EDA- Final Proect Submission

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Our main agenda is to understand how Suicide Rates have varied across the years with respect to different factors such as gender, GDP, age and location.

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 3.5.3
```

```
## Warning: package 'ggplot2' was built under R version 3.5.3
```

```
## Warning: package 'tibble' was built under R version 3.5.3
```

```
## Warning: package 'tidyr' was built under R version 3.5.3
```

```
## Warning: package 'readr' was built under R version 3.5.3
```

```
## Warning: package 'purrr' was built under R version 3.5.3
```

```
## Warning: package 'dplyr' was built under R version 3.5.3
```

```
## Warning: package 'stringr' was built under R version 3.5.3
```

```
## Warning: package 'forcats' was built under R version 3.5.3
```

```
library(ggplot2)
library(GGally)
```

```
## Warning: package 'GGally' was built under R version 3.5.3
```

```
library(broom)
library(dplyr)
library(rio)
library(countrycode)
library(maps)
```

```
## Warning: package 'maps' was built under R version 3.5.3
```

```
library(gridExtra)
library(ggthemes)
```

```
## Warning: package 'ggthemes' was built under R version 3.5.3
```

```r
library(socviz)
```

```
## Warning: package 'socviz' was built under R version 3.5.3
```

```r
library(mapproj)
```

```
## Warning: package 'mapproj' was built under R version 3.5.3
```

```r
library(rworldmap)
```

```
## Warning: package 'rworldmap' was built under R version 3.5.3
```

```r
cb_palette = c("#999999", "#E69F00", "#56B4E9", "#009E73","#F0E442", "#0072B2", "#D55E00", "#CC79A7")
library(mgcv)
library(gridExtra)
library(grid)
```

```r
data = read.csv("C:\\Users\\umamg\\OneDrive\\Desktop\\master.csv")
names(data)[names(data)=="ï..country"] = "Country"
data = filter(data, year!=2016)
data = subset(data, select = -c(generation,HDI.for.year) )
data = na.omit(data)
#View(data)
```

```r
grouped <- group_by(data, year)
year <- summarise(grouped, sr = sum(suicides_no),pop = sum(population))
year$suicide_100k <- (year$sr/year$pop)*100000

ggplot(year, aes(x=year, y=suicide_100k)) + geom_line(linetype="solid", color="blue", size=1) +geom_point() + xlab("Year") +
ylab("Suicides per 100K people") + ggtitle("Global Suicide Rates over the Years : Time Series Plot") + scale_x_continuous(br
eaks=seq(1985, 2015, 3))
```

Global Suicide Rates over the Years : Time Series Plot
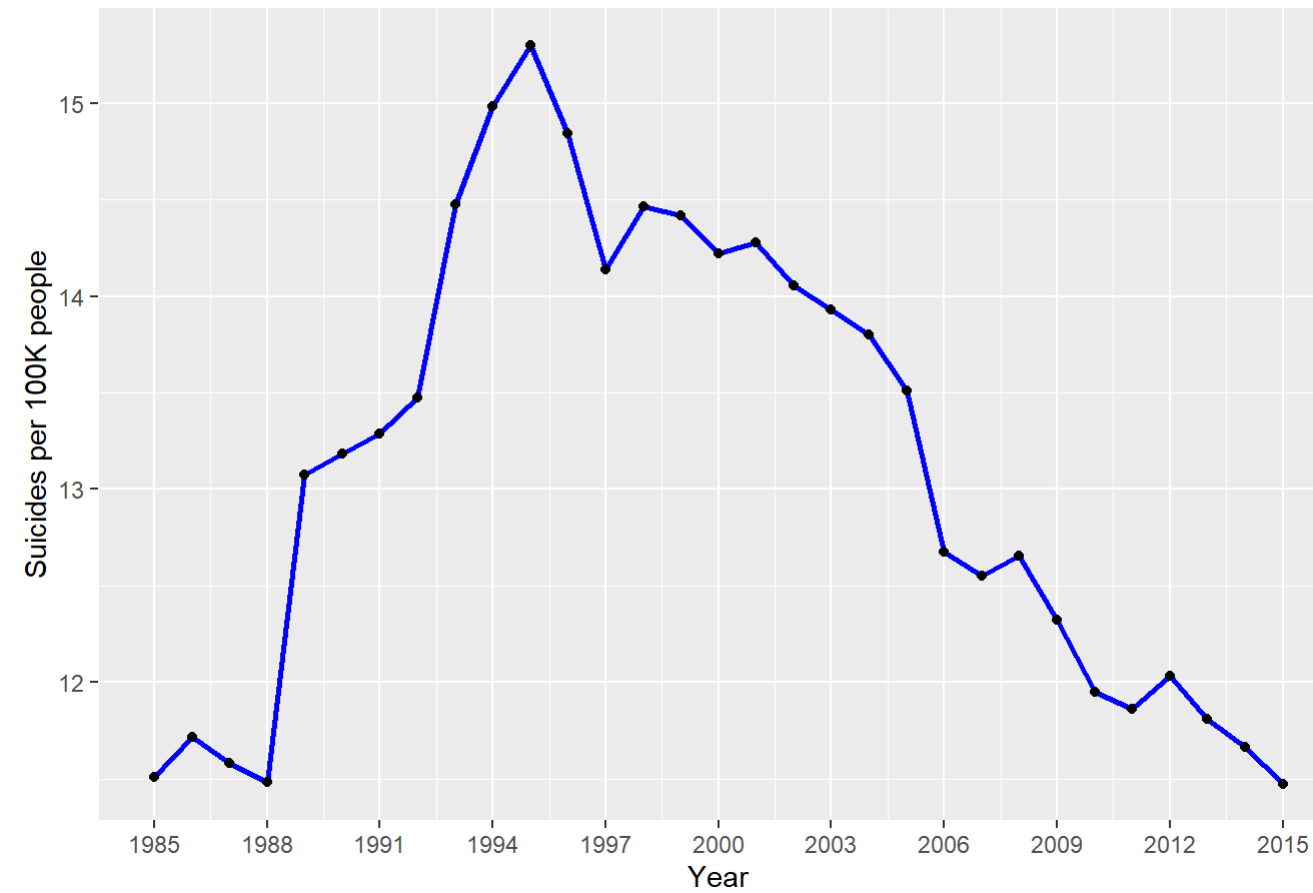


```
mean(year$suicide_100k)
```

```
## [1] 13.12023
```

Question 1: How has the suicide rate across the world varied with gender and age?

We compare the suicide rates across all the years, for both the genders.

```
grouped <- group_by(data, sex, year)
year_sex <- summarise(grouped, sr = sum(suicides_no),pop = sum(population))
year_sex$suicide_100k <- (year_sex$sr/year_sex$pop)*100000

ggplot(year_sex, aes(x=year, y=suicide_100k, color=sex)) + geom_line(size=1) +geom_point()+ xlab("Year") + ylab("Suicides pe
r 100K people") + ggtitle("Suicide Rates across Genders over the Years:Time Series Plot") +theme_bw() +scale_x_continuous(br
eaks=seq(1985, 2016, 2))
```

Suicide Rates across Genders over the Years:Time Series Plot
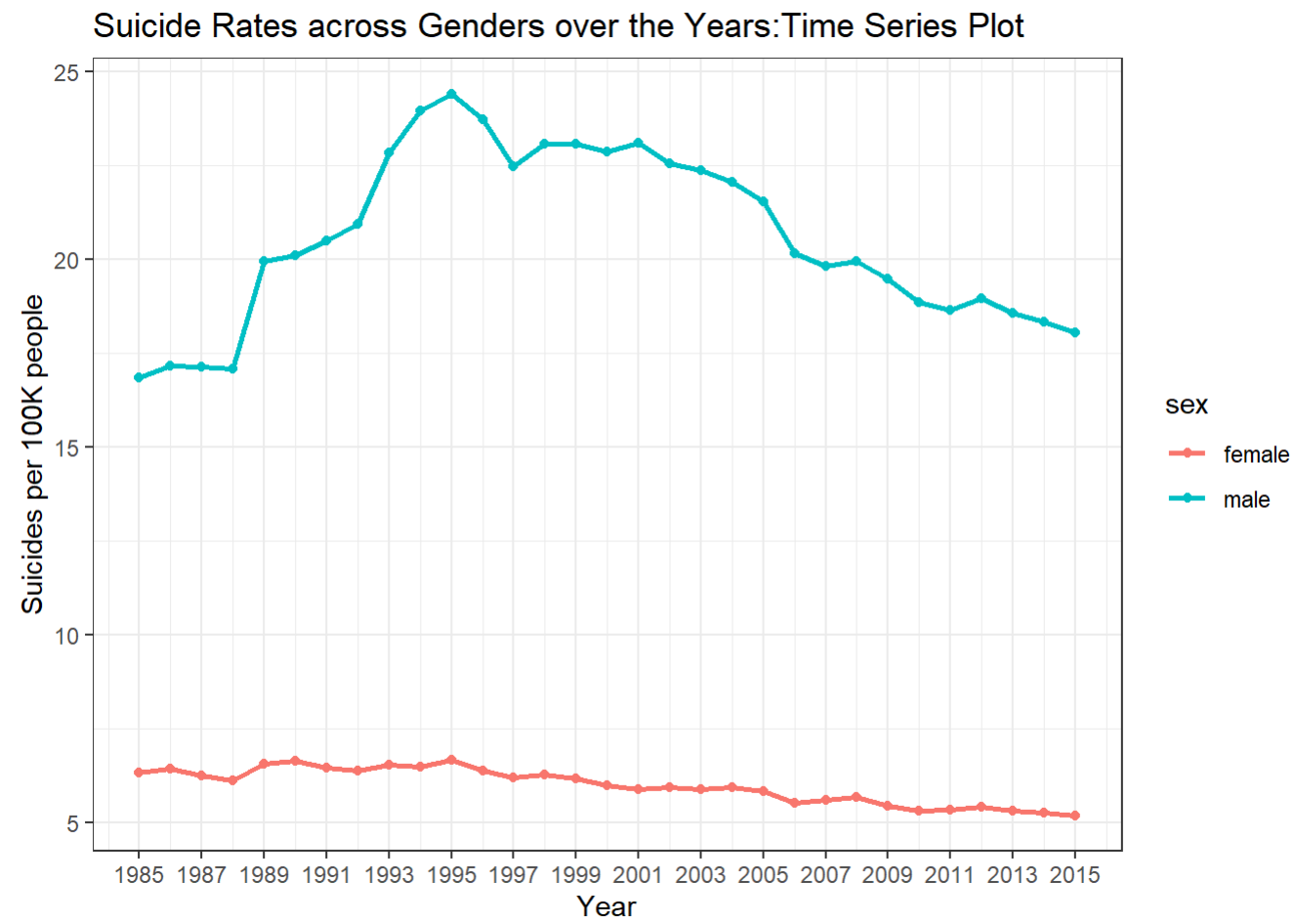

```
grouped <- group_by(data,sex)
gender_plot <- summarise(grouped, suicide_per_100k = (sum(as.numeric(suicides_no)) / sum(as.numeric(population))) * 100000)
ggplot(gender_plot, aes(x = sex, y = suicide_per_100k, fill = sex)) + geom_bar(stat = "identity", fill= c('pink','lightblue'
)) + labs(title = "Global suicides by Gender for every 100k people", x = "Sex", y = "Suicides Rate") +theme_bw() + scale_y_c
ontinuous(breaks=seq(0, 25, 5))
```

Global suicides by Gender for every 100k people
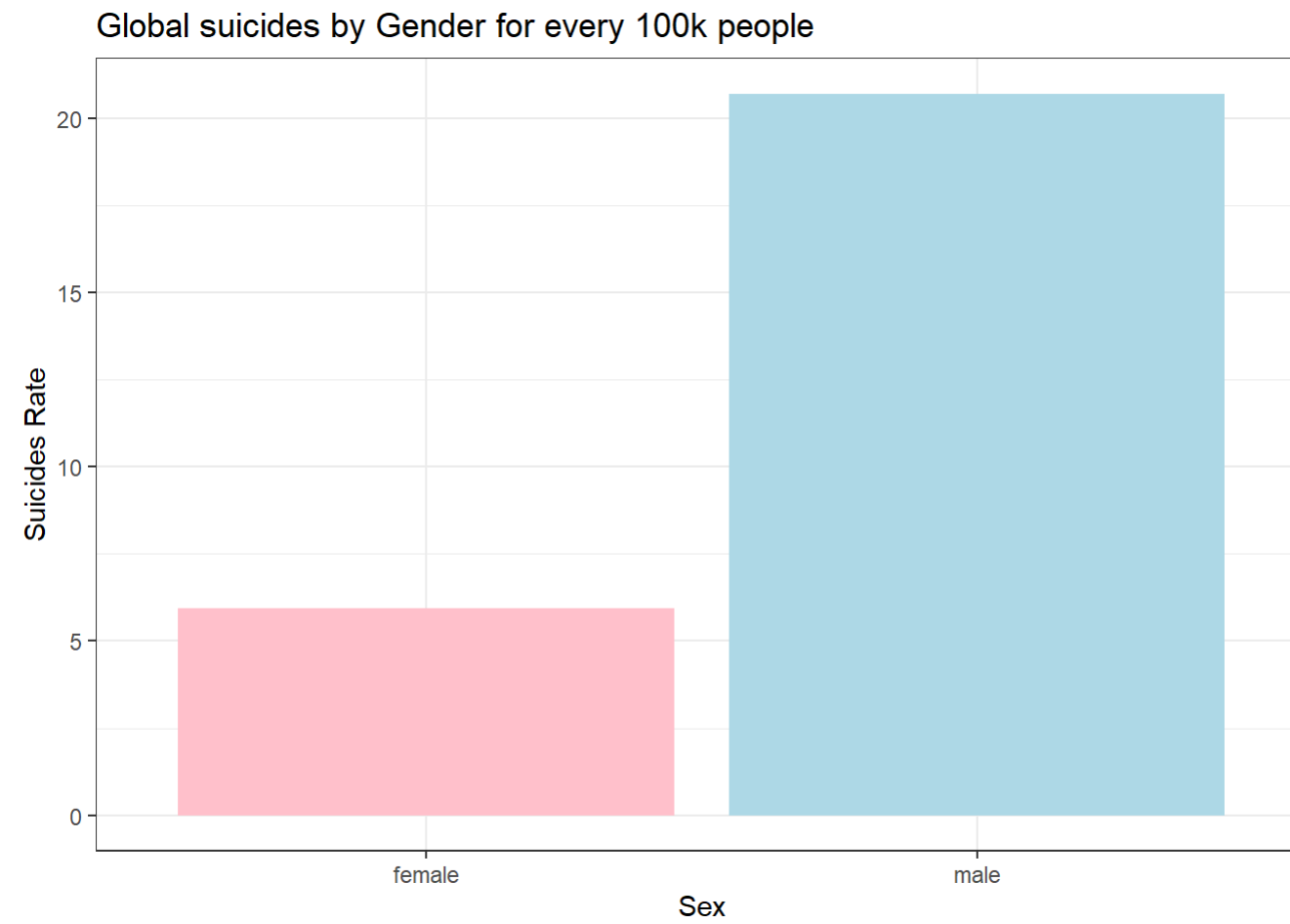

```
grouped <- group_by(data,sex)
gender_plot <- summarise(grouped, total_suicides = (sum(as.numeric(suicides_no))))
ggplot(gender_plot, aes(x = sex, y = total_suicides, fill = sex)) + geom_bar(stat = "identity", fill= c('pink','lightblue'))
+ labs(title = "Global suicides by Gender : Overall - Categorical Evaluation", x = "Sex", y = "Total Suicides") +theme_bw()
```

## Global suicides by Gender : Overall - Categorical Evaluation
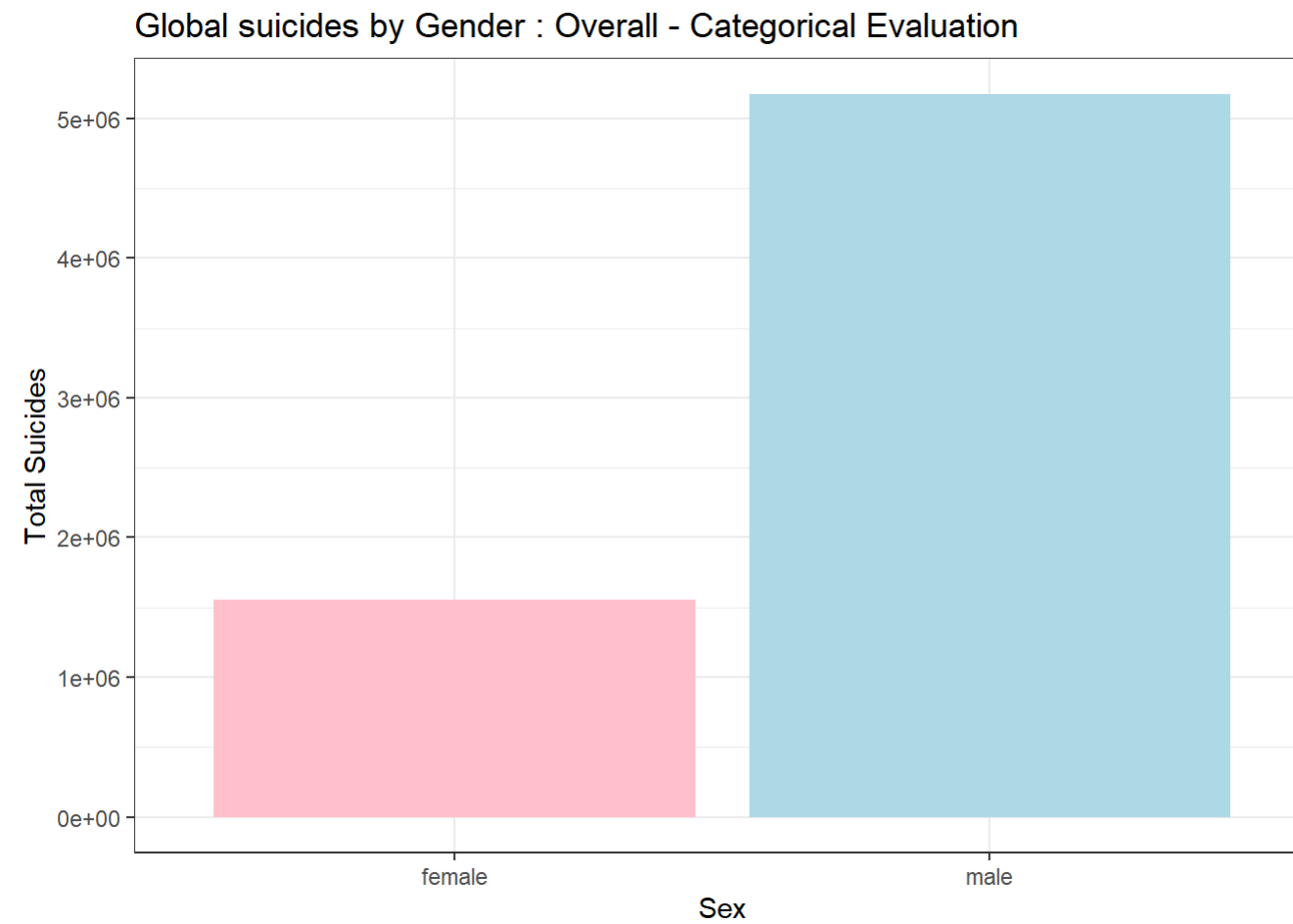
Order of Generations:

The Greatest Generation : (1910-1924) The Silent Generation : (1925-1945) Baby Boomer Generation : (1946-1964) Generation X : (1965-1979) Millennials : (1980-1994) Gen Z: (1995-2012)

```
grouped <- group_by(data, year, age)
age_generation <- summarise(grouped, sr = sum(suicides_no),pop = sum(population))
age_generation$suicide_100k <- (age_generation$sr/age_generation$pop)*100000
age_generation$Age_Range = factor(age_generation$age, levels=c('5-14 years','15-24 years','25-34 years','35-54 years', '55-74 years', '75+ years'))

ggplot(age_generation, aes(x=year, y=suicide_100k, color=Age_Range)) + geom_line(linetype="solid",size=1) + geom_point() +
    facet_wrap(.~Age_Range, ncol=2)+ xlab("Year") + ylab("Suicides per 100K people") + ggtitle("Suicide Rates across various
age groups over the Years") + scale_x_continuous(breaks=seq(1985, 2015, 3)) +theme_bw()
```

Suicide Rates across various age groups over the Years
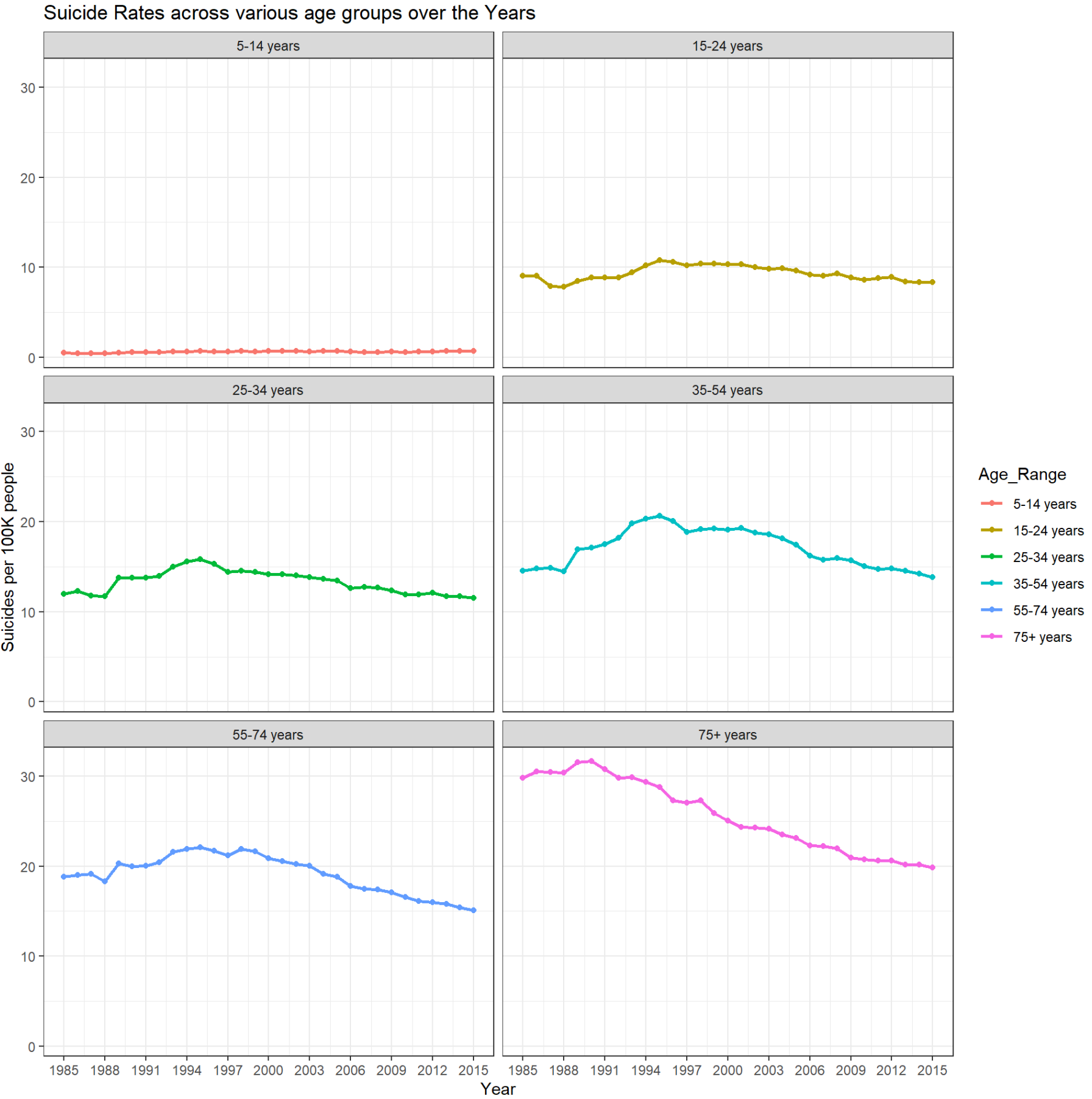
```
grouped <- group_by(data, year, age, sex)
agegender_generation <- summarise(grouped, sr = sum(suicides_no),pop = sum(population))
agegender_generation$suicide_100k <- (agegender_generation$sr/agegender_generation$pop)*100000

agegender_generation$age_order = factor(agegender_generation$age, levels=c('5-14 years','15-24 years','25-34 years','35-54 y
ears', '55-74 years', '75+ years'))
agegender_generation$Gender = factor(agegender_generation$sex, levels=c('male','female'))
ggplot(agegender_generation, aes(x=year, y=suicide_100k, color=Gender)) + geom_line(linetype="solid",size=1) +
    facet_wrap(.~age_order, ncol=2)+ xlab("Year") + ylab("Suicides per 100K people") + ggtitle("Suicide Rates across various
age groups by gender over the Years") + scale_x_continuous(breaks=seq(1985, 2015, 3)) +theme_bw()
```

Suicide Rates across various age groups by gender over the Years
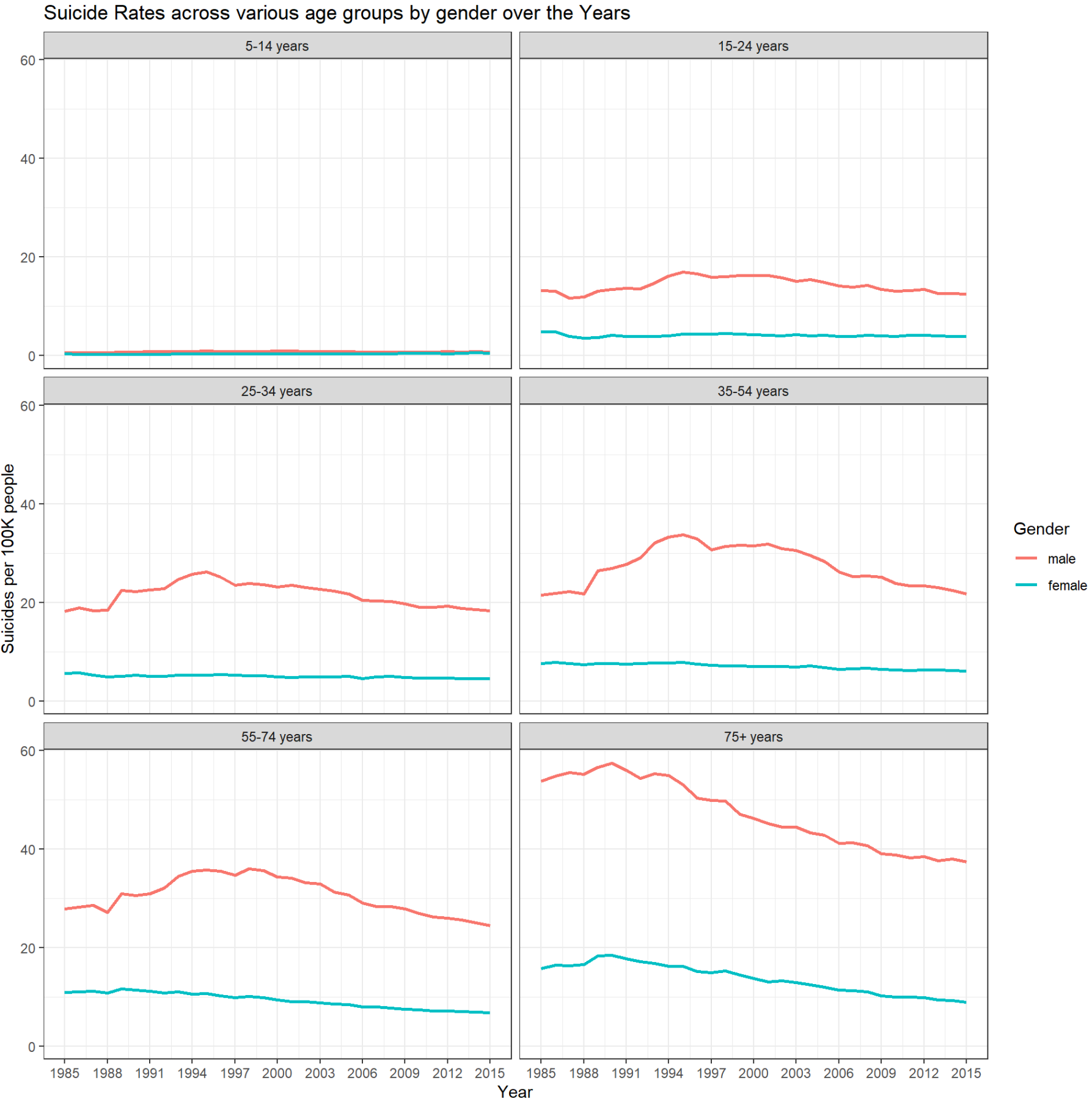
Question 2: How had the suicide rate varied across continents over the years?

We used the inbuilt CountryCode Library to group the data continent wise. Here, Oceania is a geographic region that includes Australasia, Melanesia, Micronesia and Polynesia.

```
data$continent <- countrycode(sourcevar = data[,1], origin = "country.name",destination = "continent")
```

```
country_year <- group_by(data, continent, year)
country_year <- summarise(country_year,  sr = sum(suicides_no),pop = sum(population))
country_year$suicide_100k <- (country_year$sr/country_year$pop)*100000

country_year$Continent = factor(country_year$continent, levels=c('Americas','Asia','Europe','Oceania','Africa'))

ggplot(country_year, aes(x=year, y=suicide_100k, color=Continent)) + geom_point(size=1) + facet_wrap(.~Continent, ncol=2)+
    xlab("Year") + ylab("Suicide Per 100K people") + ggtitle("Suicide Per 100K across Continents over the Years") +geom_smoo
th(method='loess') +geom_abline()
```

## Suicide Per 100K across Continents over the Years

As we can see, the data is missing values for countries such as India, Russia and most of north eastern Africa.

```
data$Country_new <- data[,1]
grouped <- group_by(data, Country_new)
global_map <- summarise(grouped, suicide_per_100k = (sum(as.integer(suicides_no)) / sum(as.integer(population)))*100000)
#View(country)
all_map <- joinCountryData2Map(global_map, joinCode = "NAME", nameJoinColumn = "Country_new")
```

```
## 98 codes from your data successfully matched countries in the map
## 2 codes from your data failed to match with a country code in the map
## 145 codes from the map weren't represented in your data
```

```
#View(all_map)
mapCountryData(all_map, nameColumnToPlot="suicide_per_100k", mapRegion = "world", mapTitle="Heat Map of Suicide Rates across
the World", colourPalette = "heat", oceanCol="skyblue1", catMethod = "diverging", missingCountryCol="seashell4")
```

Heat Map of Suicide Rates across the World

-41.5   41.5
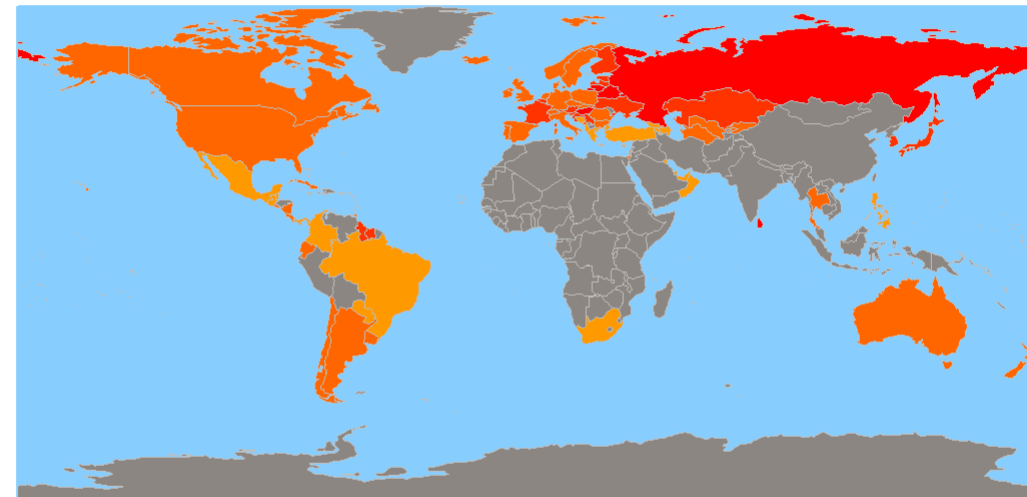
```
top_country <- group_by(data, Country)
#sapply(top_country,typeof)
top_country <- summarise(top_country,  suicide_sum = sum(suicides_no))
#View(top_country)
#sapply(top_country,typeof)
top_country$continent <- countrycode(sourcevar = top_country$Country, origin = "country.name",destination = "continent")
#View(top_country)
#sapply(top_country,typeof)
```

```
highest_suicide_country <- group_by(top_country, continent)
highest_suicide_country <- summarize(highest_suicide_country,top_sr = max(suicide_sum))
highest_suicide_country$suicide_sum <- highest_suicide_country$top_sr
highest_suicide_countries_per_continent = left_join(highest_suicide_country,top_country, by = "suicide_sum")
high = subset(highest_suicide_countries_per_continent, select =  c("continent.x","suicide_sum","Country"))
high$Continent = high$continent.x
high$Total_Suicides = high$suicide_sum
high = subset(high, select =  c("Continent","Total_Suicides","Country"))
high
```

```
## # A tibble: 5 x 3
##   Continent Total_Suicides Country
##   <chr>              <int> <fct>
## 1 Africa              7321 South Africa
## 2 Americas         1034013 United States
## 3 Asia              806902 Japan
## 4 Europe           1209742 Russian Federation
## 5 Oceania            70111 Australia
```

```
#ggplot(country_year, aes(x=year, y=suicide_100k, color=continent)) + geom_point(size=1) + facet_wrap(.~continent, ncol=2)+
#   xlab("Year") + ylab("Suicide Rate") + ggtitle("Suicide Per 100K across Continents over the Years") +geom_smooth(method
='loess')
```

Only Oceania and Europe have the correct output - the others all have very less data.

```
highest <- data[data$Country == highest_suicide_countries_per_continent$Country,]
grouped <- group_by(highest,Country, year)
highest_sr_contr <- summarize(grouped, suicide_per_100k = (sum(as.integer(suicides_no)) / sum(as.integer(population)))*10000
0)
highest_sr_contr = filter(highest_sr_contr, Country!="South Africa")

ggplot(highest_sr_contr, aes(x=year, y=suicide_per_100k, group=factor(Country), color=Country)) +
  geom_point(size=2)+
  geom_line() +theme_bw() +xlab("Year") + ylab("Suicide per 100K") + ggtitle("Suicide Per 100K across top countries:  Time S
eries Plot") + scale_x_continuous(breaks=seq(1985, 2015, 3))
```

Suicide Per 100K across top countries: Time Series Plot
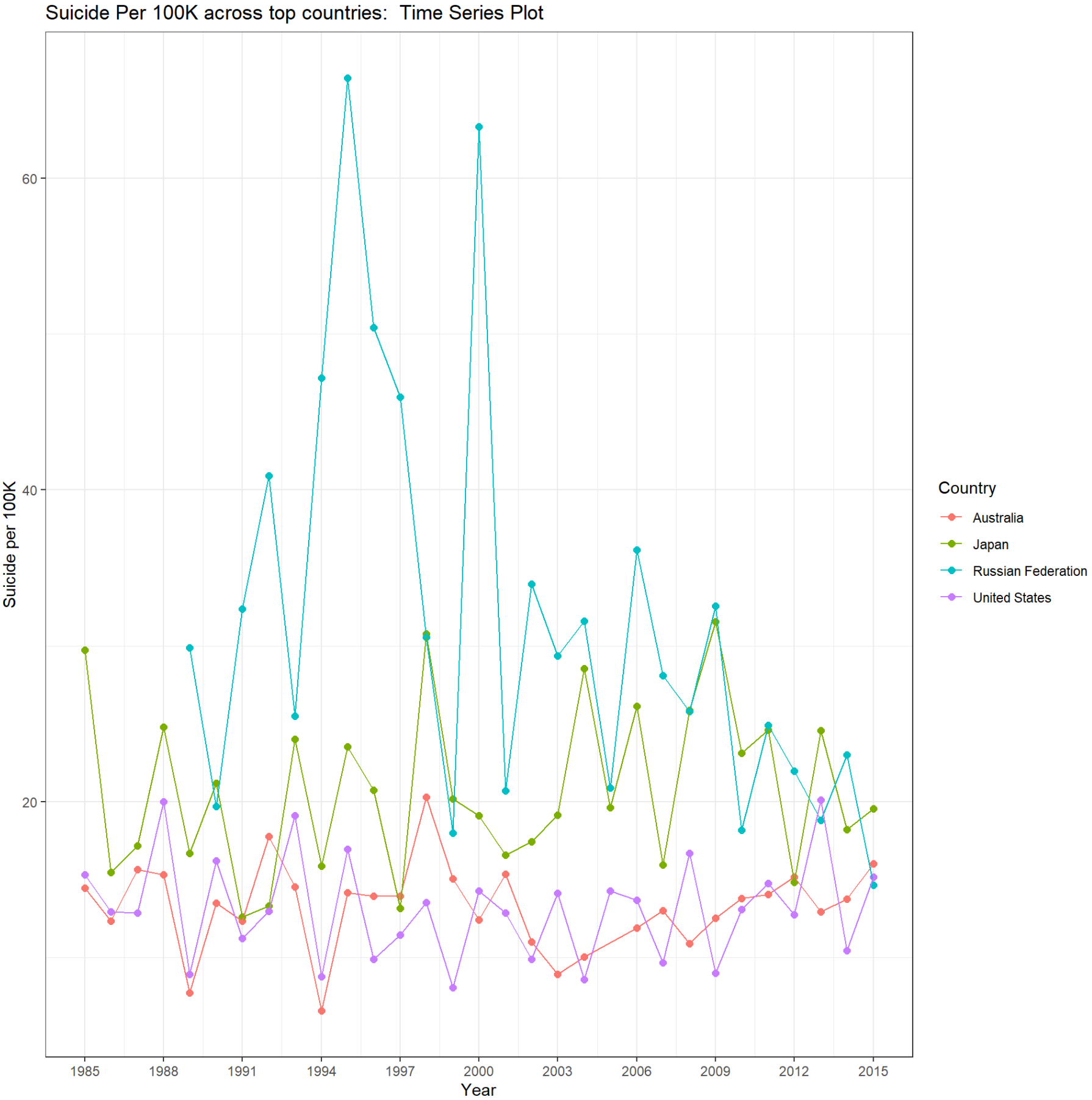
3. Suicide Rate vs GDP per Capita

```
grouped <- group_by(data, year)
gdp_sr <- summarise(grouped, sr = sum(suicides_no),pop = sum(population), gdp = mean(as.integer(gdp_per_capita....)))
gdp_sr$suicide_100k <- (gdp_sr$sr/gdp_sr$pop)*100000

ggplot(gdp_sr, aes(x=log(gdp) , y=suicide_100k))+
  geom_point(color='blue') +geom_smooth() + xlab("GDP per capita ($)") +
  ylab("Suicides per 100K") +
  ggtitle("The relationship between suicide rate and GDP per capita ")+theme_bw()
```
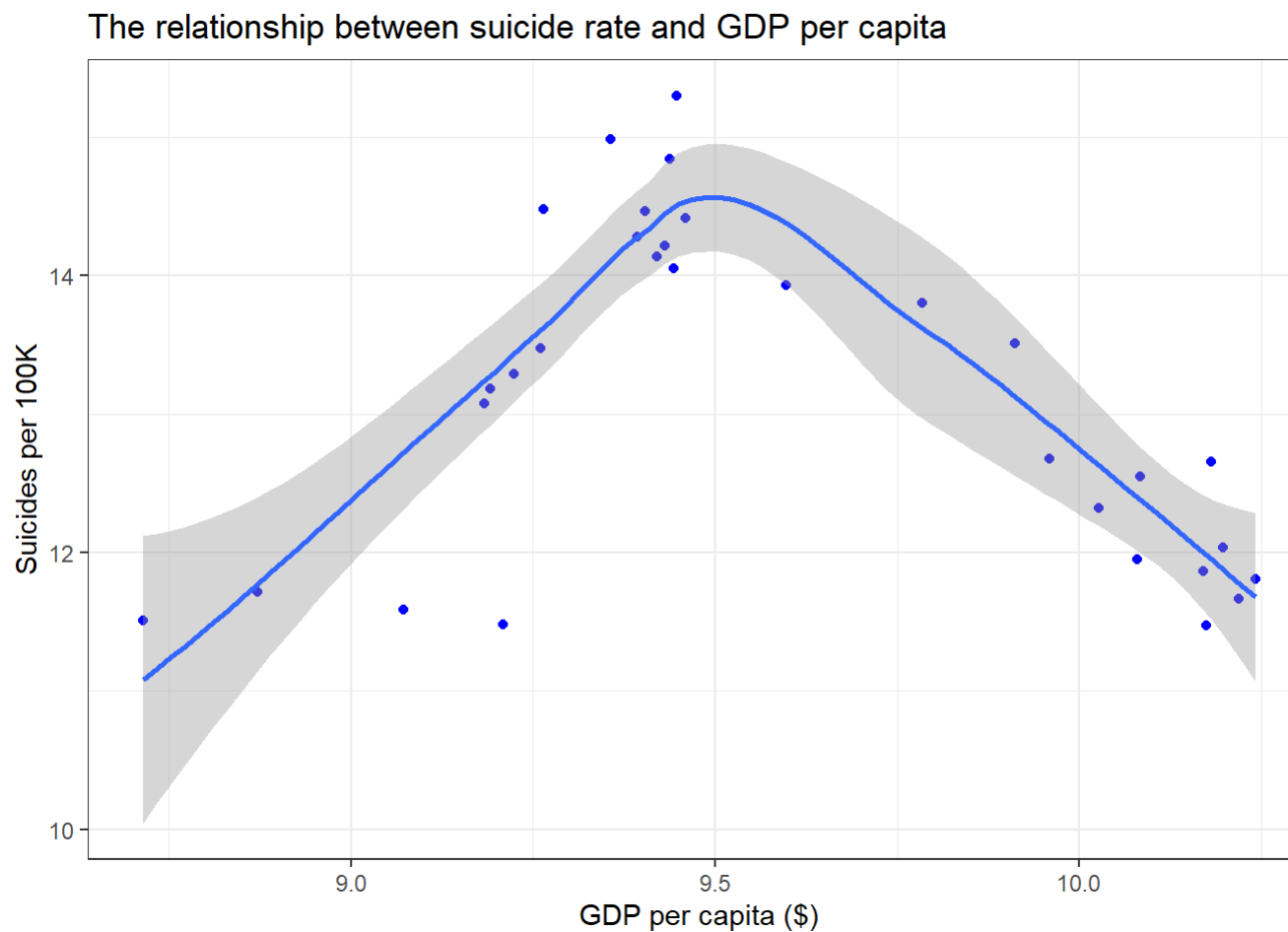
```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

The relationship between suicide rate and GDP per capita


```
r1 <- ggplot(gdp_sr, aes(y=gdp, x=year))+
        geom_point() +
        geom_line()+
        geom_smooth() + xlab("Year") +   ylab("GDP per capita ($)") +theme_bw()

r2 <- ggplot(gdp_sr, aes(y=suicide_100k, x=year))+
        geom_point()+
        geom_line()+scale_x_continuous(breaks=)+
        geom_smooth() + xlab("Year") +
 ylab("Suicides per 100K")+theme_bw()

grid.arrange(r1, r2, ncol=2,top = textGrob("A side-by-side analysis of the relationship between suicide rate and GDP per cap
ita ",gp=gpar(fontsize=12,font=3)))
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

A side-by-side analysis of the relationship between suicide rate and GDP per capita
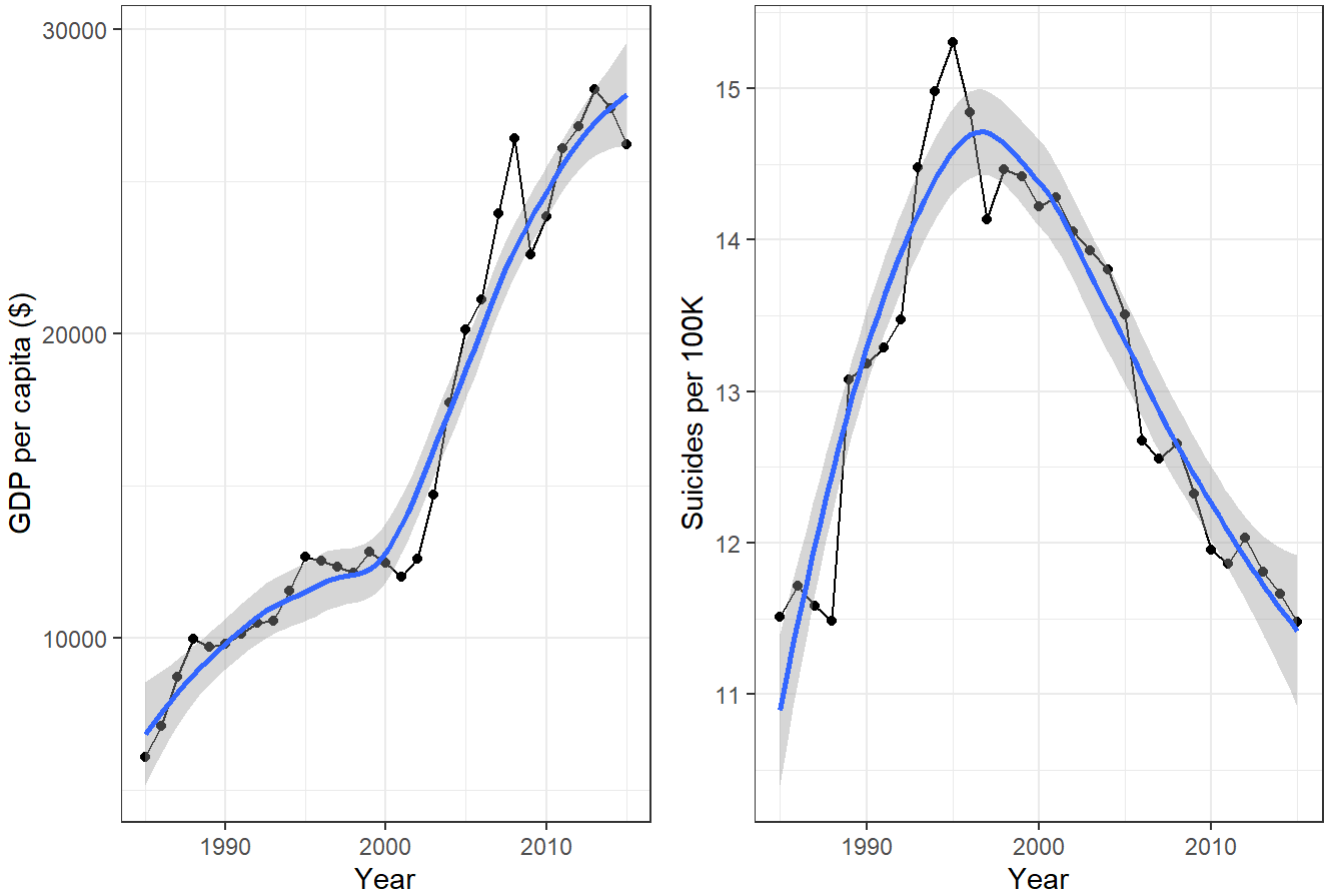


```
ggplot(gdp_sr, aes(x=gdp)) + geom_density()
```
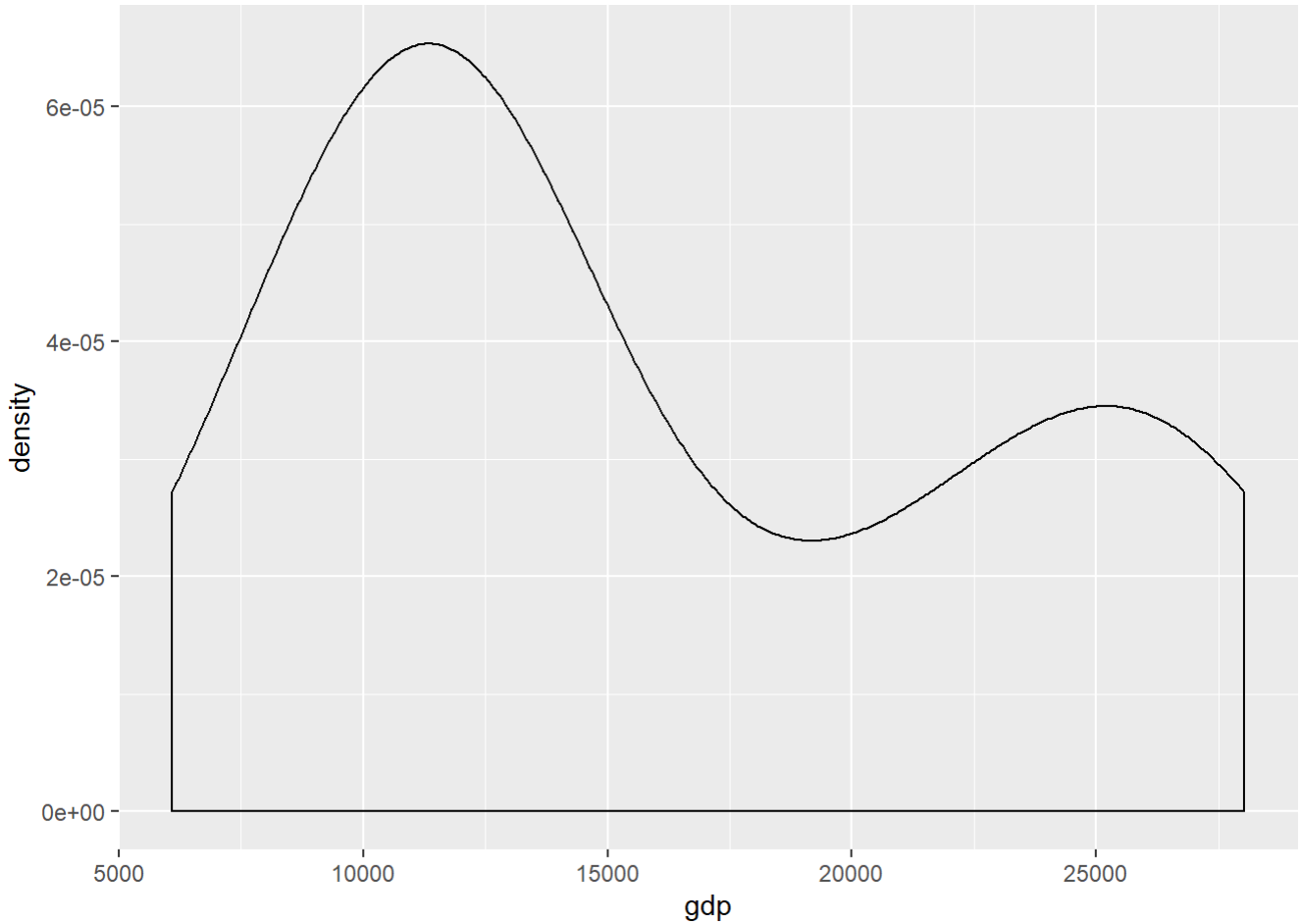
```
data$continent <- countrycode(sourcevar = data[,1], origin = "country.name",destination = "continent")
```

```
grouped <- group_by(data, Country, continent)
gdp_mean <- summarize(grouped, suicide=(sum(suicides_no)/sum(population)) * 100000,mean_gdp=mean(gdp_per_capita....))
gdp_mean <- filter(gdp_mean, continent!="Africa")
ggplot(gdp_mean, aes(x=log(mean_gdp), y=suicide, color=continent))+
  geom_point()+geom_smooth(method = lm, aes(group=1), se=FALSE, color='black')+ facet_wrap(.~continent, ncol=2) +
  ggtitle("The relationship between suicide rate and GDP per capita by continents") + theme_bw() +ylab("Suicides per 100K")
 +xlab("Mean GDP per capita (log value)")
```


The relationship between suicide rate and GDP per capita by continents
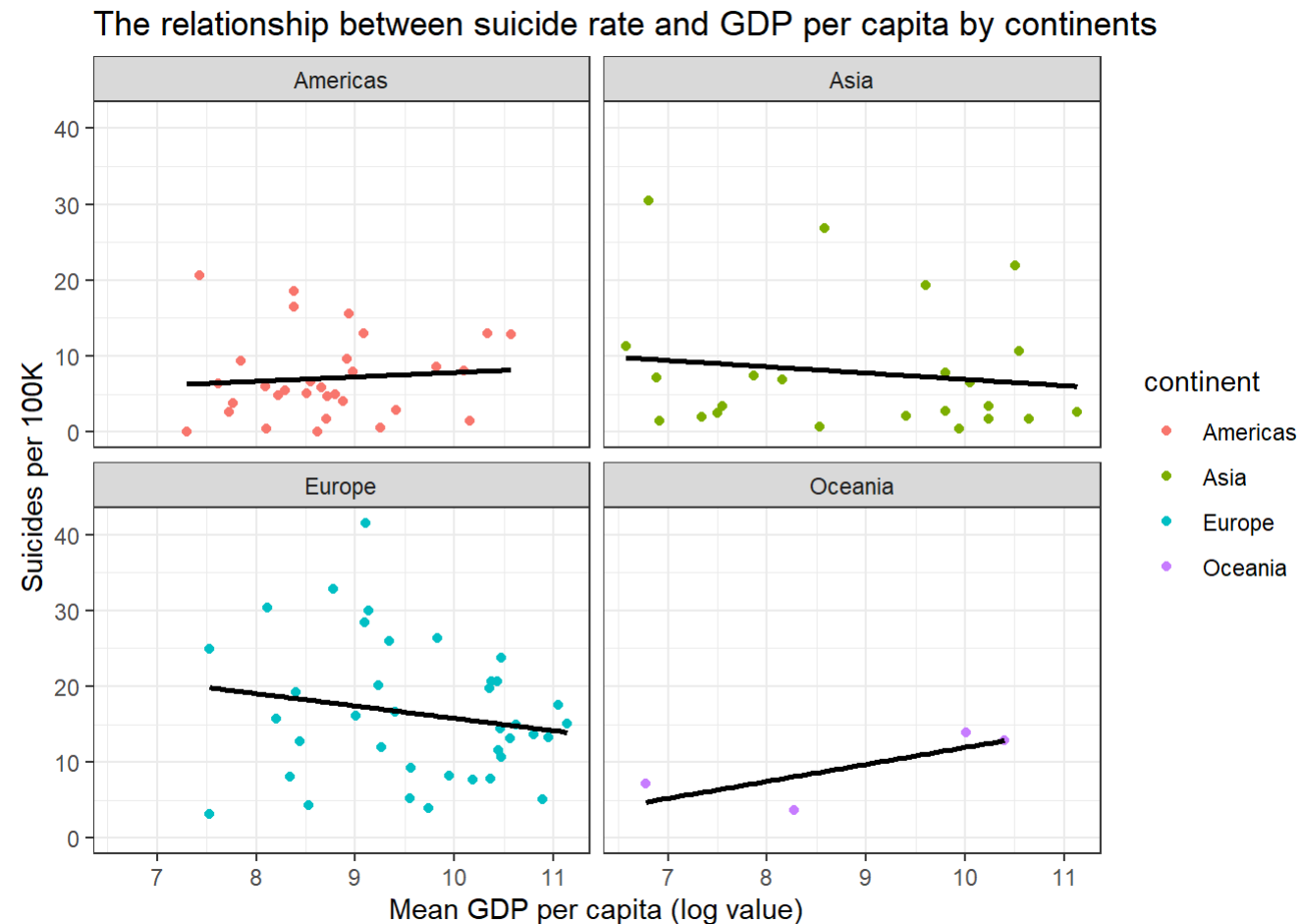
```
r1 <- ggplot(gdp_sr, aes(y=log(gdp), x=year))+
        geom_line() +
        scale_x_continuous(breaks = seq(1990,2016,3))+ geom_vline(xintercept = 2009, linetype="solid",
                color = "blue", size=1) + geom_vline(xintercept = 1991, linetype="solid",
                color = "blue", size=1)+ xlab("Year") +
 ylab("GDP per capita ($) - log transformed")+theme_bw()

r2 <- ggplot(gdp_sr, aes(y=log(suicide_100k), x=year))+
        geom_line() +
        scale_x_continuous(breaks = seq(1990,2016,3)) + geom_vline(xintercept = 2009, linetype="solid",
                color = "blue", size=1) + geom_vline(xintercept = 1991, linetype="solid",
                color = "blue", size=1) + xlab("Year") +
 ylab("Suicides per 100K")+theme_bw()


grid.arrange(r1, r2, ncol=1,top = textGrob("A comparision of suicide rate and GDP per capita during recession periods (1991,
2009) ",gp=gpar(fontsize=12,font=3)))
```

A comparision of suicide rate and GDP per capita during recession periods (1991, 2009)
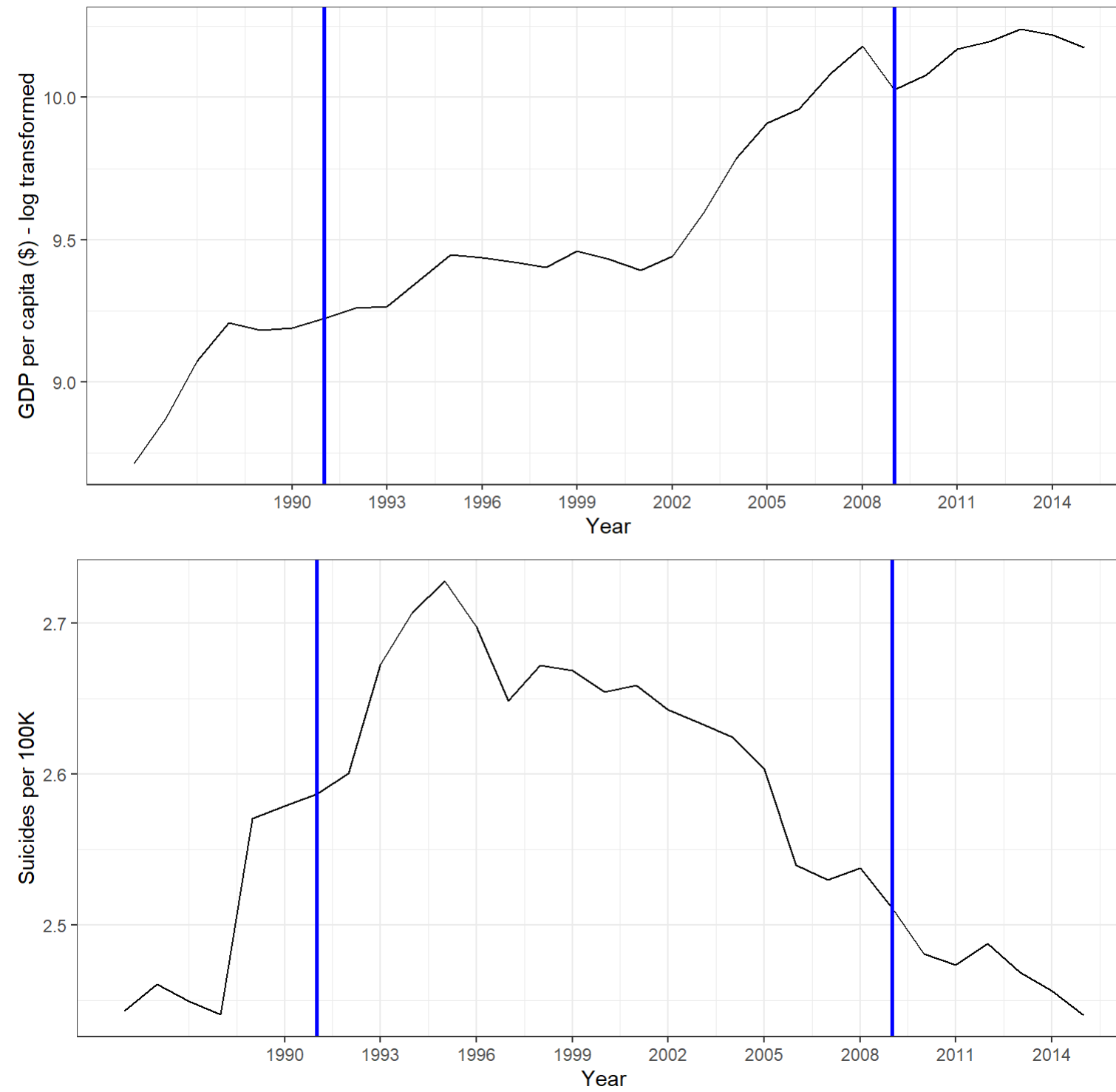
Model fitting:

```
model1 <- lm(suicide_100k ~ gdp, data=gdp_sr)
summary(model1)
```

```
## 
## Call:
## lm(formula = suicide_100k ~ gdp, data = gdp_sr)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.32263 -0.52178 -0.04318  0.81977  1.93888
## 
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.426e+01  5.114e-01   27.89   <2e-16 ***
## gdp         -7.093e-05  2.919e-05   -2.43   0.0215 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 1.124 on 29 degrees of freedom
## Multiple R-squared:  0.1692, Adjusted R-squared:  0.1405
## F-statistic: 5.905 on 1 and 29 DF,  p-value: 0.02152
```

```
cor(gdp_sr$suicide_100k,gdp_sr$gdp)
```

```
## [1] -0.411311
```

```
grouped <- group_by(data, year)
gdp_sr <- summarise(grouped, sr = sum(suicides_no),pop = sum(population), gdp = mean(as.integer(gdp_per_capita....)))
gdp_sr$suicide_100k <- (gdp_sr$sr/gdp_sr$pop)*100000

ggpairs(gdp_sr)
```

```
grouped <- group_by(data, year)
data_corrected<- summarise(grouped, sr = sum(suicides_no),pop = sum(population), gdp = mean(as.integer(gdp_per_capita....)))
data_corrected$suicide_100k <- (gdp_sr$sr/gdp_sr$pop)*100000
#View(data_corrected)
```

```
model.rlm = lm(suicide_100k ~ gdp, data = data_corrected)
model.rlm.aug = augment(model.rlm)
summary(model.rlm)
```
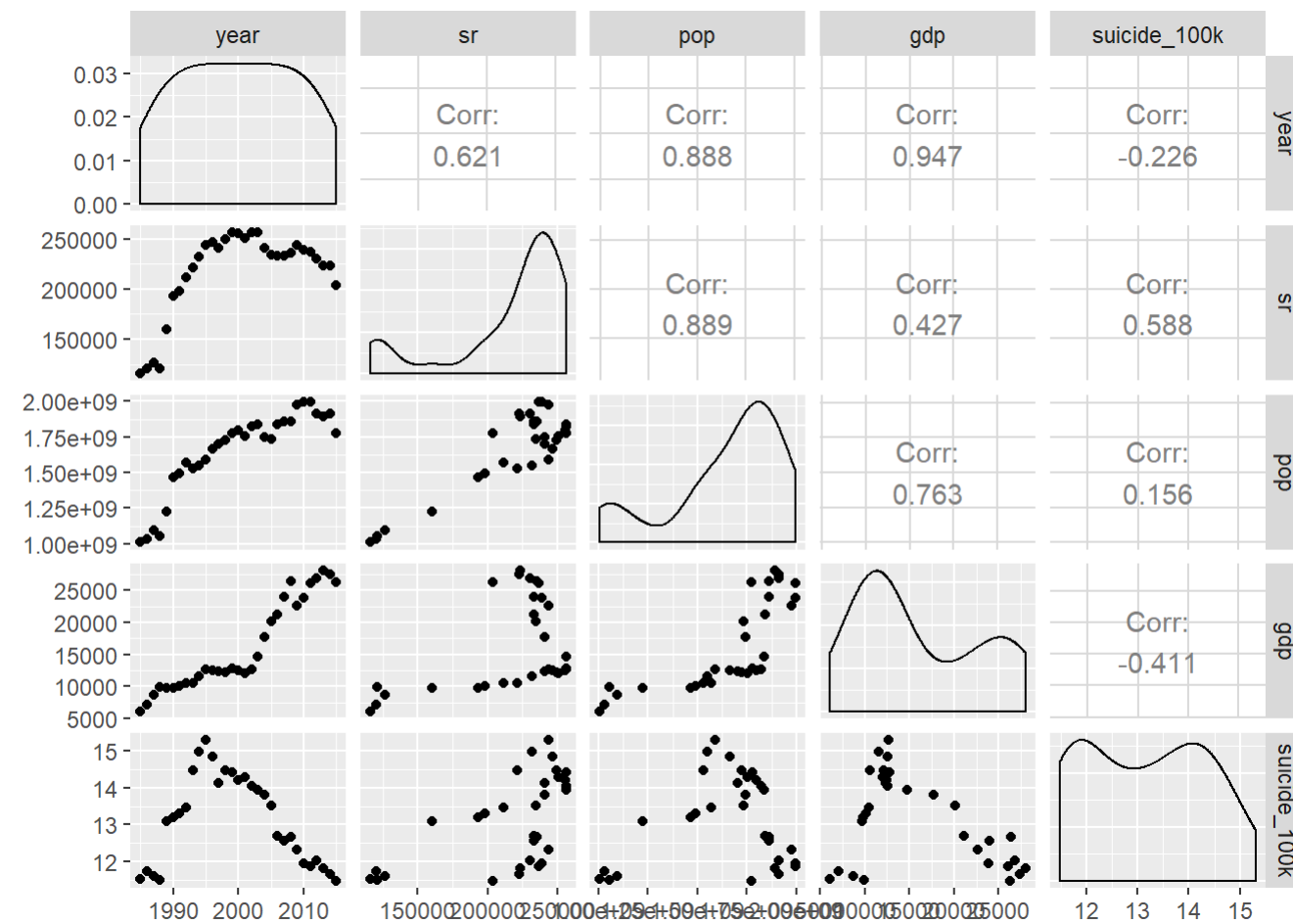
```
##
## Call:
## lm(formula = suicide_100k ~ gdp, data = data_corrected)
##
## Residuals:
##      Min      1Q   Median      3Q      Max
## -2.32263 -0.52178 -0.04318  0.81977  1.93888
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.426e+01  5.114e-01   27.89   <2e-16 ***
## gdp         -7.093e-05  2.919e-05   -2.43   0.0215 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.124 on 29 degrees of freedom
## Multiple R-squared:  0.1692, Adjusted R-squared:  0.1405
## F-statistic: 5.905 on 1 and 29 DF,  p-value: 0.02152
```

```
data_whole = subset(data, select = -c(country.year, Country_new) )
```

```
data_whole$age_cat <- 0
data_whole[data_whole$age == '5-14 years',]$age_cat = 1
data_whole[data_whole$age == '15-24 years',]$age_cat = 2
data_whole[data_whole$age == '25-34 years',]$age_cat = 3
data_whole[data_whole$age == '35-54 years',]$age_cat = 4
data_whole[data_whole$age == '55-74 years',]$age_cat = 5
data_whole[data_whole$age == '75+ years',]$age_cat = 6


data_whole$gender_cat <- 0
data_whole[data_whole$sex == 'female',]$gender_cat = 1
data_whole[data_whole$sex == 'male',]$gender_cat = 2
```

```
cor(data_whole$age_cat, data_whole$suicides_no)
```

```
## [1] 0.08026344
```

```
cor(data_whole$gender_cat, data_whole$suicides_no)
```

```
## [1] 0.1447295
```

```
model2.lm = lm(suicides_no ~ gdp_per_capita.... , data = data_whole)
model2.lm.aug = augment(model2.lm)
summary(model2.lm)
```

```
##
## Call:
## lm(formula = suicides_no ~ gdp_per_capita...., data = data_whole)
##
## Residuals:
##     Min     1Q Median     3Q    Max
##  -570.0  -223.6  -193.8  -105.8 22136.2
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.933e+02  7.272e+00   26.58   <2e-16 ***
## gdp_per_capita.... 2.981e-03  2.878e-04   10.36   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 902.8 on 27658 degrees of freedom
## Multiple R-squared:  0.003865,    Adjusted R-squared:  0.003829
## F-statistic: 107.3 on 1 and 27658 DF,  p-value: < 2.2e-16
```

```
model2.lm = lm(suicides_no ~ gdp_per_capita.... +age, data = data_whole)
model2.lm.aug = augment(model2.lm)
summary(model2.lm)
```

```
##
## Call:
## lm(formula = suicides_no ~ gdp_per_capita.... + age, data = data_whole)
##
## Residuals:
##      Min      1Q  Median      3Q     Max
##   -854.2  -259.2  -122.3     8.3 21849.0
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)        1.250e+02  1.391e+01   8.986  < 2e-16 ***
## gdp_per_capita....  2.981e-03  2.829e-04  10.537  < 2e-16 ***
## age25-34 years     6.822e+01  1.849e+01   3.690 0.000224 ***
## age35-54 years     3.555e+02  1.849e+01  19.233  < 2e-16 ***
## age5-14 years     -1.638e+02  1.849e+01  -8.861  < 2e-16 ***
## age55-74 years     1.836e+02  1.849e+01   9.932  < 2e-16 ***
## age75+ years      -3.386e+01  1.849e+01  -1.832 0.067021 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 887.5 on 27653 degrees of freedom
## Multiple R-squared:  0.03743,    Adjusted R-squared:  0.03722
## F-statistic: 179.2 on 6 and 27653 DF,  p-value: < 2.2e-16
```

```
model2.lm = lm(suicides_no ~ gdp_per_capita.... + age + sex, data = data_whole)
model2.lm.aug = augment(model2.lm)
summary(model2.lm)
```

```
##
## Call:
## lm(formula = suicides_no ~ gdp_per_capita.... + age + sex, data = data_whole)
##
## Residuals:
##      Min      1Q  Median      3Q     Max
##   -968.1  -272.6  -114.5    32.7 21718.1
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -5.905e+00  1.474e+01  -0.401 0.688613
## gdp_per_capita....  2.981e-03  2.798e-04  10.654  < 2e-16 ***
## age25-34 years     6.822e+01  1.828e+01   3.731 0.000191 ***
## age35-54 years     3.555e+02  1.828e+01  19.446  < 2e-16 ***
## age5-14 years     -1.638e+02  1.828e+01  -8.958  < 2e-16 ***
## age55-74 years     1.836e+02  1.828e+01  10.042  < 2e-16 ***
## age75+ years      -3.386e+01  1.828e+01  -1.852 0.064061 .
## sexmale            2.618e+02  1.056e+01  24.802  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 877.8 on 27652 degrees of freedom
## Multiple R-squared:  0.05838,    Adjusted R-squared:  0.05814
## F-statistic: 244.9 on 7 and 27652 DF,  p-value: < 2.2e-16
```

```
model2.lm = lm(suicides_no ~ gdp_per_capita.... + age + sex + Country, data = data_whole)
model2.lm.aug = augment(model2.lm)
summary(model2.lm)
```

```
##
## Call:
## lm(formula = suicides_no ~ gdp_per_capita.... + age + sex + Country,
##     data = data_whole)
##
## Residuals:
##      Min      1Q  Median      3Q     Max
## -3554.9  -153.3   -24.7   129.2 18187.4
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   -1.924e+02  4.208e+01  -4.573 4.83e-06
## gdp_per_capita....             3.655e-04  4.095e-04   0.893 0.372062
## age25-34 years                 6.822e+01  1.385e+01   4.927 8.40e-07
## age35-54 years                 3.555e+02  1.385e+01  25.677  < 2e-16
## age5-14 years                 -1.638e+02  1.385e+01 -11.829  < 2e-16
## age55-74 years                 1.836e+02  1.385e+01  13.260  < 2e-16
## age75+ years                  -3.386e+01  1.385e+01  -2.445 0.014480
## sexmale                        2.618e+02  7.994e+00  32.750  < 2e-16
## CountryAntigua and Barbuda    -1.057e+01  5.523e+01  -0.191 0.848256
## CountryArgentina               2.113e+02  5.355e+01   3.946 7.95e-05
## CountryArmenia                -1.061e+00  5.664e+01  -0.019 0.985051
## CountryAruba                  -1.504e+01  6.624e+01  -0.227 0.820449
## CountryAustralia               1.760e+02  5.533e+01   3.181 0.001472
## CountryAustria                 1.122e+02  5.508e+01   2.037 0.041680
## CountryAzerbaijan              1.475e+00  6.305e+01   0.023 0.981337
## CountryBahamas                -1.589e+01  5.806e+01  -0.274 0.784349
## CountryBahrain                -1.154e+01  5.892e+01  -0.196 0.844728
## CountryBarbados               -1.067e+01  5.626e+01  -0.190 0.849567
## CountryBelarus                 2.297e+02  5.855e+01   3.923 8.78e-05
## CountryBelgium                 1.502e+02  5.491e+01   2.736 0.006230
## CountryBelize                 -7.211e+00  5.468e+01  -0.132 0.895078
## CountryBosnia and Herzegovina  4.611e+00  1.417e+02   0.033 0.974045
## CountryBrazil                  6.002e+02  5.352e+01  11.213  < 2e-16
## CountryBulgaria                9.296e+01  5.387e+01   1.726 0.084410
## CountryCabo Verde             -4.790e+00  1.962e+02  -0.024 0.980524
## CountryCanada                  2.910e+02  5.554e+01   5.239 1.62e-07
## CountryChile                   1.004e+02  5.355e+01   1.875 0.060772
## CountryColombia                1.345e+02  5.350e+01   2.515 0.011913
## CountryCosta Rica              1.020e+01  5.388e+01   0.189 0.849833
## CountryCroatia                 5.989e+01  5.865e+01   1.021 0.307168
## CountryCuba                    1.354e+02  5.665e+01   2.391 0.016821
## CountryCyprus                 -1.471e+01  6.646e+01  -0.221 0.824792
## CountryCzech Republic          1.246e+02  5.575e+01   2.235 0.025453
## CountryDenmark                 3.314e+01  6.103e+01   0.543 0.587161
## CountryDominica               -7.325e+00  1.962e+02  -0.037 0.970219
## CountryEcuador                 4.755e+01  5.350e+01   0.889 0.374084
## CountryEl Salvador             3.285e+01  5.664e+01   0.580 0.561942
## CountryEstonia                 1.697e+01  5.867e+01   0.289 0.772392
## CountryFiji                   -5.910e+00  7.087e+01  -0.083 0.933540
## CountryFinland                 7.703e+01  5.598e+01   1.376 0.168813
## CountryFrance                  8.960e+02  5.521e+01  16.227  < 2e-16
## CountryGeorgia                 4.738e+00  5.786e+01   0.082 0.934744
## CountryGermany                 9.139e+02  5.724e+01  15.966  < 2e-16
## CountryGreece                  2.024e+01  5.386e+01   0.376 0.707005
## CountryGrenada                -8.869e+00  5.612e+01  -0.158 0.874435
## CountryGuatemala               1.503e+01  5.387e+01   0.279 0.780280
```

```
## CountryGuyana                            4.025e+00  5.610e+01    0.072 0.942799
## CountryHungary                           2.303e+02  5.618e+01    4.099 4.16e-05
## CountryIceland                          -1.802e+01  5.557e+01   -0.324 0.745761
## CountryIreland                           1.563e+01  5.547e+01    0.282 0.778094
## CountryIsrael                            1.512e+01  5.420e+01    0.279 0.780213
## CountryItaly                             3.385e+02  5.445e+01    6.217 5.14e-10
## CountryJamaica                          -7.087e+00  6.197e+01   -0.114 0.908950
## CountryJapan                             2.149e+03  5.533e+01   38.837  < 2e-16
## CountryKazakhstan                        3.167e+02  5.561e+01    5.696 1.24e-08
## CountryKiribati                         -6.701e+00  7.087e+01   -0.095 0.924663
## CountryKuwait                           -1.373e+01  5.710e+01   -0.240 0.809947
## CountryKyrgyzstan                        3.491e+01  5.559e+01    0.628 0.530045
## CountryLatvia                            4.062e+01  5.862e+01    0.693 0.488374
## CountryLithuania                         9.792e+01  5.862e+01    1.671 0.094832
## CountryLuxembourg                       -2.667e+01  6.011e+01   -0.444 0.657305
## CountryMacau                            -1.114e+01  1.963e+02   -0.057 0.954743
## CountryMaldives                         -8.476e+00  7.320e+01   -0.116 0.907817
## CountryMalta                            -1.034e+01  5.373e+01   -0.193 0.847337
## CountryMauritius                         1.459e+00  5.352e+01    0.027 0.978256
## CountryMexico                            2.894e+02  5.354e+01    5.405 6.55e-08
## CountryMontenegro                       -4.383e+00  7.319e+01   -0.060 0.952252
## CountryNetherlands                       1.119e+02  5.523e+01    2.025 0.042836
## CountryNew Zealand                       2.640e+01  5.490e+01    0.481 0.630543
## CountryNicaragua                         2.043e+01  8.838e+01    0.231 0.817162
## CountryNorway                            1.946e+01  5.846e+01    0.333 0.739155
## CountryOman                             -1.345e+01  1.184e+02   -0.114 0.909544
## CountryPanama                            2.405e+00  5.613e+01    0.043 0.965822
## CountryParaguay                          7.115e+00  5.512e+01    0.129 0.897289
## CountryPhilippines                       1.112e+02  6.426e+01    1.730 0.083672
## CountryPoland                            4.732e+02  5.670e+01    8.346  < 2e-16
## CountryPortugal                          6.230e+01  5.535e+01    1.126 0.260351
## CountryPuerto Rico                       1.082e+02  5.392e+01    0.201 0.840993
## CountryQatar                            -2.865e+01  7.099e+01   -0.404 0.686494
## CountryRepublic of Korea                 6.914e+02  5.376e+01   12.861  < 2e-16
## CountryRomania                           2.101e+02  5.513e+01    3.811 0.000138
## CountryRussian Federation                3.725e+03  5.515e+01   67.536  < 2e-16
## CountrySaint Kitts and Nevis            -8.802e+00  1.181e+02   -0.075 0.940597
## CountrySaint Lucia                      -8.214e+00  5.470e+01   -0.150 0.880627
## CountrySaint Vincent and Grenadines -8.180e+00  5.611e+01   -0.146 0.884092
## CountrySan Marino                       -2.629e+01  1.200e+02   -0.219 0.826599
## CountrySerbia                            1.035e+02  6.100e+01    1.697 0.089689
## CountrySeychelles                       -1.022e+01  6.110e+01   -0.167 0.867103
## CountrySingapore                         6.430e+00  5.551e+01    0.116 0.907793
## CountrySlovakia                          4.027e+01  5.797e+01    0.695 0.487290
## CountrySlovenia                          2.853e+01  5.895e+01    0.484 0.628444
## CountrySouth Africa                      2.168e+01  5.931e+01    0.366 0.714729
## CountrySpain                             2.549e+02  5.407e+01    4.715 2.43e-06
## CountrySri Lanka                         4.144e+02  7.087e+01    5.848 5.04e-09
## CountrySuriname                         -1.927e+00  5.468e+01   -0.035 0.971890
## CountrySweden                            8.361e+01  5.657e+01    1.478 0.139421
## CountrySwitzerland                       7.423e+01  6.367e+01    1.166 0.243689
## CountryThailand                          3.207e+02  5.512e+01    5.819 6.00e-09
## CountryTrinidad and Tobago               2.456e+00  5.519e+01    0.045 0.964504
## CountryTurkey                            1.094e+02  8.338e+01    1.312 0.189563
## CountryTurkmenistan                      1.704e+01  5.426e+01    0.314 0.753452
## CountryUkraine                           9.448e+02  5.467e+01   17.280  < 2e-16
## CountryUnited Arab Emirates             -1.356e+01  8.991e+01   -0.151 0.880162
## CountryUnited Kingdom                    3.493e+02  5.489e+01    6.363 2.00e-10
```

```
## CountryUnited States              2.758e+03  5.565e+01  49.571  < 2e-16
## CountryUruguay                    2.953e+01  5.472e+01   0.540 0.589434
## CountryUzbekistan                 1.247e+02  5.786e+01   2.155 0.031173
## 
## (Intercept)                       ***
## gdp_per_capita....
## age25-34 years                    ***
## age35-54 years                    ***
## age5-14 years                     ***
## age55-74 years                    ***
## age75+ years                      *
## sexmale                           ***
## CountryAntigua and Barbuda
## CountryArgentina                  ***
## CountryArmenia
## CountryAruba
## CountryAustralia                  **
## CountryAustria                    *
## CountryAzerbaijan
## CountryBahamas
## CountryBahrain
## CountryBarbados
## CountryBelarus                    ***
## CountryBelgium                    **
## CountryBelize
## CountryBosnia and Herzegovina
## CountryBrazil                     ***
## CountryBulgaria                   .
## CountryCabo Verde
## CountryCanada                     ***
## CountryChile                      .
## CountryColombia                   *
## CountryCosta Rica
## CountryCroatia
## CountryCuba                       *
## CountryCyprus
## CountryCzech Republic             *
## CountryDenmark
## CountryDominica
## CountryEcuador
## CountryEl Salvador
## CountryEstonia
## CountryFiji
## CountryFinland
## CountryFrance                     ***
## CountryGeorgia
## CountryGermany                    ***
## CountryGreece
## CountryGrenada
## CountryGuatemala
## CountryGuyana
## CountryHungary                    ***
## CountryIceland
## CountryIreland
## CountryIsrael
## CountryItaly                      ***
## CountryJamaica
## CountryJapan                      ***
```

```
## CountryKazakhstan                    ***
## CountryKiribati
## CountryKuwait
## CountryKyrgyzstan
## CountryLatvia
## CountryLithuania                     .
## CountryLuxembourg
## CountryMacau
## CountryMaldives
## CountryMalta
## CountryMauritius
## CountryMexico                        ***
## CountryMontenegro
## CountryNetherlands                   *
## CountryNew Zealand
## CountryNicaragua
## CountryNorway
## CountryOman
## CountryPanama
## CountryParaguay
## CountryPhilippines                   .
## CountryPoland                        ***
## CountryPortugal
## CountryPuerto Rico
## CountryQatar
## CountryRepublic of Korea             ***
## CountryRomania                       ***
## CountryRussian Federation            ***
## CountrySaint Kitts and Nevis
## CountrySaint Lucia
## CountrySaint Vincent and Grenadines
## CountrySan Marino
## CountrySerbia                        .
## CountrySeychelles
## CountrySingapore
## CountrySlovakia
## CountrySlovenia
## CountrySouth Africa
## CountrySpain                         ***
## CountrySri Lanka                     ***
## CountrySuriname
## CountrySweden
## CountrySwitzerland
## CountryThailand                      ***
## CountryTrinidad and Tobago
## CountryTurkey
## CountryTurkmenistan
## CountryUkraine                       ***
## CountryUnited Arab Emirates
## CountryUnited Kingdom                ***
## CountryUnited States                 ***
## CountryUruguay
## CountryUzbekistan                    *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 664.8 on 27553 degrees of freedom
```

```
## Multiple R-squared:  0.4619, Adjusted R-squared:  0.4598
## F-statistic: 223.1 on 106 and 27553 DF,  p-value: < 2.2e-16
```