberia has 8 rows"
## [1] "Madagascar has 2 rows"
## [1] "Malawi has 2 rows"
## [1] "Mali has 3 rows"
## [1] "Malta has 3 rows"
## [1] "Mauritania has 5 rows"
## [1] "Montenegro has 6 rows"
## [1] "Mozambique has 1 rows"
## [1] "Myanmar has 3 rows"
## [1] "Namibia has 10 rows"
## [1] "Nepal has 3 rows"
## [1] "Netherlands has 11 rows"
## [1] "Niger has 9 rows"
## [1] "Nigeria has 5 rows"
## [1] "Norway has 16 rows"
## [1] "Pakistan has 3 rows"
## [1] "Panama has 1 rows"
## [1] "Paraguay has 3 rows"
## [1] "Peru has 3 rows"
## [1] "RussianFederation has 1 rows"
## [1] "Rwanda has 2 rows"
## [1] "SaintLucia has 2 rows"
## [1] "SaintVincentandtheGrenadines has 3 rows"
## [1] "SaoTomeandPrincipe has 3 rows"
## [1] "Senegal has 4 rows"
## [1] "Serbia has 4 rows"
## [1] "SierraLeone has 7 rows"
## [1] "Slovenia has 16 rows"
## [1] "Somalia has 13 rows"
## [1] "SouthSudan has 15 rows"
## [1] "SriLanka has 3 rows"
## [1] "Sudan has 5 rows"
## [1] "Suriname has 5 rows"
## [1] "Sweden has 11 rows"
## [1] "Switzerland has 16 rows"
## [1] "Tajikistan has 2 rows"
## [1] "TheformerYugoslavrepublicofMacedonia has 5 rows"
## [1] "Timor-Leste has 8 rows"
## [1] "Togo has 8 rows"
## [1] "TrinidadandTobago has 2 rows"
## [1] "Turkmenistan has 2 rows"
## [1] "Uganda has 2 rows"
## [1] "UnitedKingdomofGreatBritainandNorthernIreland has 16 rows"
## [1] "UnitedRepublicofTanzania has 2 rows"
## [1] "Uzbekistan has 2 rows"
## [1] "VietNam has 3 rows"
## [1] "Zambia has 5 rows"
```

```
data[which(data$Country == 'Sudan'),c("Year","HepatitisB")]
```

```
##      Year HepatitisB
```



```

## 2458 2015      93
## 2459 2014      94
## 2460 2013      93
## 2461 2012      92
## 2462 2011      93
## 2463 2010      75
## 2464 2009      72
## 2465 2008      78
## 2466 2007      78
## 2467 2006       6
## 2468 2005      22
## 2469 2004      NA
## 2470 2003      NA
## 2471 2002      NA
## 2472 2001      NA
## 2473 2000      NA

data[which(data$Country == 'SouthSudan'),"HepatitisB"][5:11] <- data[which(data$Country == 'Sudan'),"HepatitisB"][5:11]

for(i in unique(data[!complete.cases(data$HepatitisB),"Country"])){
  print(paste(i,'has',nrow(data[which(data$Country == i & is.na(data$HepatitisB)),]),'rows'))
}

## [1] "Algeria has 4 rows"
## [1] "Angola has 7 rows"
## [1] "AntiguaandBarbuda has 1 rows"
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## [1] "Australia has 1 rows"
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## [1] "Cameroon has 5 rows"
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## [1] "Comoros has 3 rows"
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## [1] "Djibouti has 7 rows"
## [1] "EquatorialGuinea has 14 rows"
## [1] "Eritrea has 2 rows"
## [1] "Estonia has 4 rows"

```

```

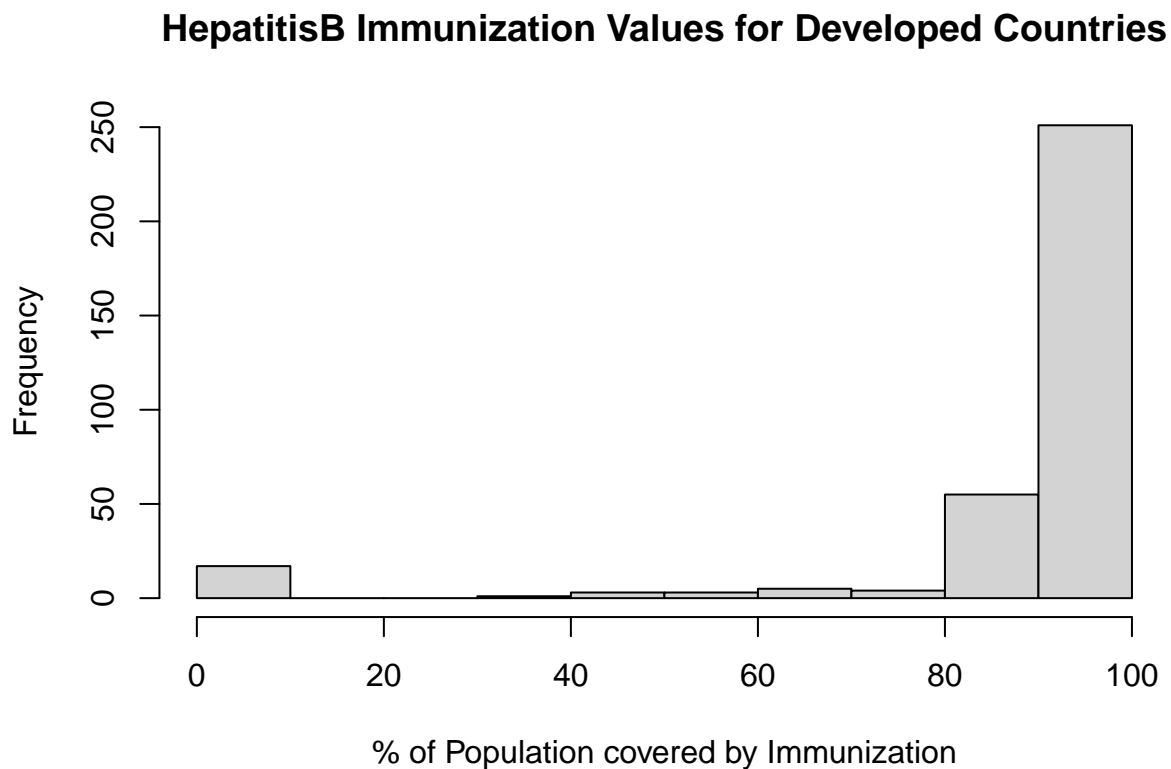
## [1] "Ethiopia has 7 rows"
## [1] "Finland has 16 rows"
## [1] "Gabon has 5 rows"
## [1] "Ghana has 2 rows"
## [1] "Grenada has 1 rows"
## [1] "Guatemala has 5 rows"
## [1] "Guinea has 7 rows"
## [1] "Guinea-Bissau has 9 rows"
## [1] "Guyana has 1 rows"
## [1] "Haiti has 13 rows"
## [1] "Hungary has 16 rows"
## [1] "Iceland has 16 rows"
## [1] "India has 4 rows"
## [1] "Ireland has 10 rows"
## [1] "Jamaica has 3 rows"
## [1] "Japan has 16 rows"
## [1] "Kenya has 2 rows"
## [1] "LaoPeople'sDemocraticRepublic has 3 rows"
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## [1] "Liberia has 8 rows"
## [1] "Madagascar has 2 rows"
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## [1] "Mauritania has 5 rows"
## [1] "Montenegro has 6 rows"
## [1] "Mozambique has 1 rows"
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## [1] "Namibia has 10 rows"
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## [1] "Netherlands has 11 rows"
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## [1] "Nigeria has 5 rows"
## [1] "Norway has 16 rows"
## [1] "Pakistan has 3 rows"
## [1] "Panama has 1 rows"
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## [1] "RussianFederation has 1 rows"
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## [1] "Senegal has 4 rows"
## [1] "Serbia has 4 rows"
## [1] "SierraLeone has 7 rows"
## [1] "Slovenia has 16 rows"
## [1] "Somalia has 13 rows"
## [1] "SouthSudan has 8 rows"
## [1] "SriLanka has 3 rows"
## [1] "Sudan has 5 rows"
## [1] "Suriname has 5 rows"
## [1] "Sweden has 11 rows"
## [1] "Switzerland has 16 rows"

```

```
## [1] "Tajikistan has 2 rows"
## [1] "TheformerYugoslavrepublicofMacedonia has 5 rows"
## [1] "Timor-Leste has 8 rows"
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## [1] "UnitedKingdomofGreatBritainandNorthernIreland has 16 rows"
## [1] "UnitedRepublicofTanzania has 2 rows"
## [1] "Uzbekistan has 2 rows"
## [1] "VietNam has 3 rows"
## [1] "Zambia has 5 rows"
```

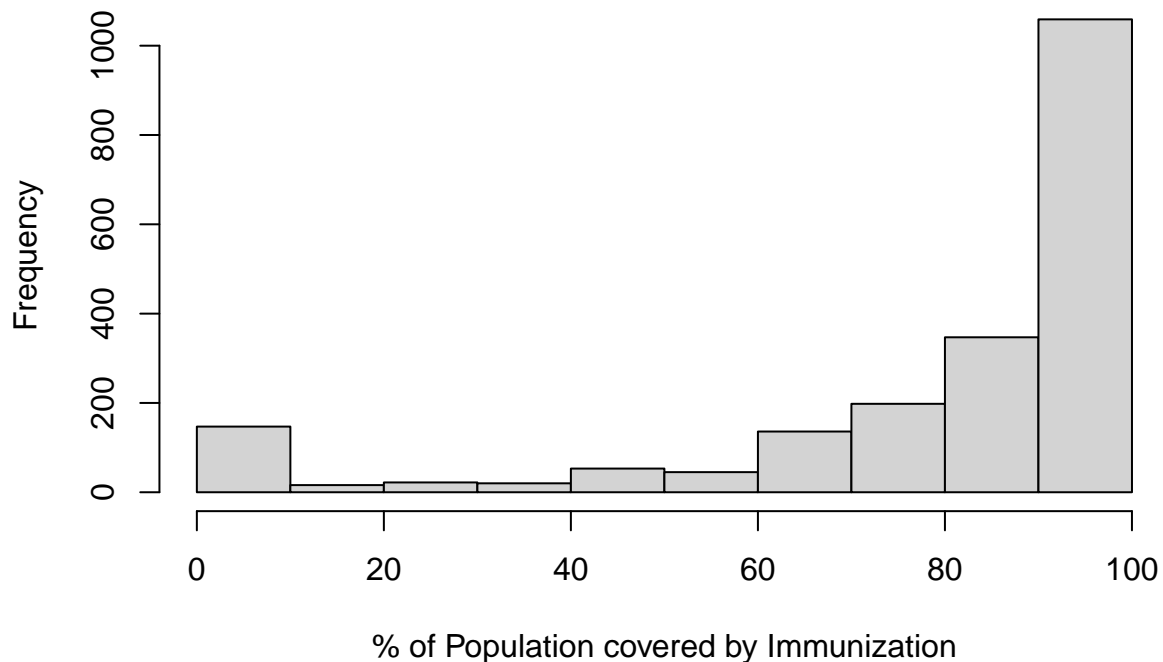
We need to check the Hepatitis b immunizations across different types of nations - developed and developing

```
hist(data[which(data$Status == 'Developed'), "HepatitisB"], main = 'HepatitisB Immunization Values for De
```



```
hist(data[which(data$Status == 'Developing'), "HepatitisB"], main = 'HepatitisB Immunization Values for D
```

HepatitisB Immunization Values for Developing Countries



```
summary(data[which(data$Status == 'Developed'), "HepatitisB"])
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##      2.00  89.00   95.00   88.04  97.00   99.00    173
```

```
summary(data[which(data$Status == 'Developing'), "HepatitisB"])
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##      1.00  74.50   91.00   79.53  96.50   99.00    373
```

For countries with 5 or less instances of missing immunization values, will use the median values of their other years to fill.

```
for(i in unique(data[!complete.cases(data$HepatitisB), "Country"])){
  if(nrow(data[which(data$Country == i & is.na(data$HepatitisB)),]) < 6){
    data[which(data$Country == i & is.na(data$HepatitisB)), "HepatitisB"] <- median(data[which(data$Country == i & !is.na(data$HepatitisB)), "HepatitisB"])
  }
}
```

For countries with more than 5 instances of missing immunization values, we will use take median values of the different years for developed and developing countries.

```
for(i in data[which(is.na(data$HepatitisB)), "Year"]){
  data[which(data$Year == i & data$Status == 'Developed' & is.na(data$HepatitisB)), "HepatitisB"] <- median(data[which(data$Year == i & data$Status == 'Developed' & !is.na(data$HepatitisB)), "HepatitisB"])
  data[which(data$Year == i & data$Status == 'Developing' & is.na(data$HepatitisB)), "HepatitisB"] <- median(data[which(data$Year == i & data$Status == 'Developing' & !is.na(data$HepatitisB)), "HepatitisB"])
}
```

Lets look at the remaining columns

```
for(i in colnames(data)){
  if(nrow(data[!complete.cases(data[i]),])>0){
    print(paste(i, 'has', nrow(data[!complete.cases(data[i]),]), 'missing values'))
  }
}
```

```
## [1] "Population has 644 missing values"
```

the last column to correct is population

```
data[which(is.na(data$Population)),c('Country', 'Status', 'Year', 'Population')]
```

	Country	Status	Year	Population
## 65	AntiguaandBarbuda	Developing	2015	NA
## 66	AntiguaandBarbuda	Developing	2014	NA
## 67	AntiguaandBarbuda	Developing	2013	NA
## 68	AntiguaandBarbuda	Developing	2012	NA
## 69	AntiguaandBarbuda	Developing	2011	NA
## 70	AntiguaandBarbuda	Developing	2010	NA
## 71	AntiguaandBarbuda	Developing	2009	NA
## 72	AntiguaandBarbuda	Developing	2008	NA
## 73	AntiguaandBarbuda	Developing	2007	NA
## 74	AntiguaandBarbuda	Developing	2006	NA
## 75	AntiguaandBarbuda	Developing	2005	NA
## 76	AntiguaandBarbuda	Developing	2004	NA
## 77	AntiguaandBarbuda	Developing	2003	NA
## 78	AntiguaandBarbuda	Developing	2002	NA
## 79	AntiguaandBarbuda	Developing	2001	NA
## 80	AntiguaandBarbuda	Developing	2000	NA
## 161	Bahamas	Developing	2015	NA
## 162	Bahamas	Developing	2014	NA
## 163	Bahamas	Developing	2013	NA
## 164	Bahamas	Developing	2012	NA
## 165	Bahamas	Developing	2011	NA
## 166	Bahamas	Developing	2010	NA
## 167	Bahamas	Developing	2009	NA
## 168	Bahamas	Developing	2008	NA
## 169	Bahamas	Developing	2007	NA
## 170	Bahamas	Developing	2006	NA
## 171	Bahamas	Developing	2005	NA
## 172	Bahamas	Developing	2004	NA
## 173	Bahamas	Developing	2003	NA
## 174	Bahamas	Developing	2002	NA
## 175	Bahamas	Developing	2001	NA
## 176	Bahamas	Developing	2000	NA
## 177	Bahrain	Developing	2015	NA
## 178	Bahrain	Developing	2014	NA
## 179	Bahrain	Developing	2013	NA
## 180	Bahrain	Developing	2012	NA
## 181	Bahrain	Developing	2011	NA
## 182	Bahrain	Developing	2010	NA
## 183	Bahrain	Developing	2009	NA
## 184	Bahrain	Developing	2008	NA
## 185	Bahrain	Developing	2007	NA
## 186	Bahrain	Developing	2006	NA

## 187	Bahrain	Developing	2005	NA
## 188	Bahrain	Developing	2004	NA
## 189	Bahrain	Developing	2003	NA
## 190	Bahrain	Developing	2002	NA
## 191	Bahrain	Developing	2001	NA
## 192	Bahrain	Developing	2000	NA
## 209	Barbados	Developing	2015	NA
## 210	Barbados	Developing	2014	NA
## 211	Barbados	Developing	2013	NA
## 212	Barbados	Developing	2012	NA
## 213	Barbados	Developing	2011	NA
## 214	Barbados	Developing	2010	NA
## 215	Barbados	Developing	2009	NA
## 216	Barbados	Developing	2008	NA
## 217	Barbados	Developing	2007	NA
## 218	Barbados	Developing	2006	NA
## 219	Barbados	Developing	2005	NA
## 220	Barbados	Developing	2004	NA
## 221	Barbados	Developing	2003	NA
## 222	Barbados	Developing	2002	NA
## 223	Barbados	Developing	2001	NA
## 224	Barbados	Developing	2000	NA
## 305	Bolivia(PlurinationalStateof)	Developing	2015	NA
## 306	Bolivia(PlurinationalStateof)	Developing	2014	NA
## 307	Bolivia(PlurinationalStateof)	Developing	2013	NA
## 308	Bolivia(PlurinationalStateof)	Developing	2012	NA
## 309	Bolivia(PlurinationalStateof)	Developing	2011	NA
## 310	Bolivia(PlurinationalStateof)	Developing	2010	NA
## 311	Bolivia(PlurinationalStateof)	Developing	2009	NA
## 312	Bolivia(PlurinationalStateof)	Developing	2008	NA
## 313	Bolivia(PlurinationalStateof)	Developing	2007	NA
## 314	Bolivia(PlurinationalStateof)	Developing	2006	NA
## 315	Bolivia(PlurinationalStateof)	Developing	2005	NA
## 316	Bolivia(PlurinationalStateof)	Developing	2004	NA
## 317	Bolivia(PlurinationalStateof)	Developing	2003	NA
## 318	Bolivia(PlurinationalStateof)	Developing	2002	NA
## 319	Bolivia(PlurinationalStateof)	Developing	2001	NA
## 320	Bolivia(PlurinationalStateof)	Developing	2000	NA
## 369	BruneiDarussalam	Developing	2015	NA
## 370	BruneiDarussalam	Developing	2014	NA
## 371	BruneiDarussalam	Developing	2013	NA
## 372	BruneiDarussalam	Developing	2012	NA
## 373	BruneiDarussalam	Developing	2011	NA
## 374	BruneiDarussalam	Developing	2010	NA
## 375	BruneiDarussalam	Developing	2009	NA
## 376	BruneiDarussalam	Developing	2008	NA
## 377	BruneiDarussalam	Developing	2007	NA
## 378	BruneiDarussalam	Developing	2006	NA
## 379	BruneiDarussalam	Developing	2005	NA
## 380	BruneiDarussalam	Developing	2004	NA
## 381	BruneiDarussalam	Developing	2003	NA
## 382	BruneiDarussalam	Developing	2002	NA
## 383	BruneiDarussalam	Developing	2001	NA
## 384	BruneiDarussalam	Developing	2000	NA

## 433	CÃ´ted'Ivoire	Developing	2015	NA
## 434	CÃ´ted'Ivoire	Developing	2014	NA
## 435	CÃ´ted'Ivoire	Developing	2013	NA
## 436	CÃ´ted'Ivoire	Developing	2012	NA
## 437	CÃ´ted'Ivoire	Developing	2011	NA
## 438	CÃ´ted'Ivoire	Developing	2010	NA
## 439	CÃ´ted'Ivoire	Developing	2009	NA
## 440	CÃ´ted'Ivoire	Developing	2008	NA
## 441	CÃ´ted'Ivoire	Developing	2007	NA
## 442	CÃ´ted'Ivoire	Developing	2006	NA
## 443	CÃ´ted'Ivoire	Developing	2005	NA
## 444	CÃ´ted'Ivoire	Developing	2004	NA
## 445	CÃ´ted'Ivoire	Developing	2003	NA
## 446	CÃ´ted'Ivoire	Developing	2002	NA
## 447	CÃ´ted'Ivoire	Developing	2001	NA
## 448	CÃ´ted'Ivoire	Developing	2000	NA
## 609	Congo	Developing	2015	NA
## 610	Congo	Developing	2014	NA
## 611	Congo	Developing	2013	NA
## 612	Congo	Developing	2012	NA
## 613	Congo	Developing	2011	NA
## 614	Congo	Developing	2010	NA
## 615	Congo	Developing	2009	NA
## 616	Congo	Developing	2008	NA
## 617	Congo	Developing	2007	NA
## 618	Congo	Developing	2006	NA
## 619	Congo	Developing	2005	NA
## 620	Congo	Developing	2004	NA
## 621	Congo	Developing	2003	NA
## 622	Congo	Developing	2002	NA
## 623	Congo	Developing	2001	NA
## 624	Congo	Developing	2000	NA
## 658	Cuba	Developing	2015	NA
## 659	Cuba	Developing	2014	NA
## 660	Cuba	Developing	2013	NA
## 661	Cuba	Developing	2012	NA
## 662	Cuba	Developing	2011	NA
## 663	Cuba	Developing	2010	NA
## 664	Cuba	Developing	2009	NA
## 665	Cuba	Developing	2008	NA
## 666	Cuba	Developing	2007	NA
## 667	Cuba	Developing	2006	NA
## 668	Cuba	Developing	2005	NA
## 669	Cuba	Developing	2004	NA
## 670	Cuba	Developing	2003	NA
## 671	Cuba	Developing	2002	NA
## 672	Cuba	Developing	2001	NA
## 673	Cuba	Developing	2000	NA
## 690	Czechia	Developed	2015	NA
## 691	Czechia	Developed	2014	NA
## 692	Czechia	Developed	2013	NA
## 693	Czechia	Developed	2012	NA
## 694	Czechia	Developed	2011	NA
## 695	Czechia	Developed	2010	NA

## 696	Czechia	Developed	2009	NA
## 697	Czechia	Developed	2008	NA
## 698	Czechia	Developed	2007	NA
## 699	Czechia	Developed	2006	NA
## 700	Czechia	Developed	2005	NA
## 701	Czechia	Developed	2004	NA
## 702	Czechia	Developed	2003	NA
## 703	Czechia	Developed	2002	NA
## 704	Czechia	Developed	2001	NA
## 705	Czechia	Developed	2000	NA
## 706	DemocraticPeople'sRepublicofKorea	Developing	2015	NA
## 707	DemocraticPeople'sRepublicofKorea	Developing	2014	NA
## 708	DemocraticPeople'sRepublicofKorea	Developing	2013	NA
## 709	DemocraticPeople'sRepublicofKorea	Developing	2012	NA
## 710	DemocraticPeople'sRepublicofKorea	Developing	2011	NA
## 711	DemocraticPeople'sRepublicofKorea	Developing	2010	NA
## 712	DemocraticPeople'sRepublicofKorea	Developing	2009	NA
## 713	DemocraticPeople'sRepublicofKorea	Developing	2008	NA
## 714	DemocraticPeople'sRepublicofKorea	Developing	2007	NA
## 715	DemocraticPeople'sRepublicofKorea	Developing	2006	NA
## 716	DemocraticPeople'sRepublicofKorea	Developing	2005	NA
## 717	DemocraticPeople'sRepublicofKorea	Developing	2004	NA
## 718	DemocraticPeople'sRepublicofKorea	Developing	2003	NA
## 719	DemocraticPeople'sRepublicofKorea	Developing	2002	NA
## 720	DemocraticPeople'sRepublicofKorea	Developing	2001	NA
## 721	DemocraticPeople'sRepublicofKorea	Developing	2000	NA
## 722	DemocraticRepublicoftheCongo	Developing	2015	NA
## 723	DemocraticRepublicoftheCongo	Developing	2014	NA
## 724	DemocraticRepublicoftheCongo	Developing	2013	NA
## 725	DemocraticRepublicoftheCongo	Developing	2012	NA
## 726	DemocraticRepublicoftheCongo	Developing	2011	NA
## 727	DemocraticRepublicoftheCongo	Developing	2010	NA
## 728	DemocraticRepublicoftheCongo	Developing	2009	NA
## 729	DemocraticRepublicoftheCongo	Developing	2008	NA
## 730	DemocraticRepublicoftheCongo	Developing	2007	NA
## 731	DemocraticRepublicoftheCongo	Developing	2006	NA
## 732	DemocraticRepublicoftheCongo	Developing	2005	NA
## 733	DemocraticRepublicoftheCongo	Developing	2004	NA
## 734	DemocraticRepublicoftheCongo	Developing	2003	NA
## 735	DemocraticRepublicoftheCongo	Developing	2002	NA
## 736	DemocraticRepublicoftheCongo	Developing	2001	NA
## 737	DemocraticRepublicoftheCongo	Developing	2000	NA
## 803	Egypt	Developing	2015	NA
## 804	Egypt	Developing	2014	NA
## 805	Egypt	Developing	2013	NA
## 806	Egypt	Developing	2012	NA
## 807	Egypt	Developing	2011	NA
## 808	Egypt	Developing	2010	NA
## 809	Egypt	Developing	2009	NA
## 810	Egypt	Developing	2008	NA
## 811	Egypt	Developing	2007	NA
## 812	Egypt	Developing	2006	NA
## 813	Egypt	Developing	2005	NA
## 814	Egypt	Developing	2004	NA

## 815	Egypt	Developing	2003	NA
## 816	Egypt	Developing	2002	NA
## 817	Egypt	Developing	2001	NA
## 818	Egypt	Developing	2000	NA
## 851	Eritrea	Developing	2015	NA
## 852	Eritrea	Developing	2014	NA
## 853	Eritrea	Developing	2013	NA
## 854	Eritrea	Developing	2012	NA
## 963	Gambia	Developing	2015	NA
## 964	Gambia	Developing	2014	NA
## 965	Gambia	Developing	2013	NA
## 966	Gambia	Developing	2012	NA
## 967	Gambia	Developing	2011	NA
## 968	Gambia	Developing	2010	NA
## 969	Gambia	Developing	2009	NA
## 970	Gambia	Developing	2008	NA
## 971	Gambia	Developing	2007	NA
## 972	Gambia	Developing	2006	NA
## 973	Gambia	Developing	2005	NA
## 974	Gambia	Developing	2004	NA
## 975	Gambia	Developing	2003	NA
## 976	Gambia	Developing	2002	NA
## 977	Gambia	Developing	2001	NA
## 978	Gambia	Developing	2000	NA
## 1043	Grenada	Developing	2015	NA
## 1044	Grenada	Developing	2014	NA
## 1045	Grenada	Developing	2013	NA
## 1046	Grenada	Developing	2012	NA
## 1047	Grenada	Developing	2011	NA
## 1048	Grenada	Developing	2010	NA
## 1049	Grenada	Developing	2009	NA
## 1050	Grenada	Developing	2008	NA
## 1051	Grenada	Developing	2007	NA
## 1052	Grenada	Developing	2006	NA
## 1053	Grenada	Developing	2005	NA
## 1054	Grenada	Developing	2004	NA
## 1055	Grenada	Developing	2003	NA
## 1056	Grenada	Developing	2002	NA
## 1057	Grenada	Developing	2001	NA
## 1058	Grenada	Developing	2000	NA
## 1219	Iran(IslamicRepublicof)	Developing	2015	NA
## 1220	Iran(IslamicRepublicof)	Developing	2014	NA
## 1221	Iran(IslamicRepublicof)	Developing	2013	NA
## 1222	Iran(IslamicRepublicof)	Developing	2012	NA
## 1223	Iran(IslamicRepublicof)	Developing	2011	NA
## 1224	Iran(IslamicRepublicof)	Developing	2010	NA
## 1225	Iran(IslamicRepublicof)	Developing	2009	NA
## 1226	Iran(IslamicRepublicof)	Developing	2008	NA
## 1227	Iran(IslamicRepublicof)	Developing	2007	NA
## 1228	Iran(IslamicRepublicof)	Developing	2006	NA
## 1229	Iran(IslamicRepublicof)	Developing	2005	NA
## 1230	Iran(IslamicRepublicof)	Developing	2004	NA
## 1231	Iran(IslamicRepublicof)	Developing	2003	NA
## 1232	Iran(IslamicRepublicof)	Developing	2002	NA

## 1233	Iran(IslamicRepublicof)	Developing	2001	NA
## 1234	Iran(IslamicRepublicof)	Developing	2000	NA
## 1395	Kuwait	Developing	2015	NA
## 1396	Kuwait	Developing	2014	NA
## 1397	Kuwait	Developing	2013	NA
## 1398	Kuwait	Developing	2012	NA
## 1399	Kuwait	Developing	2011	NA
## 1400	Kuwait	Developing	2010	NA
## 1401	Kuwait	Developing	2009	NA
## 1402	Kuwait	Developing	2008	NA
## 1403	Kuwait	Developing	2007	NA
## 1404	Kuwait	Developing	2006	NA
## 1405	Kuwait	Developing	2005	NA
## 1406	Kuwait	Developing	2004	NA
## 1407	Kuwait	Developing	2003	NA
## 1408	Kuwait	Developing	2002	NA
## 1409	Kuwait	Developing	2001	NA
## 1410	Kuwait	Developing	2000	NA
## 1411	Kyrgyzstan	Developing	2015	NA
## 1412	Kyrgyzstan	Developing	2014	NA
## 1413	Kyrgyzstan	Developing	2013	NA
## 1414	Kyrgyzstan	Developing	2012	NA
## 1415	Kyrgyzstan	Developing	2011	NA
## 1416	Kyrgyzstan	Developing	2010	NA
## 1417	Kyrgyzstan	Developing	2009	NA
## 1418	Kyrgyzstan	Developing	2008	NA
## 1419	Kyrgyzstan	Developing	2007	NA
## 1420	Kyrgyzstan	Developing	2006	NA
## 1421	Kyrgyzstan	Developing	2005	NA
## 1422	Kyrgyzstan	Developing	2004	NA
## 1423	Kyrgyzstan	Developing	2003	NA
## 1424	Kyrgyzstan	Developing	2002	NA
## 1425	Kyrgyzstan	Developing	2001	NA
## 1426	Kyrgyzstan	Developing	2000	NA
## 1427	LaoPeople'sDemocraticRepublic	Developing	2015	NA
## 1428	LaoPeople'sDemocraticRepublic	Developing	2014	NA
## 1429	LaoPeople'sDemocraticRepublic	Developing	2013	NA
## 1430	LaoPeople'sDemocraticRepublic	Developing	2012	NA
## 1431	LaoPeople'sDemocraticRepublic	Developing	2011	NA
## 1432	LaoPeople'sDemocraticRepublic	Developing	2010	NA
## 1433	LaoPeople'sDemocraticRepublic	Developing	2009	NA
## 1434	LaoPeople'sDemocraticRepublic	Developing	2008	NA
## 1435	LaoPeople'sDemocraticRepublic	Developing	2007	NA
## 1436	LaoPeople'sDemocraticRepublic	Developing	2006	NA
## 1437	LaoPeople'sDemocraticRepublic	Developing	2005	NA
## 1438	LaoPeople'sDemocraticRepublic	Developing	2004	NA
## 1439	LaoPeople'sDemocraticRepublic	Developing	2003	NA
## 1440	LaoPeople'sDemocraticRepublic	Developing	2002	NA
## 1441	LaoPeople'sDemocraticRepublic	Developing	2001	NA
## 1442	LaoPeople'sDemocraticRepublic	Developing	2000	NA
## 1507	Libya	Developing	2015	NA
## 1508	Libya	Developing	2014	NA
## 1509	Libya	Developing	2013	NA
## 1510	Libya	Developing	2012	NA

## 1511	Libya	Developing	2011	NA
## 1512	Libya	Developing	2010	NA
## 1513	Libya	Developing	2009	NA
## 1514	Libya	Developing	2008	NA
## 1515	Libya	Developing	2007	NA
## 1516	Libya	Developing	2006	NA
## 1517	Libya	Developing	2005	NA
## 1518	Libya	Developing	2004	NA
## 1519	Libya	Developing	2003	NA
## 1520	Libya	Developing	2002	NA
## 1521	Libya	Developing	2001	NA
## 1522	Libya	Developing	2000	NA
## 1700	Micronesia(FederatedStatesof)	Developing	2015	NA
## 1701	Micronesia(FederatedStatesof)	Developing	2014	NA
## 1702	Micronesia(FederatedStatesof)	Developing	2013	NA
## 1703	Micronesia(FederatedStatesof)	Developing	2012	NA
## 1704	Micronesia(FederatedStatesof)	Developing	2011	NA
## 1705	Micronesia(FederatedStatesof)	Developing	2010	NA
## 1706	Micronesia(FederatedStatesof)	Developing	2009	NA
## 1707	Micronesia(FederatedStatesof)	Developing	2008	NA
## 1708	Micronesia(FederatedStatesof)	Developing	2007	NA
## 1709	Micronesia(FederatedStatesof)	Developing	2006	NA
## 1710	Micronesia(FederatedStatesof)	Developing	2005	NA
## 1711	Micronesia(FederatedStatesof)	Developing	2004	NA
## 1712	Micronesia(FederatedStatesof)	Developing	2003	NA
## 1713	Micronesia(FederatedStatesof)	Developing	2002	NA
## 1714	Micronesia(FederatedStatesof)	Developing	2001	NA
## 1715	Micronesia(FederatedStatesof)	Developing	2000	NA
## 1846	NewZealand	Developed	2015	NA
## 1847	NewZealand	Developed	2014	NA
## 1848	NewZealand	Developed	2013	NA
## 1849	NewZealand	Developed	2012	NA
## 1850	NewZealand	Developed	2011	NA
## 1851	NewZealand	Developed	2010	NA
## 1852	NewZealand	Developed	2009	NA
## 1853	NewZealand	Developed	2008	NA
## 1854	NewZealand	Developed	2007	NA
## 1855	NewZealand	Developed	2006	NA
## 1856	NewZealand	Developed	2005	NA
## 1857	NewZealand	Developed	2004	NA
## 1858	NewZealand	Developed	2003	NA
## 1859	NewZealand	Developed	2002	NA
## 1860	NewZealand	Developed	2001	NA
## 1861	NewZealand	Developed	2000	NA
## 1927	Oman	Developing	2015	NA
## 1928	Oman	Developing	2014	NA
## 1929	Oman	Developing	2013	NA
## 1930	Oman	Developing	2012	NA
## 1931	Oman	Developing	2011	NA
## 1932	Oman	Developing	2010	NA
## 1933	Oman	Developing	2009	NA
## 1934	Oman	Developing	2008	NA
## 1935	Oman	Developing	2007	NA
## 1936	Oman	Developing	2006	NA

## 1937	Oman	Developing	2005	NA
## 1938	Oman	Developing	2004	NA
## 1939	Oman	Developing	2003	NA
## 1940	Oman	Developing	2002	NA
## 1941	Oman	Developing	2001	NA
## 1942	Oman	Developing	2000	NA
## 2072	Qatar	Developing	2015	NA
## 2073	Qatar	Developing	2014	NA
## 2074	Qatar	Developing	2013	NA
## 2075	Qatar	Developing	2012	NA
## 2076	Qatar	Developing	2011	NA
## 2077	Qatar	Developing	2010	NA
## 2078	Qatar	Developing	2009	NA
## 2079	Qatar	Developing	2008	NA
## 2080	Qatar	Developing	2007	NA
## 2081	Qatar	Developing	2006	NA
## 2082	Qatar	Developing	2005	NA
## 2083	Qatar	Developing	2004	NA
## 2084	Qatar	Developing	2003	NA
## 2085	Qatar	Developing	2002	NA
## 2086	Qatar	Developing	2001	NA
## 2087	Qatar	Developing	2000	NA
## 2088	RepublicofKorea	Developing	2015	NA
## 2089	RepublicofKorea	Developing	2014	NA
## 2090	RepublicofKorea	Developing	2013	NA
## 2091	RepublicofKorea	Developing	2012	NA
## 2092	RepublicofKorea	Developing	2011	NA
## 2093	RepublicofKorea	Developing	2010	NA
## 2094	RepublicofKorea	Developing	2009	NA
## 2095	RepublicofKorea	Developing	2008	NA
## 2096	RepublicofKorea	Developing	2007	NA
## 2097	RepublicofKorea	Developing	2006	NA
## 2098	RepublicofKorea	Developing	2005	NA
## 2099	RepublicofKorea	Developing	2004	NA
## 2100	RepublicofKorea	Developing	2003	NA
## 2101	RepublicofKorea	Developing	2002	NA
## 2102	RepublicofKorea	Developing	2001	NA
## 2103	RepublicofKorea	Developing	2000	NA
## 2104	RepublicofMoldova	Developing	2015	NA
## 2105	RepublicofMoldova	Developing	2014	NA
## 2106	RepublicofMoldova	Developing	2013	NA
## 2107	RepublicofMoldova	Developing	2012	NA
## 2108	RepublicofMoldova	Developing	2011	NA
## 2109	RepublicofMoldova	Developing	2010	NA
## 2110	RepublicofMoldova	Developing	2009	NA
## 2111	RepublicofMoldova	Developing	2008	NA
## 2112	RepublicofMoldova	Developing	2007	NA
## 2113	RepublicofMoldova	Developing	2006	NA
## 2114	RepublicofMoldova	Developing	2005	NA
## 2115	RepublicofMoldova	Developing	2004	NA
## 2116	RepublicofMoldova	Developing	2003	NA
## 2117	RepublicofMoldova	Developing	2002	NA
## 2118	RepublicofMoldova	Developing	2001	NA
## 2119	RepublicofMoldova	Developing	2000	NA

##	2169	SaintLucia	Developing	2015	NA
##	2170	SaintLucia	Developing	2014	NA
##	2171	SaintLucia	Developing	2013	NA
##	2172	SaintLucia	Developing	2012	NA
##	2173	SaintLucia	Developing	2011	NA
##	2174	SaintLucia	Developing	2010	NA
##	2175	SaintLucia	Developing	2009	NA
##	2176	SaintLucia	Developing	2008	NA
##	2177	SaintLucia	Developing	2007	NA
##	2178	SaintLucia	Developing	2006	NA
##	2179	SaintLucia	Developing	2005	NA
##	2180	SaintLucia	Developing	2004	NA
##	2181	SaintLucia	Developing	2003	NA
##	2182	SaintLucia	Developing	2002	NA
##	2183	SaintLucia	Developing	2001	NA
##	2184	SaintLucia	Developing	2000	NA
##	2185	SaintVincentandtheGrenadines	Developing	2015	NA
##	2186	SaintVincentandtheGrenadines	Developing	2014	NA
##	2187	SaintVincentandtheGrenadines	Developing	2013	NA
##	2188	SaintVincentandtheGrenadines	Developing	2012	NA
##	2189	SaintVincentandtheGrenadines	Developing	2011	NA
##	2190	SaintVincentandtheGrenadines	Developing	2010	NA
##	2191	SaintVincentandtheGrenadines	Developing	2009	NA
##	2192	SaintVincentandtheGrenadines	Developing	2008	NA
##	2193	SaintVincentandtheGrenadines	Developing	2007	NA
##	2194	SaintVincentandtheGrenadines	Developing	2006	NA
##	2195	SaintVincentandtheGrenadines	Developing	2005	NA
##	2196	SaintVincentandtheGrenadines	Developing	2004	NA
##	2197	SaintVincentandtheGrenadines	Developing	2003	NA
##	2198	SaintVincentandtheGrenadines	Developing	2002	NA
##	2199	SaintVincentandtheGrenadines	Developing	2001	NA
##	2200	SaintVincentandtheGrenadines	Developing	2000	NA
##	2234	SaudiArabia	Developing	2015	NA
##	2235	SaudiArabia	Developing	2014	NA
##	2236	SaudiArabia	Developing	2013	NA
##	2237	SaudiArabia	Developing	2012	NA
##	2238	SaudiArabia	Developing	2011	NA
##	2239	SaudiArabia	Developing	2010	NA
##	2240	SaudiArabia	Developing	2009	NA
##	2241	SaudiArabia	Developing	2008	NA
##	2242	SaudiArabia	Developing	2007	NA
##	2243	SaudiArabia	Developing	2006	NA
##	2244	SaudiArabia	Developing	2005	NA
##	2245	SaudiArabia	Developing	2004	NA
##	2246	SaudiArabia	Developing	2003	NA
##	2247	SaudiArabia	Developing	2002	NA
##	2248	SaudiArabia	Developing	2001	NA
##	2249	SaudiArabia	Developing	2000	NA
##	2314	Singapore	Developed	2015	NA
##	2315	Singapore	Developed	2014	NA
##	2316	Singapore	Developed	2013	NA
##	2317	Singapore	Developed	2012	NA
##	2318	Singapore	Developed	2011	NA
##	2319	Singapore	Developed	2010	NA

## 2320	Singapore	Developed	2009	NA
## 2321	Singapore	Developed	2008	NA
## 2322	Singapore	Developed	2007	NA
## 2323	Singapore	Developed	2006	NA
## 2324	Singapore	Developed	2005	NA
## 2325	Singapore	Developed	2004	NA
## 2326	Singapore	Developed	2003	NA
## 2327	Singapore	Developed	2002	NA
## 2328	Singapore	Developed	2001	NA
## 2329	Singapore	Developed	2000	NA
## 2330	Slovakia	Developed	2015	NA
## 2331	Slovakia	Developed	2014	NA
## 2332	Slovakia	Developed	2013	NA
## 2333	Slovakia	Developed	2012	NA
## 2334	Slovakia	Developed	2011	NA
## 2335	Slovakia	Developed	2010	NA
## 2336	Slovakia	Developed	2009	NA
## 2337	Slovakia	Developed	2008	NA
## 2338	Slovakia	Developed	2007	NA
## 2339	Slovakia	Developed	2006	NA
## 2340	Slovakia	Developed	2005	NA
## 2341	Slovakia	Developed	2004	NA
## 2342	Slovakia	Developed	2003	NA
## 2343	Slovakia	Developed	2002	NA
## 2344	Slovakia	Developed	2001	NA
## 2345	Slovakia	Developed	2000	NA
## 2378	Somalia	Developing	2015	NA
## 2379	Somalia	Developing	2014	NA
## 2380	Somalia	Developing	2013	NA
## 2381	Somalia	Developing	2012	NA
## 2382	Somalia	Developing	2011	NA
## 2383	Somalia	Developing	2010	NA
## 2384	Somalia	Developing	2009	NA
## 2385	Somalia	Developing	2008	NA
## 2386	Somalia	Developing	2007	NA
## 2387	Somalia	Developing	2006	NA
## 2388	Somalia	Developing	2005	NA
## 2389	Somalia	Developing	2004	NA
## 2390	Somalia	Developing	2003	NA
## 2391	Somalia	Developing	2002	NA
## 2392	Somalia	Developing	2001	NA
## 2393	Somalia	Developing	2000	NA
## 2586	TheformerYugoslavrepublicofMacedonia	Developing	2015	NA
## 2587	TheformerYugoslavrepublicofMacedonia	Developing	2014	NA
## 2588	TheformerYugoslavrepublicofMacedonia	Developing	2013	NA
## 2589	TheformerYugoslavrepublicofMacedonia	Developing	2012	NA
## 2590	TheformerYugoslavrepublicofMacedonia	Developing	2011	NA
## 2591	TheformerYugoslavrepublicofMacedonia	Developing	2010	NA
## 2592	TheformerYugoslavrepublicofMacedonia	Developing	2009	NA
## 2593	TheformerYugoslavrepublicofMacedonia	Developing	2008	NA
## 2594	TheformerYugoslavrepublicofMacedonia	Developing	2007	NA
## 2595	TheformerYugoslavrepublicofMacedonia	Developing	2006	NA
## 2596	TheformerYugoslavrepublicofMacedonia	Developing	2005	NA
## 2597	TheformerYugoslavrepublicofMacedonia	Developing	2004	NA

##	2598	TheformerYugoslavrepublicofMacedonia	Developing	2003	NA
##	2599	TheformerYugoslavrepublicofMacedonia	Developing	2002	NA
##	2600	TheformerYugoslavrepublicofMacedonia	Developing	2001	NA
##	2601	TheformerYugoslavrepublicofMacedonia	Developing	2000	NA
##	2747	UnitedArabEmirates	Developing	2015	NA
##	2748	UnitedArabEmirates	Developing	2014	NA
##	2749	UnitedArabEmirates	Developing	2013	NA
##	2750	UnitedArabEmirates	Developing	2012	NA
##	2751	UnitedArabEmirates	Developing	2011	NA
##	2752	UnitedArabEmirates	Developing	2010	NA
##	2753	UnitedArabEmirates	Developing	2009	NA
##	2754	UnitedArabEmirates	Developing	2008	NA
##	2755	UnitedArabEmirates	Developing	2007	NA
##	2756	UnitedArabEmirates	Developing	2006	NA
##	2757	UnitedArabEmirates	Developing	2005	NA
##	2758	UnitedArabEmirates	Developing	2004	NA
##	2759	UnitedArabEmirates	Developing	2003	NA
##	2760	UnitedArabEmirates	Developing	2002	NA
##	2761	UnitedArabEmirates	Developing	2001	NA
##	2762	UnitedArabEmirates	Developing	2000	NA
##	2763	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2015	NA
##	2764	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2014	NA
##	2765	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2013	NA
##	2766	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2012	NA
##	2767	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2011	NA
##	2768	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2010	NA
##	2769	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2009	NA
##	2770	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2008	NA
##	2771	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2007	NA
##	2772	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2006	NA
##	2773	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2005	NA
##	2774	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2004	NA
##	2775	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2003	NA
##	2776	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2002	NA
##	2777	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2001	NA
##	2778	UnitedKingdomofGreatBritainandNorthernIreland	Developed	2000	NA
##	2779	UnitedRepublicofTanzania	Developing	2015	NA
##	2780	UnitedRepublicofTanzania	Developing	2014	NA
##	2781	UnitedRepublicofTanzania	Developing	2013	NA
##	2782	UnitedRepublicofTanzania	Developing	2012	NA
##	2783	UnitedRepublicofTanzania	Developing	2011	NA
##	2784	UnitedRepublicofTanzania	Developing	2010	NA
##	2785	UnitedRepublicofTanzania	Developing	2009	NA
##	2786	UnitedRepublicofTanzania	Developing	2008	NA
##	2787	UnitedRepublicofTanzania	Developing	2007	NA
##	2788	UnitedRepublicofTanzania	Developing	2006	NA
##	2789	UnitedRepublicofTanzania	Developing	2005	NA
##	2790	UnitedRepublicofTanzania	Developing	2004	NA
##	2791	UnitedRepublicofTanzania	Developing	2003	NA
##	2792	UnitedRepublicofTanzania	Developing	2002	NA
##	2793	UnitedRepublicofTanzania	Developing	2001	NA
##	2794	UnitedRepublicofTanzania	Developing	2000	NA
##	2795	UnitedStatesofAmerica	Developed	2015	NA
##	2796	UnitedStatesofAmerica	Developed	2014	NA

## 2797	UnitedStatesofAmerica	Developed	2013	NA
## 2798	UnitedStatesofAmerica	Developed	2012	NA
## 2799	UnitedStatesofAmerica	Developed	2011	NA
## 2800	UnitedStatesofAmerica	Developed	2010	NA
## 2801	UnitedStatesofAmerica	Developed	2009	NA
## 2802	UnitedStatesofAmerica	Developed	2008	NA
## 2803	UnitedStatesofAmerica	Developed	2007	NA
## 2804	UnitedStatesofAmerica	Developed	2006	NA
## 2805	UnitedStatesofAmerica	Developed	2005	NA
## 2806	UnitedStatesofAmerica	Developed	2004	NA
## 2807	UnitedStatesofAmerica	Developed	2003	NA
## 2808	UnitedStatesofAmerica	Developed	2002	NA
## 2809	UnitedStatesofAmerica	Developed	2001	NA
## 2810	UnitedStatesofAmerica	Developed	2000	NA
## 2859	Venezuela(BolivarianRepublicof)	Developing	2015	NA
## 2860	Venezuela(BolivarianRepublicof)	Developing	2014	NA
## 2861	Venezuela(BolivarianRepublicof)	Developing	2013	NA
## 2862	Venezuela(BolivarianRepublicof)	Developing	2012	NA
## 2863	Venezuela(BolivarianRepublicof)	Developing	2011	NA
## 2864	Venezuela(BolivarianRepublicof)	Developing	2010	NA
## 2865	Venezuela(BolivarianRepublicof)	Developing	2009	NA
## 2866	Venezuela(BolivarianRepublicof)	Developing	2008	NA
## 2867	Venezuela(BolivarianRepublicof)	Developing	2007	NA
## 2868	Venezuela(BolivarianRepublicof)	Developing	2006	NA
## 2869	Venezuela(BolivarianRepublicof)	Developing	2005	NA
## 2870	Venezuela(BolivarianRepublicof)	Developing	2004	NA
## 2871	Venezuela(BolivarianRepublicof)	Developing	2003	NA
## 2872	Venezuela(BolivarianRepublicof)	Developing	2002	NA
## 2873	Venezuela(BolivarianRepublicof)	Developing	2001	NA
## 2874	Venezuela(BolivarianRepublicof)	Developing	2000	NA
## 2875	VietNam	Developing	2015	NA
## 2876	VietNam	Developing	2014	NA
## 2877	VietNam	Developing	2013	NA
## 2878	VietNam	Developing	2012	NA
## 2879	VietNam	Developing	2011	NA
## 2880	VietNam	Developing	2010	NA
## 2881	VietNam	Developing	2009	NA
## 2882	VietNam	Developing	2008	NA
## 2883	VietNam	Developing	2007	NA
## 2884	VietNam	Developing	2006	NA
## 2885	VietNam	Developing	2005	NA
## 2886	VietNam	Developing	2004	NA
## 2887	VietNam	Developing	2003	NA
## 2888	VietNam	Developing	2002	NA
## 2889	VietNam	Developing	2001	NA
## 2890	VietNam	Developing	2000	NA
## 2891	Yemen	Developing	2015	NA
## 2892	Yemen	Developing	2014	NA
## 2893	Yemen	Developing	2013	NA
## 2894	Yemen	Developing	2012	NA
## 2895	Yemen	Developing	2011	NA
## 2896	Yemen	Developing	2010	NA
## 2897	Yemen	Developing	2009	NA
## 2898	Yemen	Developing	2008	NA


```

## 2899          Yemen Developing 2007          NA
## 2900          Yemen Developing 2006          NA
## 2901          Yemen Developing 2005          NA
## 2902          Yemen Developing 2004          NA
## 2903          Yemen Developing 2003          NA
## 2904          Yemen Developing 2002          NA
## 2905          Yemen Developing 2001          NA
## 2906          Yemen Developing 2000          NA

for(i in unique(data[!complete.cases(data$Population),"Country"])){
  print(paste(i,'has',nrow(data[which(data$Country == i & is.na(data$Population)),]),'missing population
'})

## [1] "AntiguaandBarbuda has 16 missing population instances"
## [1] "Bahamas has 16 missing population instances"
## [1] "Bahrain has 16 missing population instances"
## [1] "Barbados has 16 missing population instances"
## [1] "Bolivia(PlurinationalStateof) has 16 missing population instances"
## [1] "BruneiDarussalam has 16 missing population instances"
## [1] "CÃ´te d'Ivoire has 16 missing population instances"
## [1] "Congo has 16 missing population instances"
## [1] "Cuba has 16 missing population instances"
## [1] "Czechia has 16 missing population instances"
## [1] "DemocraticPeople'sRepublicofKorea has 16 missing population instances"
## [1] "DemocraticRepublicoftheCongo has 16 missing population instances"
## [1] "Egypt has 16 missing population instances"
## [1] "Eritrea has 4 missing population instances"
## [1] "Gambia has 16 missing population instances"
## [1] "Grenada has 16 missing population instances"
## [1] "Iran(IslamicRepublicof) has 16 missing population instances"
## [1] "Kuwait has 16 missing population instances"
## [1] "Kyrgyzstan has 16 missing population instances"
## [1] "LaoPeople'sDemocraticRepublic has 16 missing population instances"
## [1] "Libya has 16 missing population instances"
## [1] "Micronesia(FederatedStatesof) has 16 missing population instances"
## [1] "NewZealand has 16 missing population instances"
## [1] "Oman has 16 missing population instances"
## [1] "Qatar has 16 missing population instances"
## [1] "RepublicofKorea has 16 missing population instances"
## [1] "RepublicofMoldova has 16 missing population instances"
## [1] "SaintLucia has 16 missing population instances"
## [1] "SaintVincentandtheGrenadines has 16 missing population instances"
## [1] "SaudiArabia has 16 missing population instances"
## [1] "Singapore has 16 missing population instances"
## [1] "Slovakia has 16 missing population instances"
## [1] "Somalia has 16 missing population instances"
## [1] "TheformerYugoslavrepublicofMacedonia has 16 missing population instances"
## [1] "UnitedArabEmirates has 16 missing population instances"
## [1] "UnitedKingdomofGreatBritainandNorthernIreland has 16 missing population instances"
## [1] "UnitedRepublicofTanzania has 16 missing population instances"
## [1] "UnitedStatesofAmerica has 16 missing population instances"
## [1] "Venezuela(BolivarianRepublicof) has 16 missing population instances"
## [1] "VietNam has 16 missing population instances"
## [1] "Yemen has 16 missing population instances"

```

Population is an important variable for the analysis. Each country's population is distinct and cannot be filled using median, mean or using another calculation. Hence, we will try to fill these values manually, by searching the internet and searching for the populations of these countries. Since it would be difficult to gather population data for so many missing instances, we will only fill the missing population instances for 2015, which is the latest year in the dataset.

```
Population_2015 <- c(93566,353658,1234571,276300,10426154,414400,21570746,76244532,11241161,10506813,25
data[which(data$Year == "2015" & is.na(data$Population)), 'Population'] <- Population_2015
```

Answering the Given Questions

Now that we have finished cleaning the data and removing missing instances as much as possible, its time to answer the important questions. We will answer these questions using data only for the year 2015.

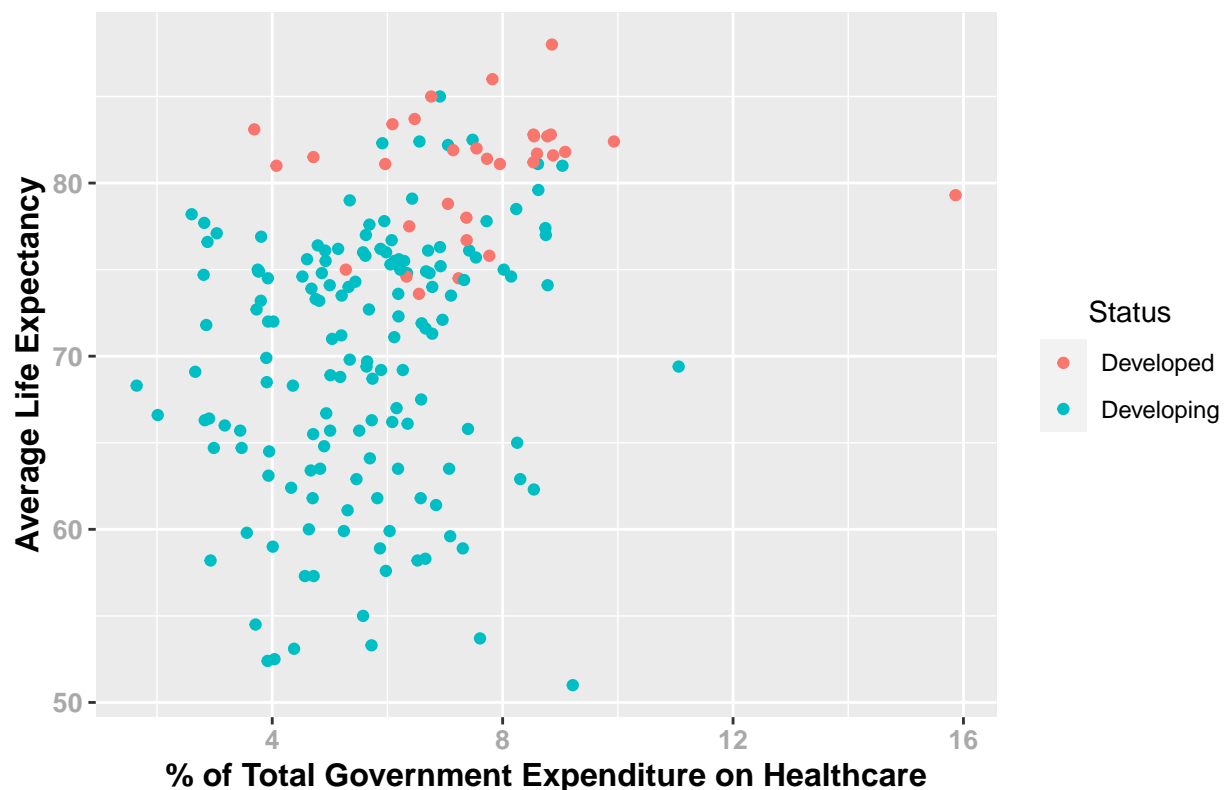
```
library(ggplot2)
```

Q1 - Does various predicting factors which has been chosen initially really affect the Life expectancy? What are the predicting variables actually affecting the life expectancy?

This is a question that we would try to answer towards the end of the analysis.

Q2 - Should a country having a lower life expectancy value(<65) increase its healthcare expenditure in order to improve its average lifespan?

Expenditure on Healthcare vs Life Expectancy

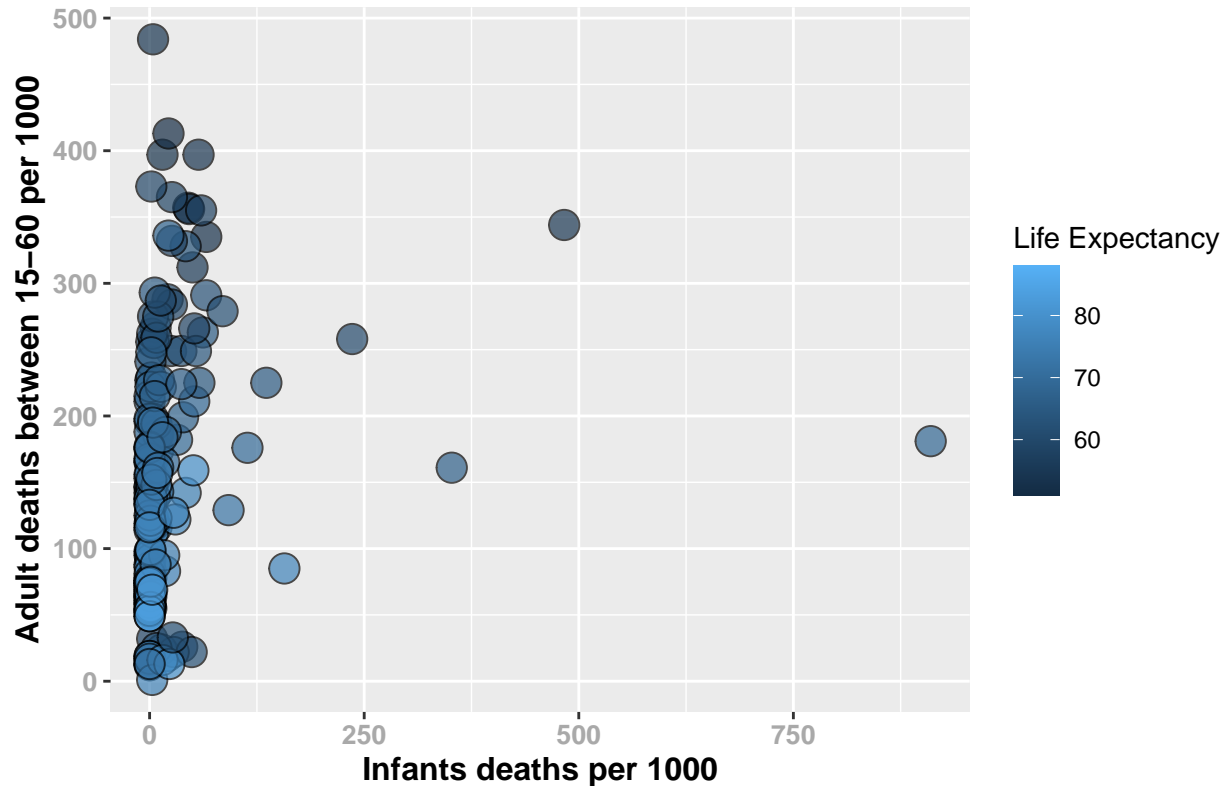


Based on the scatterplot, we can state that there is no apparent positive relation between total healthcare expenditure and life expectancy. A dominant share of Countries with high life expectancy are channeling the same % of the government expenditure towards healthcare as the countries with life expectancy lower than 65. Hence, we can state that life expectancy has more to do than just with healthcare expenditure. We

can also see that most of the developed countries with life expectancy above 70 spend on healthcare almost similar to developing nations with lower life expectancy.

Q3 - How does Infant and Adult mortality rates affect life expectancy?

Impact of Infant/Adult mortality on life expectancy

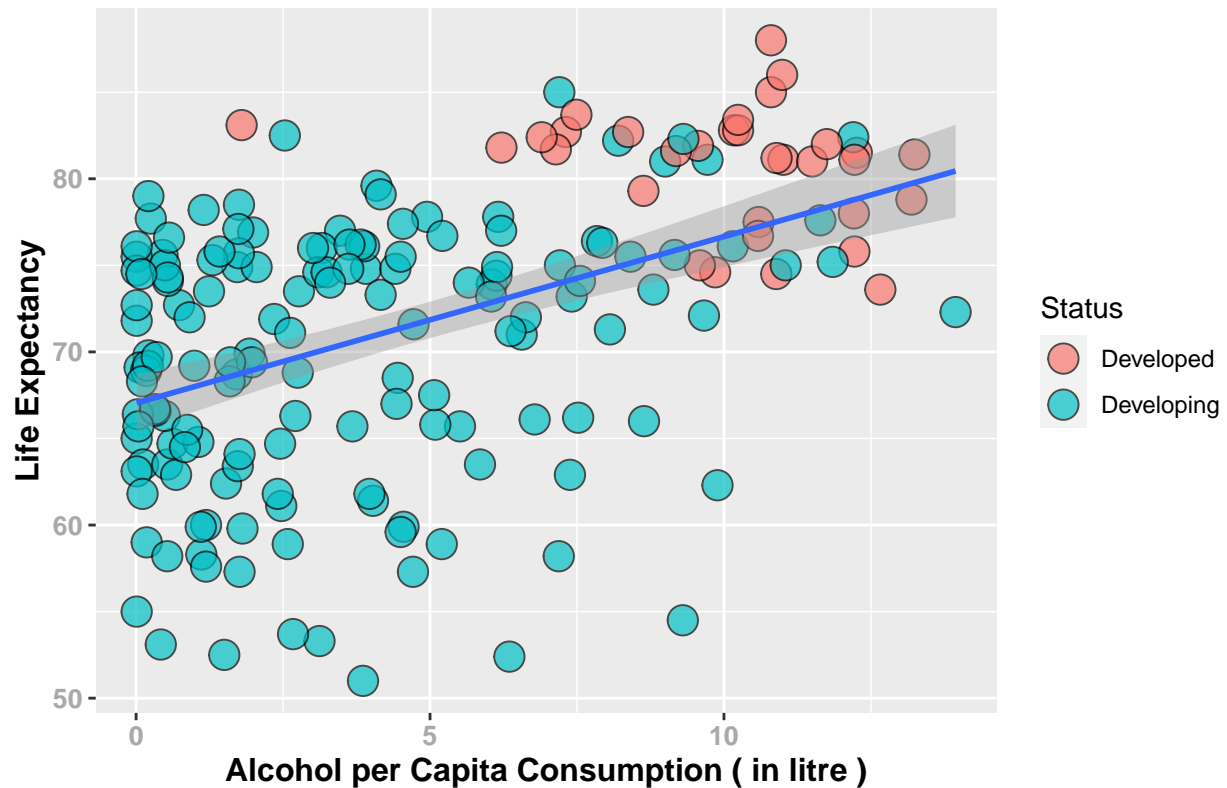


From the scatterplot, firstly we can conclude that, as of 2015, most countries usually record exceptionally low infant death rates. Very few countries have gone past 100 deaths, which may need to be investigated. However, the adult deaths vary. Back to question, we can state that countries with a very low infants deaths and adult deaths below 150 seem to have an average life expectancy of above 75. Hence, the main target should be looking after the health of the adults in the country as lower adult deaths will significantly improve the life expectancy.

Q4 - Does Life Expectancy have positive or negative relationship with drinking alcohol?

```
## `geom_smooth()` using formula 'y ~ x'
```

Alcohol Consumption vs Life Expectancy

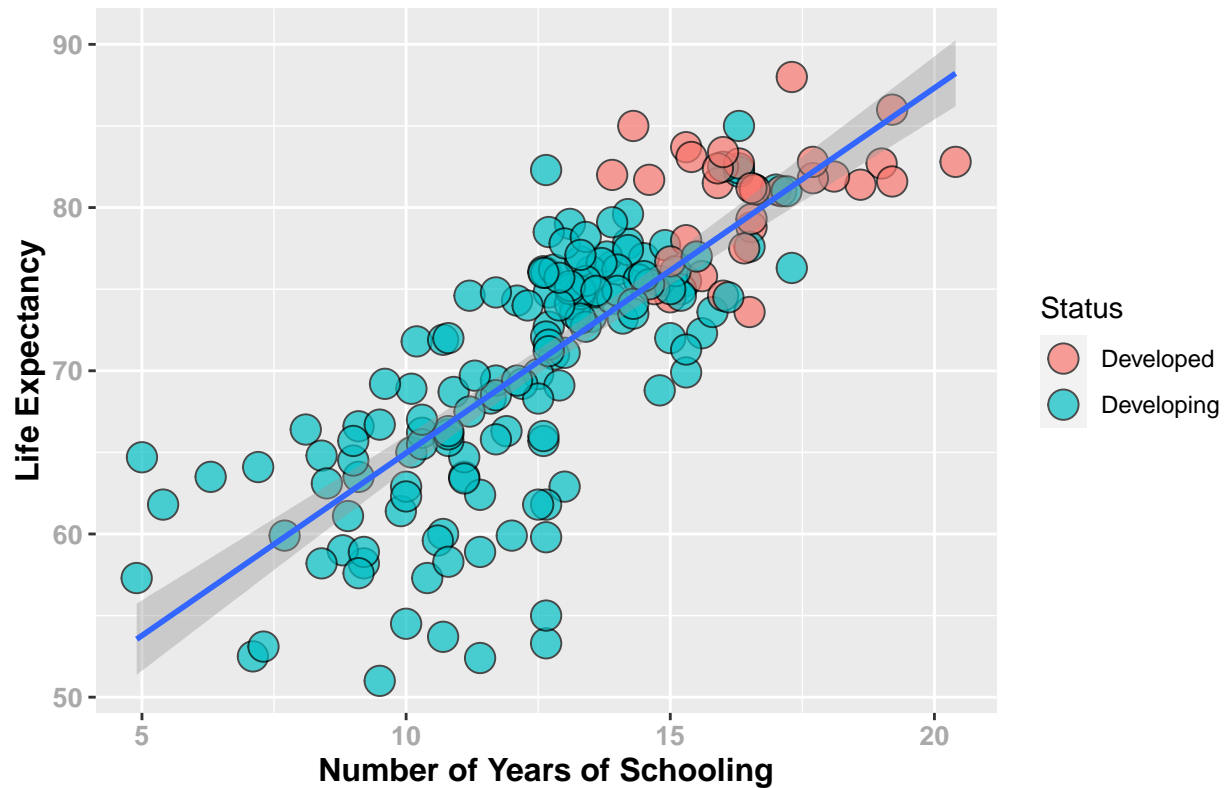


From the scatterplot, it seems that life expectancy has a moderately strong positive correlation with alcohol consumption. The higher the per capita consumption of alcohol, the higher the life expectancy. However, not all points in the plot seem to indicate that. There are many countries with low consumption and higher life expectancy. However, when we try to analyse using the status of the country, it appears as if all the points with very high consumption and high life expectancy are related to developed countries. It's not necessary that alcohol consumption could lead to improved life expectancy. There could be other factors in a country that could affect the life span. Correlation doesn't always imply causation.

Q5 - What is the impact of schooling on the lifespan of humans?

```
## `geom_smooth()` using formula 'y ~ x'
```

Impact of schooling on the lifespan of humans

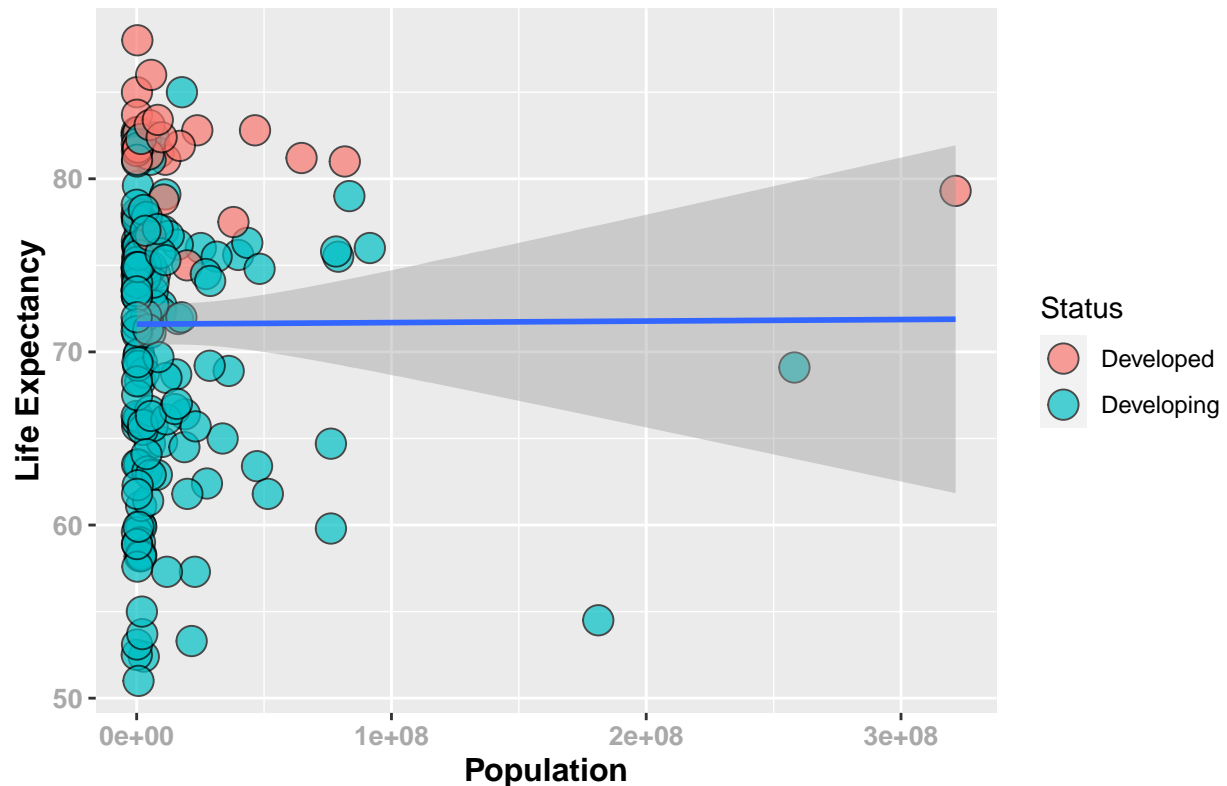


From the scatter plot, we can catch a clear and a very strong positive correlation between Numbers of Years of Schooling and Life Expectancy. Countries where people get more years of schooling record very high life expectancy. Hence, we can definitely consider schooling as an important predictor.

Q6 - Do densely populated countries tend to have lower life expectancy?

```
## `geom_smooth()` using formula 'y ~ x'
```

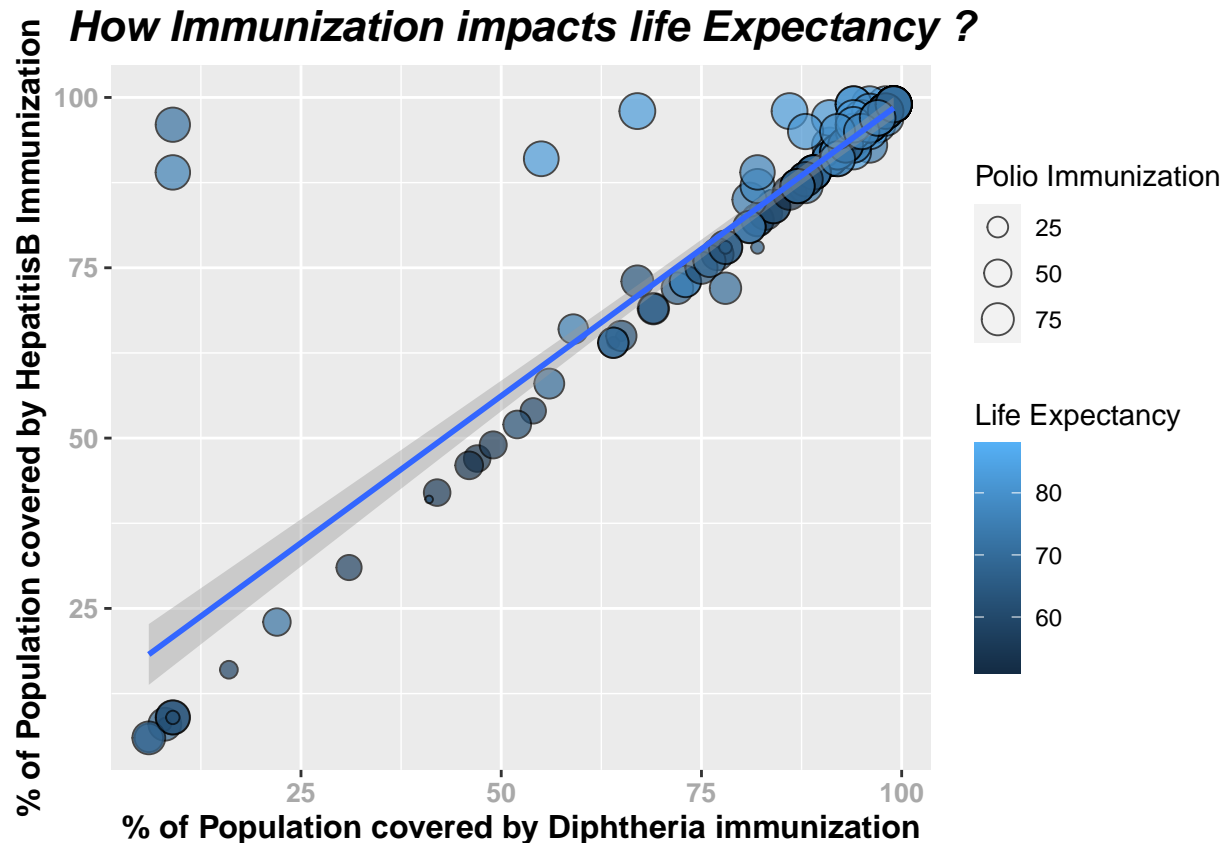
Relationship between Population and Life Expectancy



From the scatterplot, we can conclude that there is no apparent correlation between population and life expectancy. There are many densely populated countries with high life expectancy and low life expectancy. There are cases of countries with extremely large populations and high and low life expectancy. However, on mapping status of countries, it also be seen that even developed countries with large populations, similar to those of developing countries, have very high life expectancy. Hence, we can state that simply having a large population can't be a reason for having lower life expectancy.

Q7 - What is the impact of Immunization coverage on life Expectancy?

```
## `geom_smooth()` using formula 'y ~ x'
```



From the scatterplot, we can see that there is a very positive relationship between immunization rates and Life expectancy. Countries which are working hard on providing immunization against diseases like HepatitisB, Diphtheria and Polio to large share of their population record very high life expectancies. Therefore, Immunization does play a crucial role in determining the life expectancy of a country.

Getting back to our first question Q1 - Does various predicting factors which has been chosen initially really affect the Life expectancy? What are the predicting variables actually affecting the life expectancy?

```
##
## Call:
## lm(formula = Lifeexpectancy ~ AdultMortality + infantdeaths +
##     Alcohol + Totalexpenditure + HepatitisB + Measles + BMI +
##     under.fivedeaths + Polio + Totalexpenditure + Diphtheria +
##     HIV.AIDS + GDP + Population + Schooling, data = data[which(data$Year ==
##     "2015"), ])
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -9.610 -1.858  0.034   2.122   8.076
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.728e+01  2.061e+00  27.801  < 2e-16 ***
## AdultMortality -3.233e-02  3.668e-03  -8.815  1.46e-15 ***
## infantdeaths   7.642e-02  3.534e-02   2.162  0.03201 *
## Alcohol        1.364e-01  8.752e-02   1.559  0.12094
```

```
## Totalexpenditure 1.570e-01 1.538e-01 1.021 0.30869
## HepatitisB 2.292e-02 2.699e-02 0.849 0.39703
## Measles -1.814e-05 6.085e-05 -0.298 0.76595
## BMI 1.511e-02 1.516e-02 0.997 0.32038
## under.fivedeaths -6.151e-02 2.606e-02 -2.360 0.01941 *
## Polio 2.181e-02 1.458e-02 1.496 0.13648
## Diphtheria 6.905e-03 3.091e-02 0.223 0.82352
## HIV.AIDS -6.688e-01 2.558e-01 -2.615 0.00975 **
## GDP 4.583e-05 2.658e-05 1.724 0.08652 .
## Population 2.101e-09 7.537e-09 0.279 0.78080
## Schooling 1.003e+00 1.500e-01 6.687 3.23e-10 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.342 on 168 degrees of freedom
## Multiple R-squared: 0.8438, Adjusted R-squared: 0.8308
## F-statistic: 64.83 on 14 and 168 DF, p-value: < 2.2e-16
```

From the regression model's summary, we can infer the various predicting factors initially chosen were able to explain about 84 % of variations in life expectancy points and were actually key influencers of the life expectancy.

However, based on the insights that we derived from answering the important questions, lets use the variables of Schooling, HepatitisB , Diphtheria, Polio and Adult Mortality for understanding the relationship with life expectancy.

```
##
## Call:
## lm(formula = Lifeexpectancy ~ Schooling + HepatitisB + Diphtheria +
##     Polio + AdultMortality, data = data[which(data$Year == "2015"),
##     ])
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -10.2365  -1.8316   0.1336   2.2482   7.4026
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  54.98675    1.87926  29.260 <2e-16 ***
## Schooling    1.31019    0.11173  11.726 <2e-16 ***
## HepatitisB    0.01672    0.02738   0.611  0.5421
## Diphtheria    0.02196    0.03139   0.700  0.4850
## Polio         0.02806    0.01456   1.927  0.0556 .
## AdultMortality -0.03893    0.00320 -12.167 <2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.458 on 177 degrees of freedom
## Multiple R-squared: 0.8237, Adjusted R-squared: 0.8188
## F-statistic: 165.5 on 5 and 177 DF, p-value: < 2.2e-16
```

From the new model, we have achieved a multiple R square and Adjusted R square (0.8237 and 0.8188 respectively) which is slightly lower but almost similar to that of the model that used all predicting variables in dataset i.e (0.8438 and 0.8308 respectively). The new model can explain around 82% of the variation in life expectancy while the model using all variables in the dataset could explain around 84 % variation in the study. Hence, we can conclude by saying that Schooling, Immunization and Controlling Adult Deaths are

the absolutely crucial factors affecting Life Expectancy. Other factors like expenditure on healthcare, BMI, Status of Country, Population, etc do have an positive impact on life expectancy but not by a significant margin.

Therefore, a suggestion that could be given to countries, especially developing ones, to improve life expectancy would be to initially work on providing schooling to all children, immunization against harmful diseases and taking care of the health of adults.