Suicide Rates Across the World
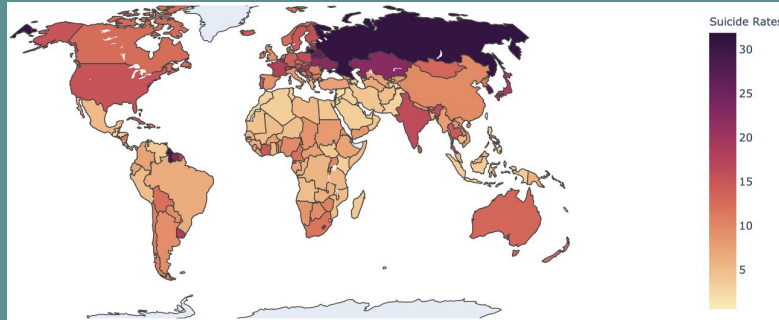

Suicide Rates

GROUP 9

- Y. Ying Ma
- E. Furkan Guduk
- M. Bahadir Kucuk

Outline

- Research Question
- Data Sources
- Data Wrangling Methods
- Conclusion
- Final Statement
- Limitations in Approach
- Source Code

Research Question

Which populations are more inclined to attempt suicide?

SUB-QUESTIONS

1. *"Is there any relation between a country's suicide rates and level of development?"*

2. *"How have suicide rates in different regions of the world changed over the years?"*

3. *"Is any gender more inclined to commit suicide?"*

4. *"Is there any relation between a country's suicide rates and happiness score?"*

Data Sources

1. https://www.kaggle.com/unsdsn/world-happiness?select=2016.csv

   Last access date: 24.01.2021

2. https://www.kaggle.com/unsdsn/world-happiness?select=2015.csv

   Last access date: 24.01.2021

3. https://apps.who.int/gho/data/node.sdg.3-4-data?lang=en

   Last access date: 24.01.2021

**All Sources in CSV Format**

kaggle™

World Health Organization
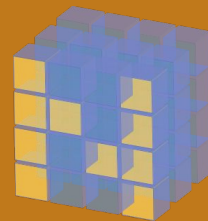
Data Wrangling Methods

Suicide Rates Per Country

Suicide Rates of 183 Countries per 100.000 population by years 2000,2005,2010,2015,2016

	Country	Year	Both sexes	Male	Female	Both sexes.1	Male.1	Female.1
0	Afghanistan	2016	29.8	31.8	27.7	4.7	7.6	1.5
1	Afghanistan	2015	29.8	31.9	27.8	4.8	7.8	1.5
2	Afghanistan	2010	31.7	34.1	29.4	5.1	8.6	1.4
3	Afghanistan	2005	34.1	36.5	31.6	6.3	10.8	1.5
4	Afghanistan	2000	34.4	36.6	32.1	5.7	10.0	1.0
...	...	...	...	...	...	...	...	...
910	Zimbabwe	2016	19.3	18.7	19.8	10.7	15.7	6.0
911	Zimbabwe	2015	19.4	18.6	19.9	10.6	15.5	6.0
912	Zimbabwe	2010	21.1	20.5	21.5	11.9	18.1	6.1
913	Zimbabwe	2005	22.5	22.1	22.9	13.9	21.7	6.4
914	Zimbabwe	2000	21.6	21.6	21.7	12.9	20.6	5.5

915 rows × 8 columns
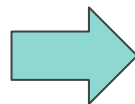
| Year	2000	2005	2010	2015	2016
Country					
Afghanistan	5.7	6.3	5.1	4.8	4.7
Albania	5.5	6.7	7.8	6.0	6.3
Algeria	4.1	3.8	3.3	3.2	3.2
Angola	7.9	7.2	5.7	5.0	4.7
Antigua and Barbuda	2.0	1.2	0.3	0.8	0.5
...	...	...	...	...	...
Venezuela (Bolivarian Republic of)	8.0	5.9	4.3	3.8	3.7
Viet Nam	6.7	6.7	7.0	7.2	7.3
Yemen	6.8	8.1	8.8	8.6	8.5
Zambia	8.1	6.5	6.3	6.1	6.1
Zimbabwe	12.9	13.9	11.9	10.6	10.7

183 rows × 5 columns

```python
#Suicide rates by country
world_data = df.pivot(index = 'Country', columns = 'Year', values = 'Both sexes.1')
```

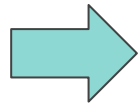|	Country	Suicide rate
0	Afghanistan	4.7
1	Afghanistan	4.8
2	Afghanistan	5.1
3	Afghanistan	6.3
4	Afghanistan	5.7
...	...	...
910	Zimbabwe	10.7
911	Zimbabwe	10.6
912	Zimbabwe	11.9
913	Zimbabwe	13.9
914	Zimbabwe	12.9

915 rows × 2 columns

Top 10 Countries
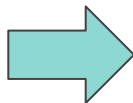
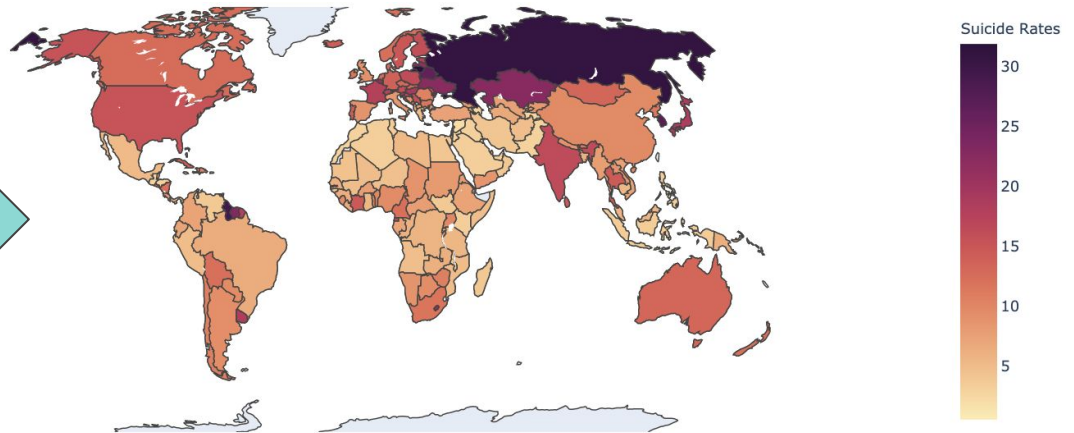| Country	Suicide rate
Russian Federation	41.46
Lithuania	39.74
Belarus	35.78
Kazakhstan	30.70
Ukraine	28.80
Guyana	26.58
Republic of Korea	26.18
Latvia	25.38
Hungary	24.92
Suriname	24.72

```python
#Top 10 highest suicide rates
top10_suicide = df[['Country', 'Both sexes.1']].rename(columns={'Both sexes.1': 'Suicide rate'})
top10_suicide = top10_suicide.groupby('Country')[['Suicide rate']].mean()
top10_suicide = top10_suicide.nlargest(10, 'Suicide rate')
```

Year	Country	2016
0	Afghanistan	4.7
1	Albania	6.3
2	Algeria	3.2
3	Angola	4.7
4	Antigua and Barbuda	0.5
...	...	...
178	Venezuela (Bolivarian Republic of)	3.7
179	Viet Nam	7.3
180	Yemen	8.5
181	Zambia	6.1
182	Zimbabwe	10.7

183 rows × 2 columns

Visualization of General Suicide Rates on the World Map
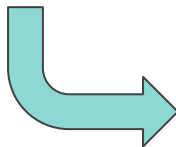

Applied this method for each year in the dataset

```
#Visualization on the World Map
map_data_2016 = world_data.reset_index()[["Country", 2016]]
layout = dict(title='2016 Suicide Rates', geo=dict(showframe=False, projection={'type': 'natural earth'}))
data = go.Choropleth(locations=map_data_2016['Country'], locationmode='country names',
                     z=map_data_2016[2016], colorscale='matter', colorbar={'title': 'Suicide Rates'})
fig = go.Figure(data=data, layout=layout)
iplot(fig)
```

Suicide Rates Per Region

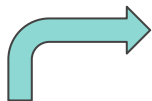|	WHO region	2016	2015	2010	2005	2000	2016.1	2015.1	2010.1	2005.1	...	2016.4	2015.4	2010.4	2005.4	2000.4	2016.5	2015.5	2010.5	2005.5	2000.5
0	Global	18.3	18.5	19.4	20.9	22.4	21.6	21.8	22.8	24.5	...	13.5	13.6	14.3	15.3	16.0	7.7	7.8	8.6	9.3	9.7
1	Africa	20.6	20.7	21.4	22.8	24.1	21.1	21.2	21.8	22.9	...	9.9	9.9	9.9	10.4	10.8	4.8	4.9	5.3	5.4	5.8
2	Americas	15.1	15.1	15.9	17.3	19.2	17.8	17.8	18.7	20.3	...	15.1	15.2	14.0	13.2	13.1	4.6	4.6	4.1	3.9	3.6
3	South-East Asia	23.1	23.2	24.0	24.7	25.6	26.5	26.6	27.0	27.5	...	14.8	14.9	14.8	15.1	15.8	11.6	11.7	12.1	13.4	12.8
4	Europe	16.7	17.1	18.8	22.3	23.5	22.2	22.7	24.9	29.5	...	24.7	25.2	29.2	33.9	35.6	6.6	6.8	7.3	8.3	8.9
5	Eastern Mediterranean	22.0	22.3	23.5	24.9	25.6	24.1	24.3	25.6	27.2	...	5.1	5.0	5.5	6.3	6.0	2.7	2.7	3.0	3.8	4.0
6	Western Pacific	16.2	16.5	17.1	17.9	20.0	19.3	19.5	20.2	20.9	...	10.9	10.9	12.0	12.4	12.9	9.4	9.5	11.5	12.0	13.4

7 rows × 31 columns

	WHO region	2000	2005	2010	2015	2016
0	Global	12.9	12.3	11.5	10.7	10.6
1	Africa	8.3	7.9	7.6	7.4	7.4
2	Americas	8.3	8.5	9.0	9.9	9.8
3	South-East Asia	14.3	14.2	13.5	13.3	13.2
4	Europe	21.8	20.7	17.9	15.7	15.4
5	Eastern Mediterranean	5.0	5.1	4.3	3.9	3.9
6	Western Pacific	13.1	12.2	11.7	10.2	10.2

```python
#Region suicide rates
df2 = pd.read_csv("data2.csv", header = 2)

region_suicide = df2[["WHO region", "2000.3", "2005.3", "2010.3", "2015.3", "2016.3"]]
region_suicide = region_suicide.rename(columns={"2000.3": "2000", "2005.3": "2005",
                                                "2010.3": "2010", "2015.3": "2015", "2016.3": "2016"})
```
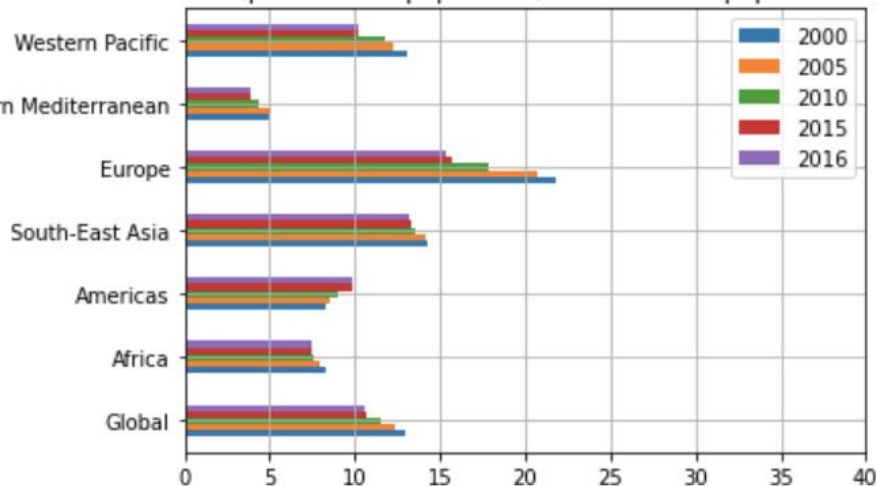
Region Suicide Rates

|	WHO region	2000	2005	2010	2015	2016
0	Global	12.9	12.3	11.5	10.7	10.6
1	Africa	8.3	7.9	7.6	7.4	7.4
2	Americas	8.3	8.5	9.0	9.9	9.8
3	South-East Asia	14.3	14.2	13.5	13.3	13.2
4	Europe	21.8	20.7	17.9	15.7	15.4
5	Eastern Mediterranean	5.0	5.1	4.3	3.9	3.9
6	Western Pacific	13.1	12.2	11.7	10.2	10.2

```python
#Region suicide rates
df2 = pd.read_csv("data2.csv", header = 2)
region_suicide = df2[["WHO region", "2000.3", "2005.3", "2010.3", "2015.3", "2016.3"]]
region_suicide = region_suicide.rename(columns={"2000.3": "2000", "2005.3": "2005", "2010.3": "2010", "2015.3": "2015", "2016.3": "2016"})
region_suicide.plot(kind='barh', title='Suicide rates (per 100 000 population) under overall population by region',
                    x='WHO region', xlabel='', grid=True).set_xlim([0, 40])
```

Suicide Rates in 2000-2016

Year	Global
2000	12.9
2005	12.3
2010	11.5
2015	10.7
2016	10.6

Global suicide rates (2000-2016)
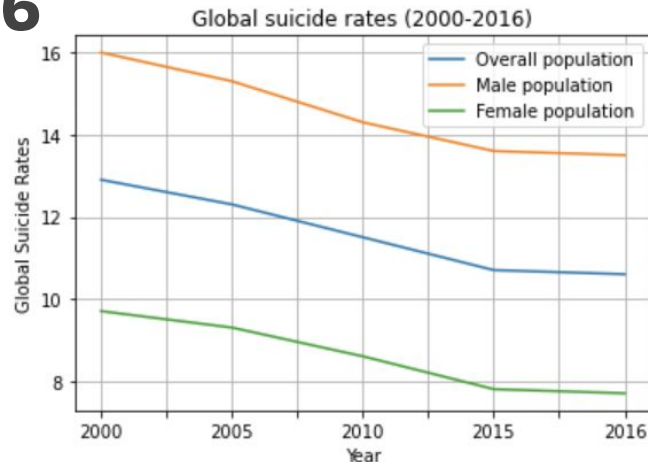
```python
#Global suicide rates
global_suicide = region_suicide.loc[region_suicide["WHO region"] == 'Global'].rename(columns={'WHO region': 'Year'}).set_index('Year').transpose()

#Global male suicide rates
global_male_suicide = male_region_suicide.loc[male_region_suicide["WHO region"] == 'Global'].rename(columns={'WHO region': 'Year'}).set_index('Year').transpose()

#Global female suicide rates
global_female_suicide = female_region_suicide.loc[female_region_suicide["WHO region"] == 'Global'].rename(columns={'WHO region': 'Year'}).set_index('Year').transpose()

frames = [global_suicide, global_male_suicide, global_female_suicide]
suicide_and_gender = pd.concat(frames, axis=1)
suicide_and_gender.columns = ['Overall population', 'Male population', 'Female population']
suicide_and_gender.plot(kind='line', title='Global suicide rates (2000-2016)', xlabel='Year', ylabel='Global Suicide Rates', grid=True, legend=True)
```

Suicide Rates and Happiness Scores in 2016

	Country	Region	Happiness Rank	Happiness Score	Lower Confidence Interval	Upper Confidence Interval	Economy (GDP per Capita)	Family
0	Denmark	Western Europe	1	7.526	7.460	7.592	1.44178	1.16374
1	Switzerland	Western Europe	2	7.509	7.428	7.590	1.52733	1.14524
2	Iceland	Western Europe	3	7.501	7.333	7.669	1.42666	1.18326
3	Norway	Western Europe	4	7.498	7.421	7.575	1.57744	1.12690
4	Finland	Western Europe	5	7.413	7.351	7.475	1.40598	1.13464
...	...	...	...	...	...	...	...	...
152	Benin	Sub-Saharan Africa	153	3.484	3.404	3.564	0.39499	0.10419
153	Afghanistan	Southern Asia	154	3.360	3.288	3.432	0.38227	0.11037
154	Togo	Sub-Saharan Africa	155	3.303	3.192	3.414	0.28123	0.00000
155	Syria	Middle East and Northern Africa	156	3.069	2.936	3.202	0.74719	0.14866
156	Burundi	Sub-Saharan Africa	157	2.905	2.732	3.078	0.06831	0.23442

157 rows × 13 columns

```
#Happiness scores
happy2016 = pd.read_csv("2016.csv")
map_data_happiness = happy2016[["Country", "Happiness Score"]]
```

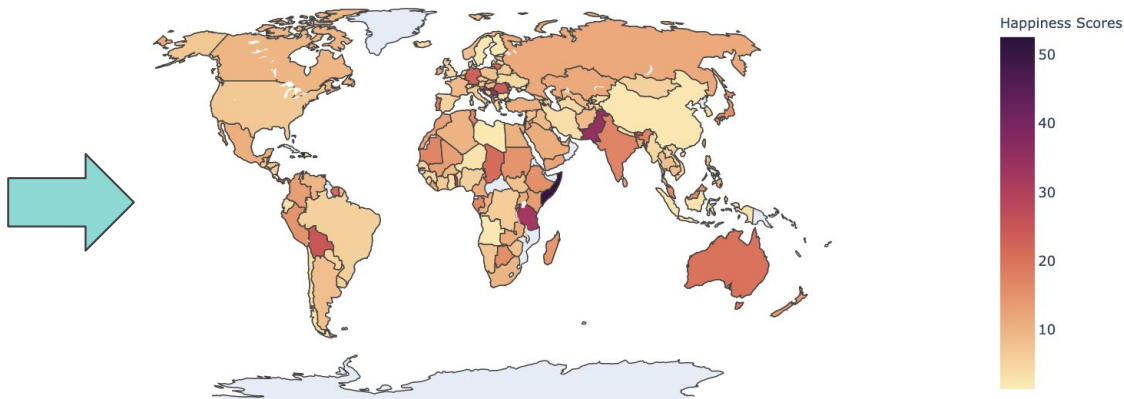|	Country	Happiness Score
0	Denmark	7.526
1	Switzerland	7.509
2	Iceland	7.501
3	Norway	7.498
4	Finland	7.413
...	...	...
152	Benin	3.484
153	Afghanistan	3.360
154	Togo	3.303
155	Syria	3.069
156	Burundi	2.905

157 rows × 2 columns

	Country	Happiness Score
0	Denmark	7.526
1	Switzerland	7.509
2	Iceland	7.501
3	Norway	7.498
4	Finland	7.413
...	...	...
152	Benin	3.484
153	Afghanistan	3.360
154	Togo	3.303
155	Syria	3.069
156	Burundi	2.905

157 rows × 2 columns

Visualization of Happiness Score on the World Map

```python
#Happiness scores
happy2016 = pd.read_csv("2016.csv")
map_data_happiness = happy2016[["Country", "Happiness Score"]]
layout = dict(title='Happiness Score', geo=dict(showframe=False, projection={'type': 'natural earth'}))
data = go.Choropleth(locations=map_data_happiness['Country'], locationmode='country names', z=map_data_2000[2000],
                     colorscale='matter', colorbar={'title': 'Happiness Scores'})
fig = go.Figure(data=data, layout=layout)
iplot(fig)
```

Suicide rate and happiness score by region

	Happiness Score	Suicide Rate
Africa	4.136421	7.4
South-East Asia	5.175447	13.2
Eastern Mediterranean	5.386053	3.9
Global	5.778442	10.6
Europe	6.028178	15.4
Americas	6.677875	9.8
Western Pacific	7.323500	10.2

```python
happiness_by_region16 = happiness_by_region16.rename(index={'Sub-Saharan Africa': 'Africa',
                                                             'Latin America and Caribbean': 'Americas', 'North America': 'Americas',
                                                             'Southern Asia': 'South-East Asia', 'Eastern Asia': 'South-East Asia',
                                                             'Southeastern Asia': 'South-East Asia', 'Central and Eastern Europe': 'Europe',
                                                             'Western Europe': 'Europe', 'Middle East and Northern Africa': 'Eastern Mediterranean',
                                                             'Australia and New Zealand': 'Western Pacific'})

happiness_by_region16 = happiness_by_region16.groupby(["Region"]).mean()
happiness_by_region16 = pd.concat([happiness_by_region16, global_value], axis=0)

#Suicide rates
suicides_by_region16 = region_suicide[['WHO region', '2016']].set_index('WHO region').rename(columns={'2016': 'Suicide Rate'})

frames = [happiness_by_region16, suicides_by_region16]
suicides_and_happiness = pd.concat(frames, axis=1).sort_values('Happiness Score', ascending=True)
```

```python
happiness_by_region16 = suicides_and_happiness[['Happiness Score']]
suicides_by_region16 = suicides_and_happiness[['Suicide Rate']]

fig, ax1 = plt.subplots()

ax2 = ax1.twinx()
ax1.plot(happiness_by_region16, 'g-')
ax2.plot(suicides_by_region16, 'b-')

ax1.set_ylabel('Happiness by region', color='g')
ax2.set_ylabel('Suicide rate by region', color='b', rotation=270, labelpad=15)
plt.title('Suicide rate against happiness score by region')
plt.draw()

ax1.tick_params(axis='x', labelrotation=45)
ax1.grid('on', which='major', axis='y')
ax2.grid('on', which='major', axis='y')
```


Suicide rate against happiness score by region
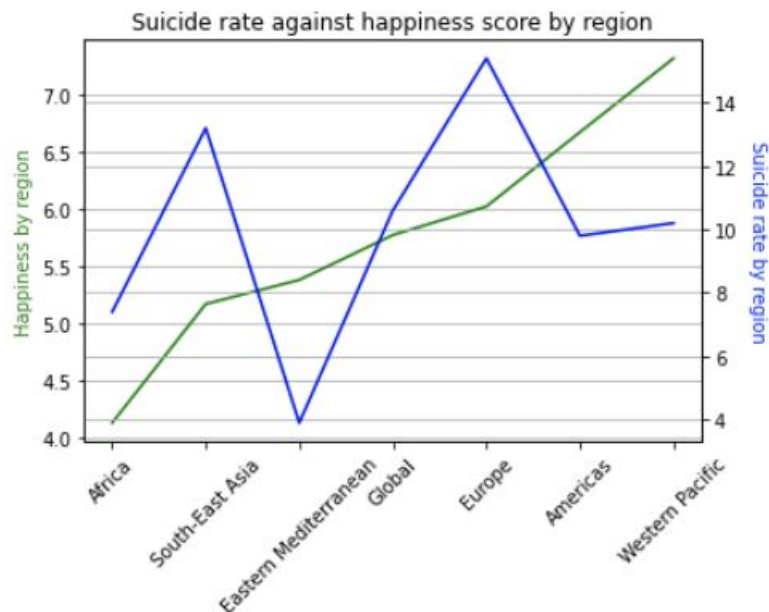
Conclusion

SUB-QUESTIONS

1. Is there any relation between a country's suicide rates and level of development?

2. How have suicide rates in different regions of the world changed over the years?

3. Is any gender more inclined to commit suicide?

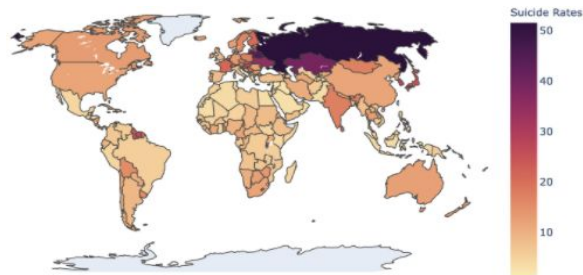4. Is there any relation between a country's suicide rates and happiness score?

Sub-Question - 1

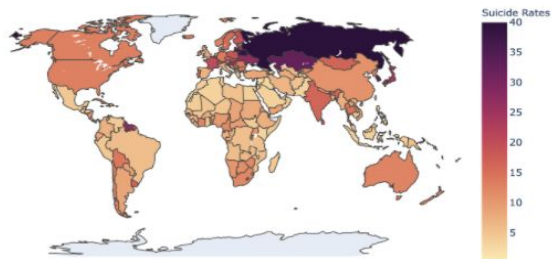Is there any relation between a country's suicide rates and level of development?
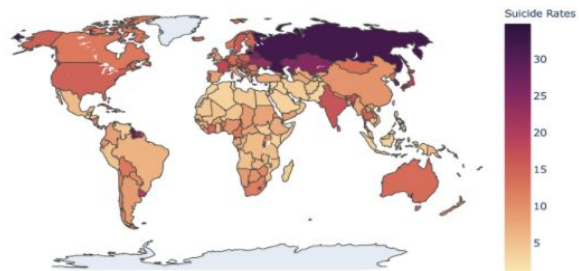
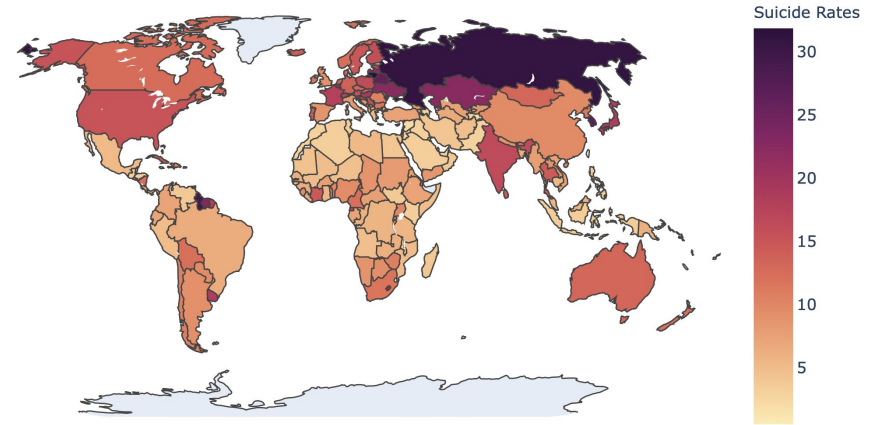# Country's Suicide Rates and Level of Development
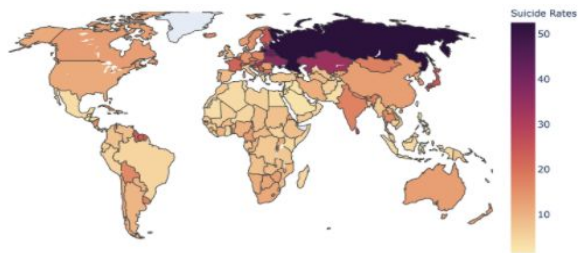
2000

2005

2010

2015

Country's Suicide Rates and Level of Development
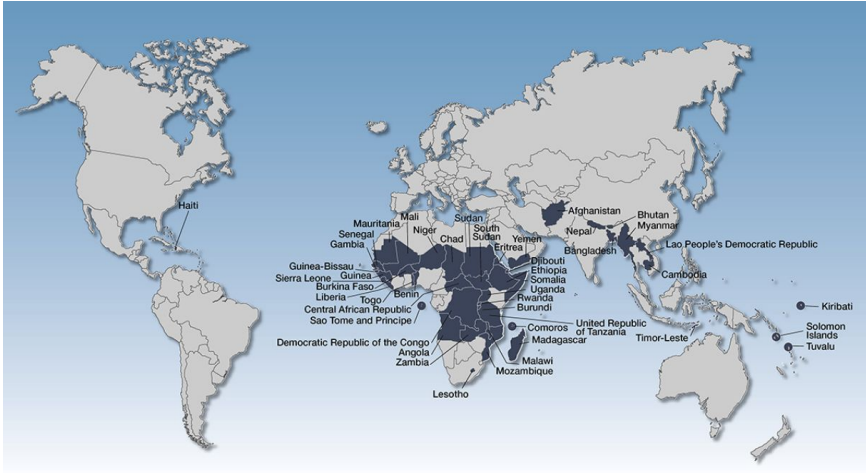
Least Developed Countries

Suicide Rates in 2016

Country's Suicide Rates and Level of Development

Top 10 of Suicide Rates

| Country	Suicide rate
Russian Federation	41.46
Lithuania	39.74
Belarus	35.78
Kazakhstan	30.70
Ukraine	28.80
Guyana	26.58
Republic of Korea	26.18
Latvia	25.38
Hungary	24.92
Suriname	24.72

Sub-Question - 2

How have suicide rates in different regions of the world changed over the years?

Suicide Rates Changes Over Years By WHO Regions

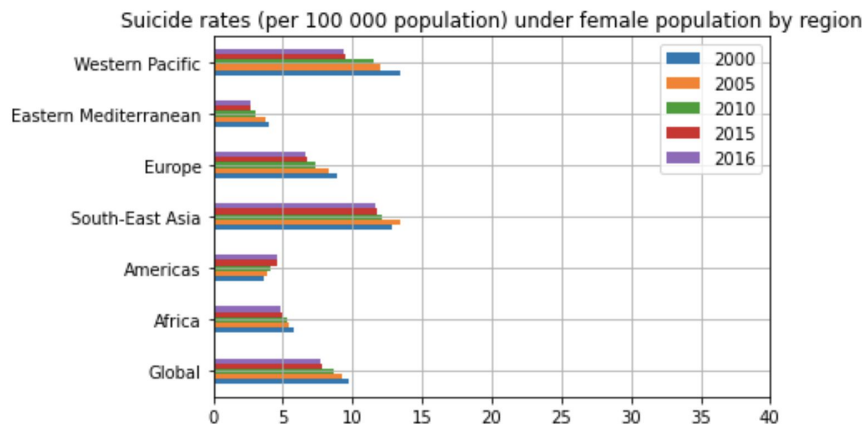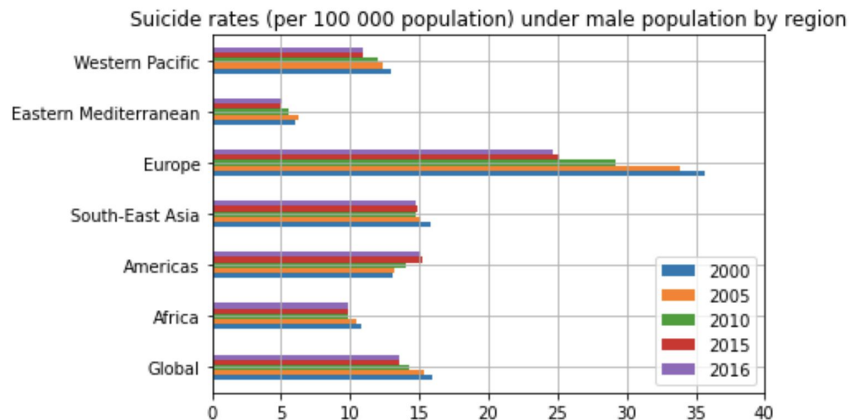- Except Americas, Suicide Rates **decreased** over the years

Suicide rates (per 100 000 population) under overall population by region
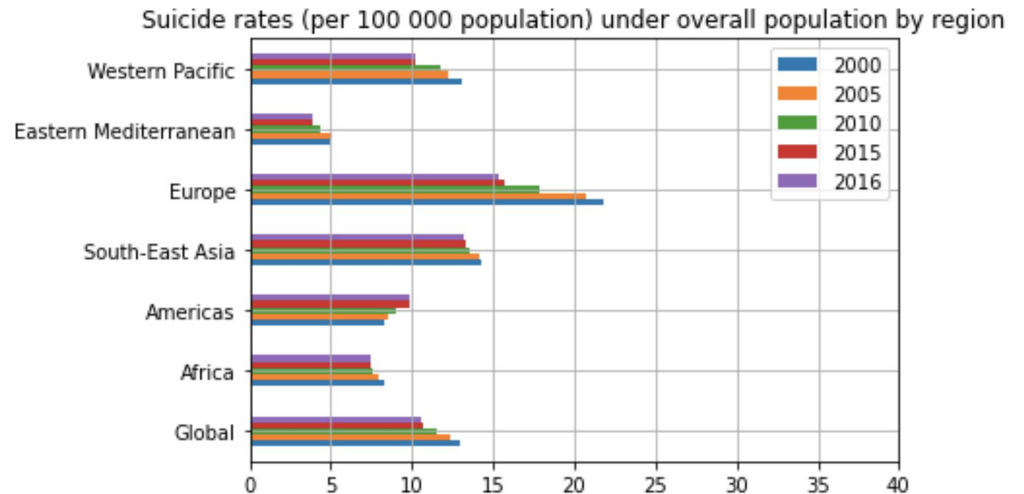
Sub-Question - 3

"Is any gender more inclined to commit suicide?"
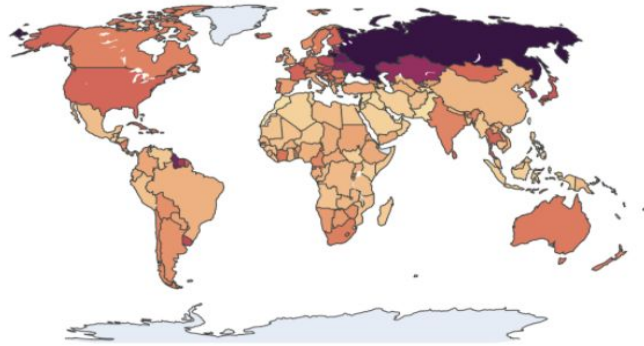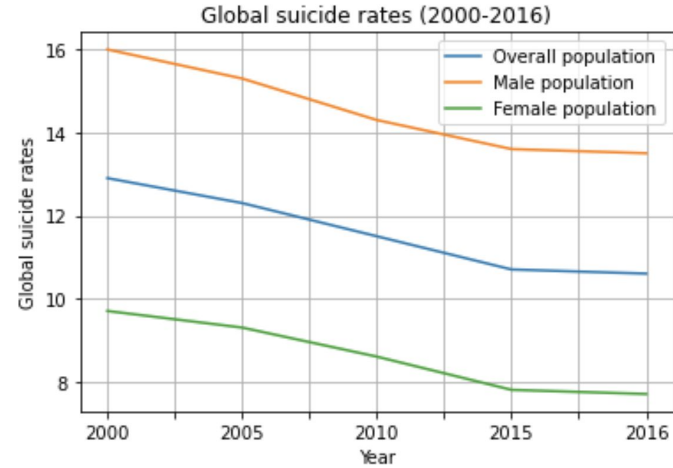
"Is any gender more inclined to commit suicide?"

Gender's Suicide Rates Over the Years by Region

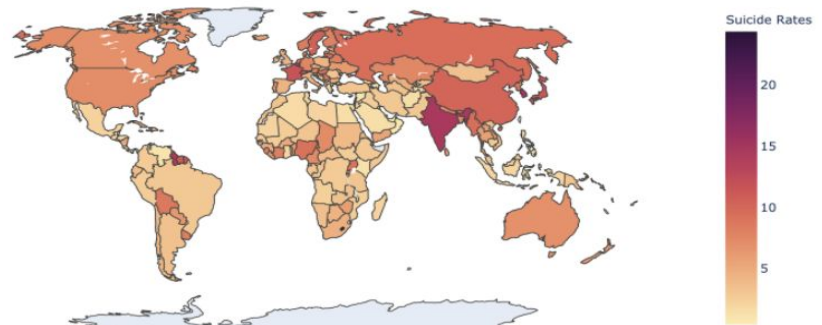# "Is any gender more inclined to commit suicide?"

- **All Suicide Rates by Gender decreased Over the Years**

Global suicide rates (2000-2016)

Male 2016
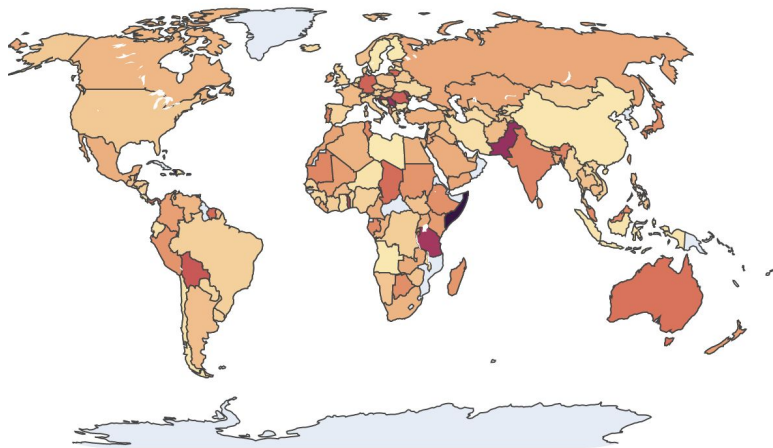

Female 2016

Sub-Question - 4

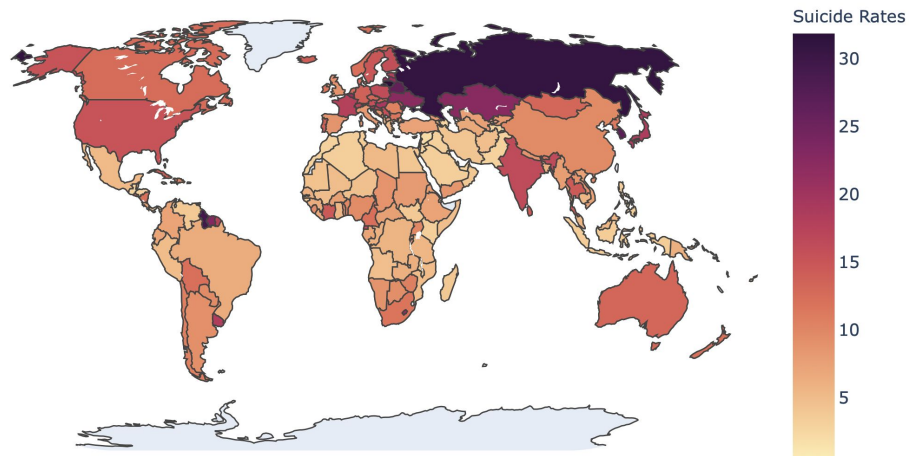Is there any relation between a country's suicide rates and happiness score?

No actual relation between Happiness Score and Suicide Rates

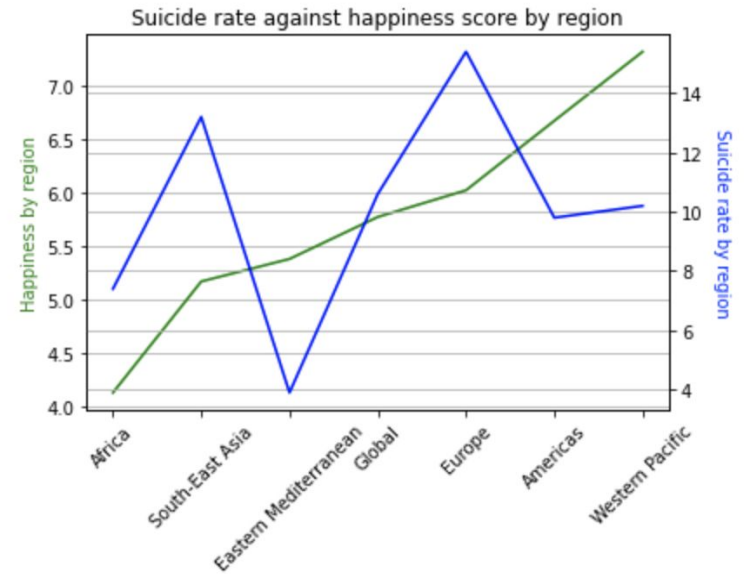2016 Happiness Score

2016 Suicide Rates

No actual relation between Happiness Score and Suicide Rates

	Happiness Score	Suicide Rate
Africa	4.136421	7.4
South-East Asia	5.175447	13.2
Eastern Mediterranean	5.386053	3.9
Global	5.778442	10.6
Europe	6.028178	15.4
Americas	6.677875	9.8
Western Pacific	7.323500	10.2

Suicide rate against happiness score by region

FINAL STATEMENT

Which populations are more inclined to attempt suicide?

Limitations in Approach

Source Code

Jupyter Notebook

The source code in Jupyter Notebook format can be found here.

HTML

The source code in HTML format can be found here.

Sources

Kaggle Image:
https://medium.com/@ODSC/10-tips-to-get-started-with-kaggle-fc7cb9316d27

WHO Image: https://www.who.int/

WHO Countries Image: https://unctad.org/topic/least-developed-countries/map

Numpy Image:https://nl.wikipedia.org/wiki/NumPy

Pandas:https://en.wikipedia.org/wiki/Pandas_(software)

Matplotlib: https://matplotlib.org/3.1.1/api/_as_gen/matplotlib.pyplot.html

Plotly Image: https://en.wikipedia.org/wiki/Plotly