

## Load Relevant R Libraries

```
library(rmarkdown); library(knitr); library(moments);  
library(scatterplot3d); library(corrplot); library(pso)  
library(psych); library(GPArotation); library(lavaan); library(readxl)
```

## Matrix Construction

```
data_matrix_csv <- read.csv("C:/Users/User/OneDrive - University of St. Thomas/Classes/STAT360/STAT360 I  
life_expectancy <- as.matrix(data_matrix_csv)  
  
col_names_unedited <- c(  
  "Life expectancy at birth, total (years)",  
  "CO2 emissions (metric tons per capita)",  
  "Access to electricity (% of population)",  
  "Current health expenditure (% of GDP)",  
  "Out-of-pocket expenditure (% of current health expenditure)",  
  "Domestic private health expenditure per capita, PPP (current international $)",  
  "Domestic general government health expenditure per capita, PPP (current international $)",  
  "Renewable internal freshwater resources per capita (cubic meters)",  
  "Prevalence of HIV, total (% of population ages 15-49)",  
  "Unemployment, total (% of total labor force) (national estimate)",  
  "Government Effectiveness: Estimate",  
  "Income share held by highest 10%",  
  "Prevalence of current tobacco use (% of adults)",  
  "Total alcohol consumption per capita (liters of pure alcohol, projected estimates, 15+ years of age)",  
  "Political Stability and Absence of Violence/Terrorism: Estimate",  
  "Population density (people per sq. km of land area)"  
)  
  
# Better for displaying  
col_names <- c(  
  "Life_expectancy",  
  "CO2_emissions",  
  "Electricity",  
  "Health_expenditure",  
  "Out_of_pocket",  
  "Private_health_expenditure",  
  "Govt_health_expenditure",  
  "Freshwater_resources",  
  "HIV_prevalence",  
  "Unemployment",  
  "Govt_effectiveness",  
  "Income_share",  
  "Tobacco_use",
```

```

"Alcohol_consumption",
"Political_stability",
"Population_density"
)

colnames(life_expectancy) <- col_names

```

## Matrix Output

```
head(life_expectancy)
```

```

##           Life_expectancy CO2_emissions Electricity Health_expenditure
## Afghanistan      63.565    0.2975637    97.70000    14.831319
## Albania           79.282    1.7494625   100.00000         NA
## Algeria           76.474    3.9944018    99.50000    6.251709
## American Samoa         NA         NA         NA         NA
## Andorra           NA     6.2872038   100.00000    7.408406
## Angola            62.448    0.7536382    45.63388    2.655926
##           Out_of_pocket Private_health_expenditure Govt_health_expenditure
## Afghanistan      76.81837             246.99055         10.77558
## Albania           NA             NA             398.65667
## Algeria           33.39915             263.28668         490.58659
## American Samoa         NA             NA             NA
## Andorra           12.59579             1175.59749        2970.76663
## Angola            37.88715             95.44837         70.74730
##           Freshwater_resources HIV_prevalence Unemployment
## Afghanistan      1248.3618             0.1         NA
## Albania           9424.7372             0.1         11.47
## Algeria           263.3627             0.1         NA
## American Samoa         NA             NA         NA
## Andorra           4133.9743             NA         NA
## Angola            4574.4540             1.7         16.50
##           Govt_effectiveness Income_share Tobacco_use Alcohol_consumption
## Afghanistan      -1.49562669         NA         23.8         0.01618
## Albania           -0.03333325         23.6         23.0         5.10935
## Algeria           -0.54141891         NA         21.0         0.61271
## American Samoa         0.53768432         NA         NA         NA
## Andorra           1.90103769         NA         32.0        11.05154
## Angola            -1.08401024         NA         NA         6.17199
##           Political_stability Population_density
## Afghanistan      -2.6555312         57.90825
## Albania           0.1111686         104.16755
## Algeria           -1.0443426         17.93032
## American Samoa         1.1721891        236.60500
## Andorra           1.6022023         162.43191
## Angola            -0.3585250         25.95138

```

```
dim(life_expectancy)
```

```
## [1] 217 16
```

**Response:** “Life expectancy at birth, total (years)”

**Predictors:**

“CO2 emissions (metric tons per capita)”,

“Access to electricity (% of population)”,

“Current health expenditure (% of GDP)”,

“Out-of-pocket expenditure (% of current health expenditure)”,

“Domestic private health expenditure per capita, PPP (current international \$)”,

“Domestic general government health expenditure per capita, PPP (current international \$)”,

“Renewable internal freshwater resources per capita (cubic meters)”,

“Prevalence of HIV, total (% of population ages 15-49)”,

“Unemployment, total (% of total labor force) (national estimate)”,

“Government Effectiveness: Estimate”,

“Income share held by highest 10%”,

“Prevalence of current tobacco use (% of adults)”,

“Total alcohol consumption per capita (liters of pure alcohol, projected estimates, 15+ years of age)”,

“Political Stability and Absence of Violence/Terrorism: Estimate”,

“Population density (people per sq. km of land area)”

**Adjustments to Original Dimensions**

- No adjustments needed at this time