

Suicide Rates Overview

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*Millions of lives have been taken by the virus
Countless families fell into pieces because of the loss of loved ones*



703,000

people commit suicide worldwide each year
based on American Foundation for Suicide Prevention

Goals

- 1. Discovered the variables that affect the suicide rates*
- 2. Researched the reasons behind those phenomena*

Datasets

Suicide Rates Overview 1985 to 2016

- Country
- Sex
- Age
- Generation
- Suicides number
- Population
- Suicide number/100k Pop
- GDP for the year
- GDP per capita

World Happiness Report 2015

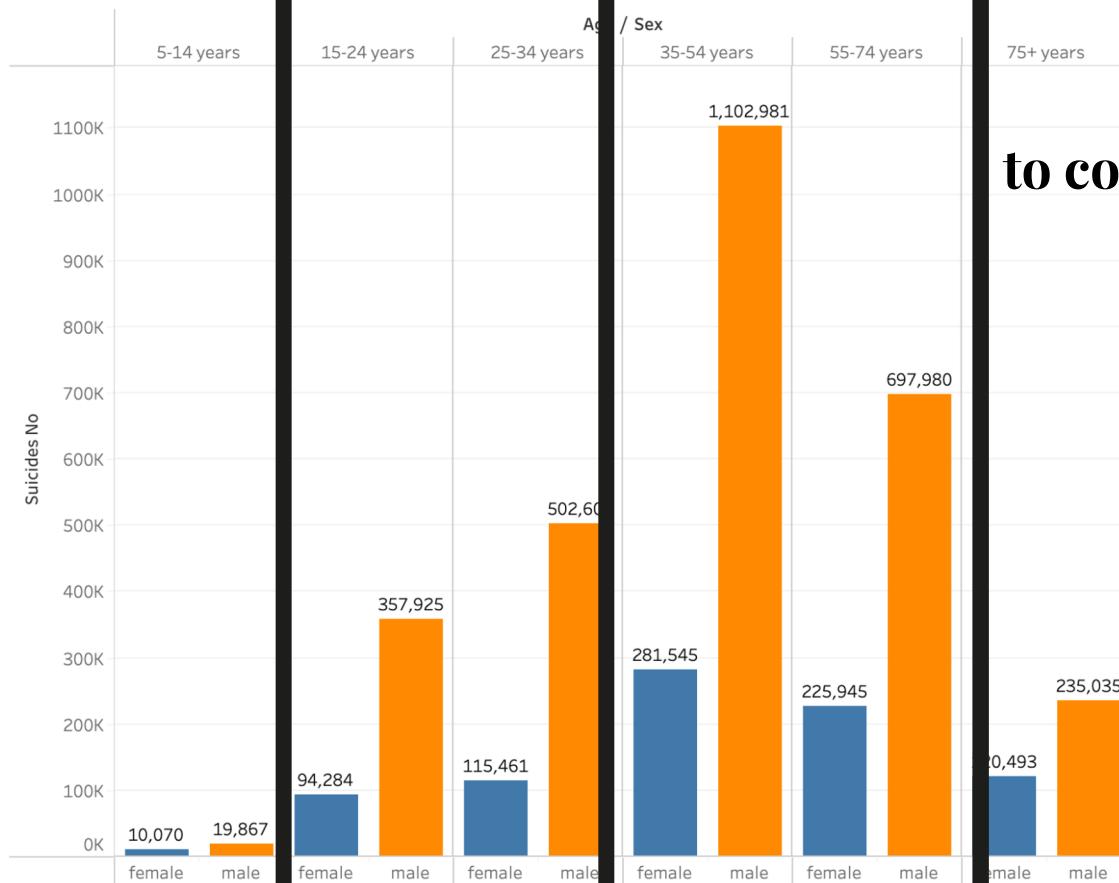
- Country
- Year
- Happiness rank
- Happiness score

Analysis Aspects & Assumptions

- Age & Gender
- Happiness Rate
- Generation
- GDP

1. Age and gender

Age&Gender



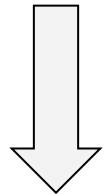
**3-4 times easier
to commit suicide for male**

Sex

female
male

Extension Research

Traditional male gender roles discourage emotional expression



More likely for male to get mental illness

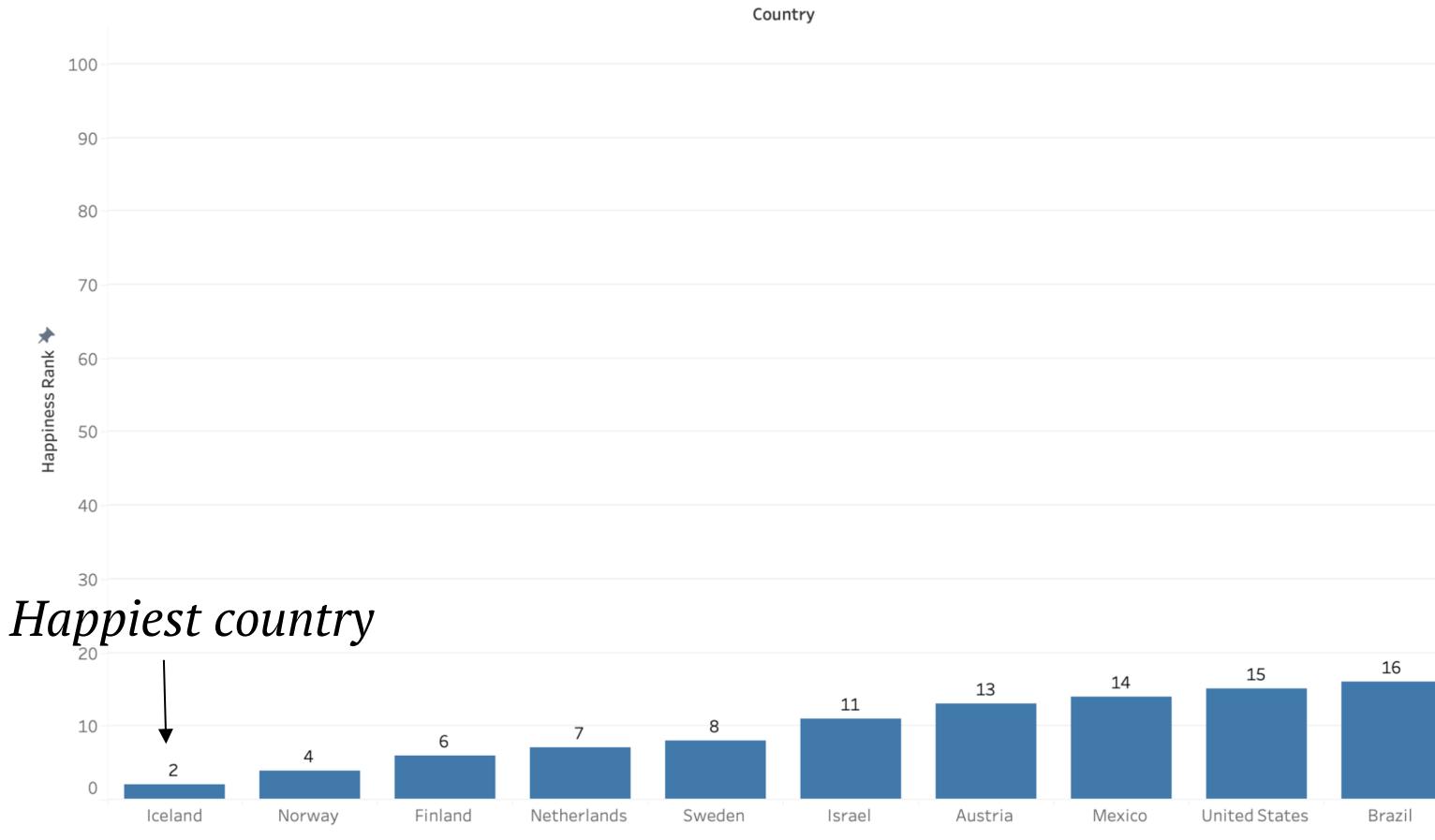
Conclusion

Suicide & Mental health issues

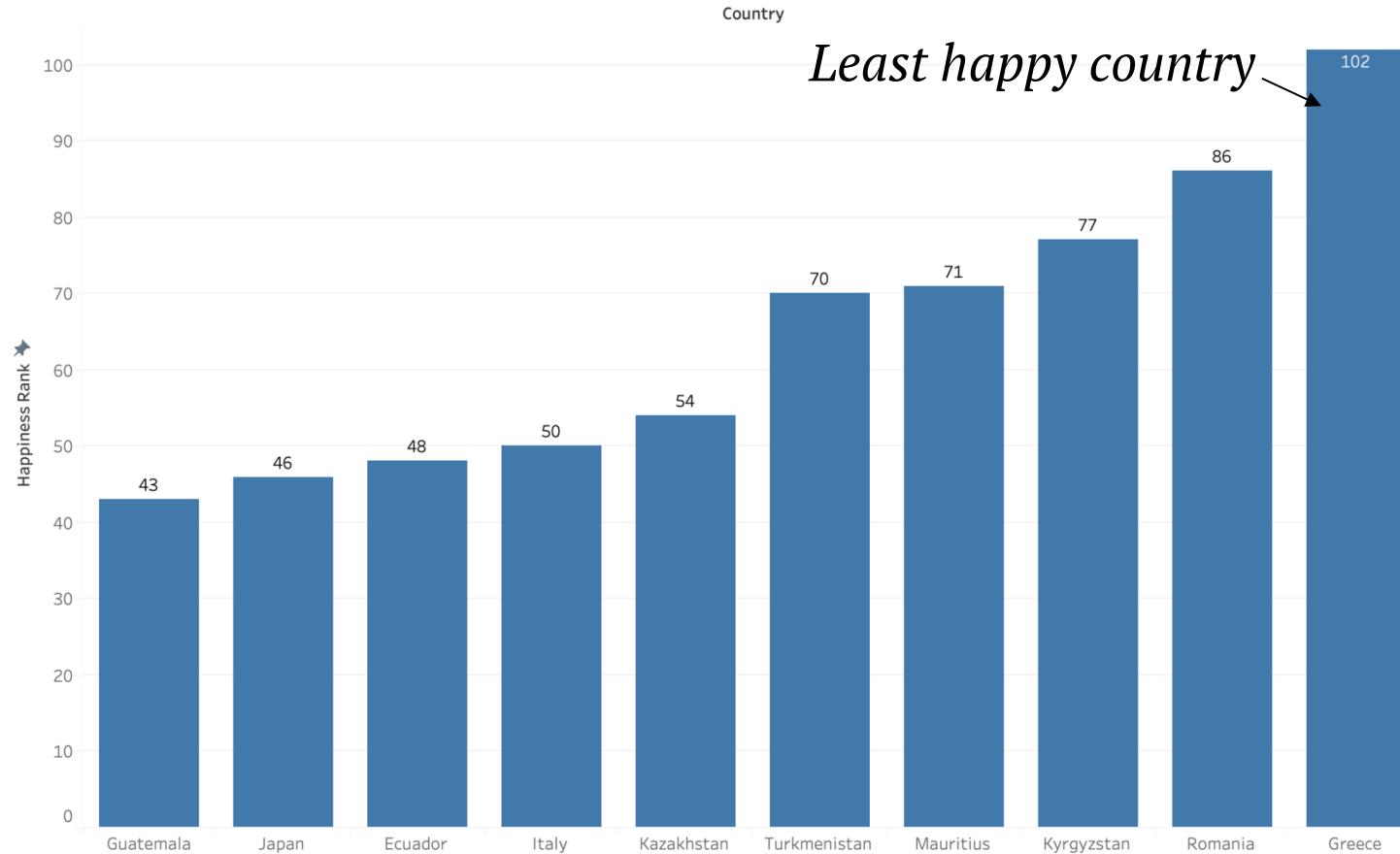
(Depression, alcohol use disorder, etc)

2. Country happiness rank

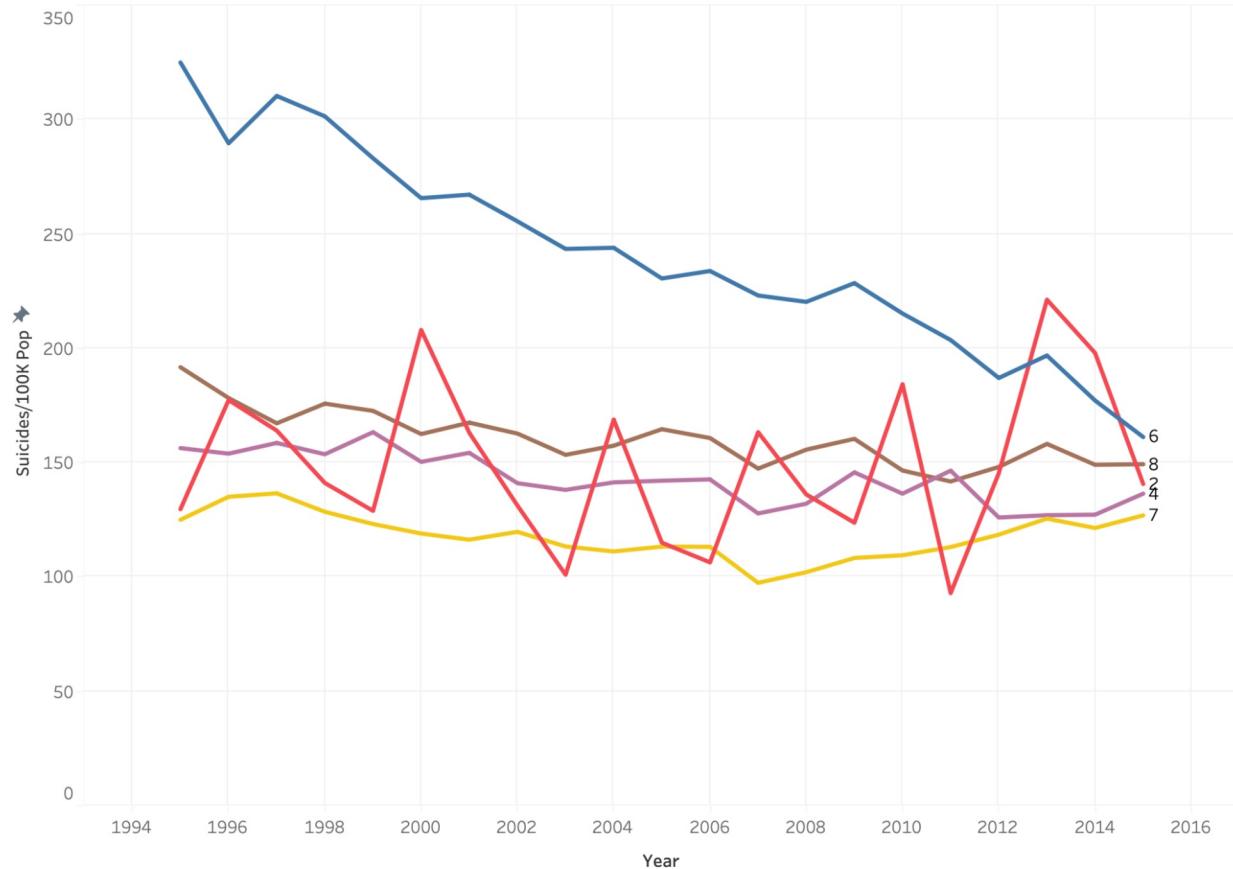
top10



bottom10

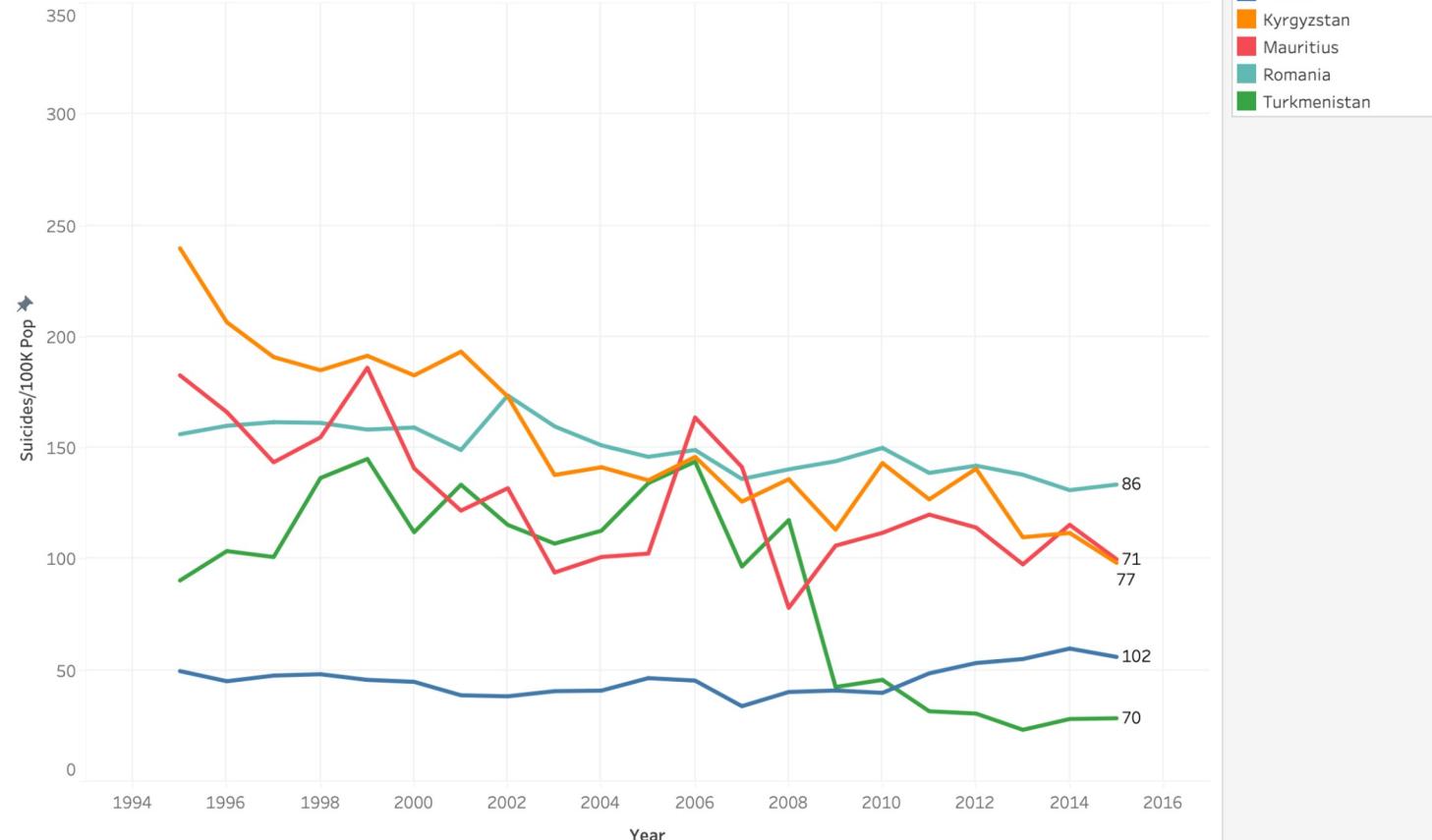


top5 countries

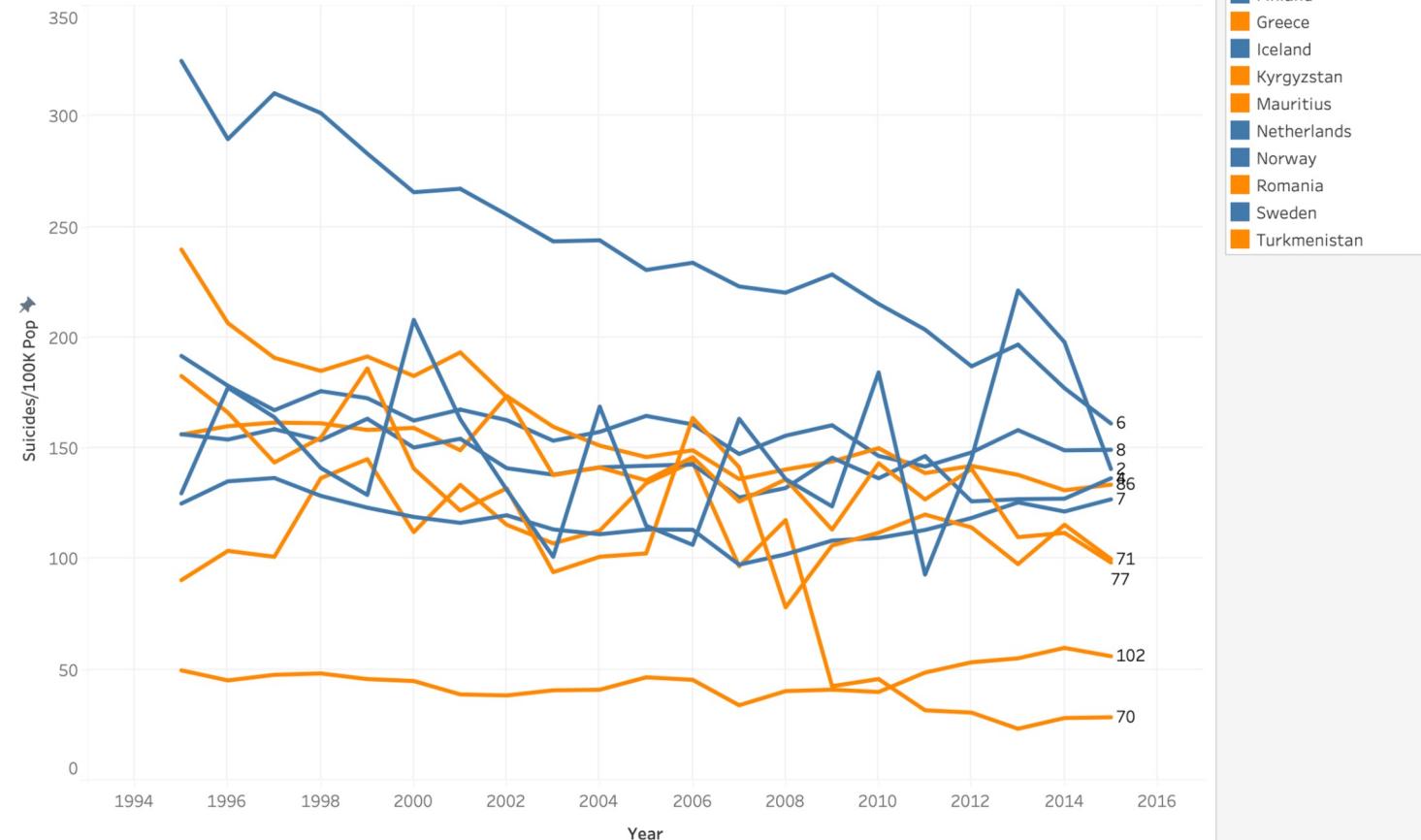


Country
Finland
Iceland
Netherlands
Norway
Sweden

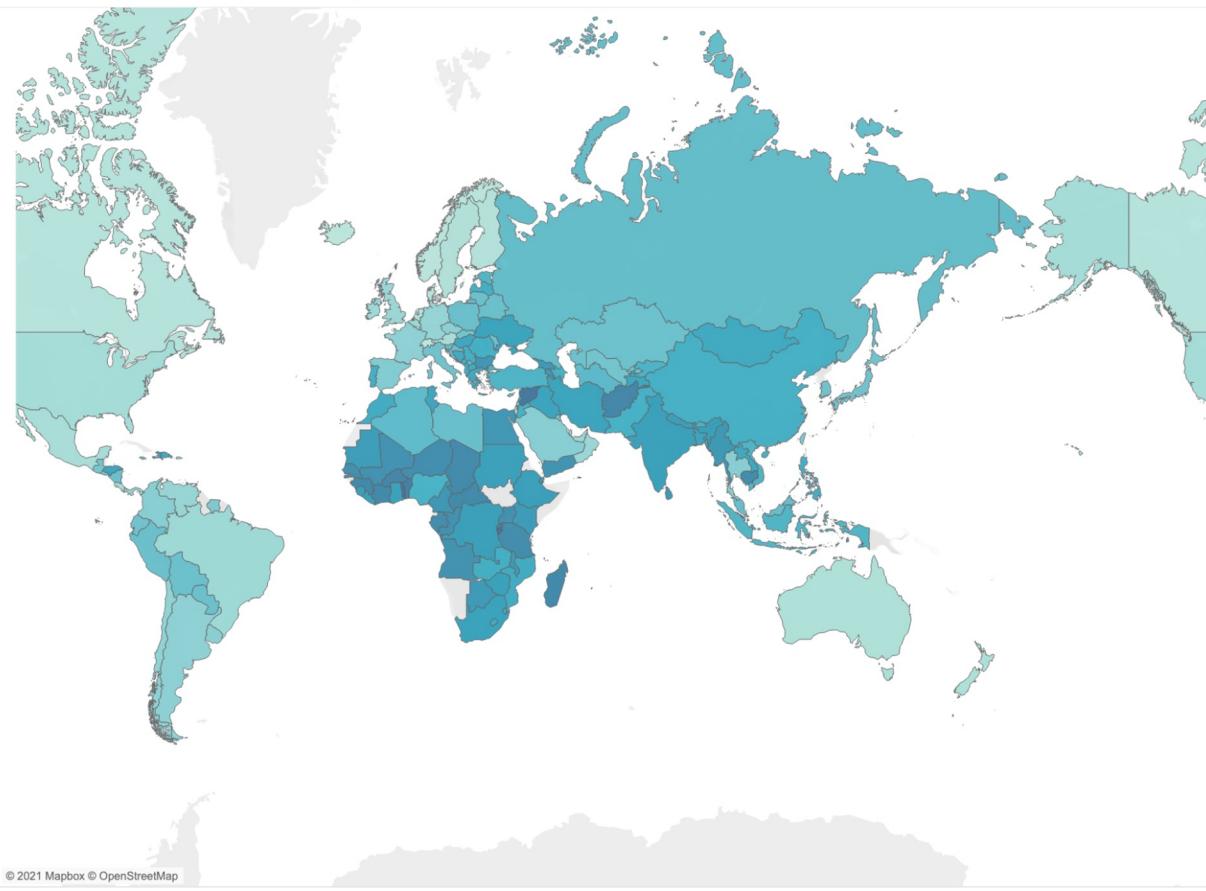
bottom5 countries



top5 vs. bottom5



Developed vs Underdeveloped



Happiest country

Conclusion

*More pressure for making a living
V.s.*

Difficult to collect data from underdeveloped countries

3. Generation

Let dive in a little bit.

A explanation of the concept of generation.

The Greatest Generation — born 1901-1924

Also known as the G.I. Generation

The Silent Generation — born 1925-1945

Baby Boomer Generation — born 1946-1964

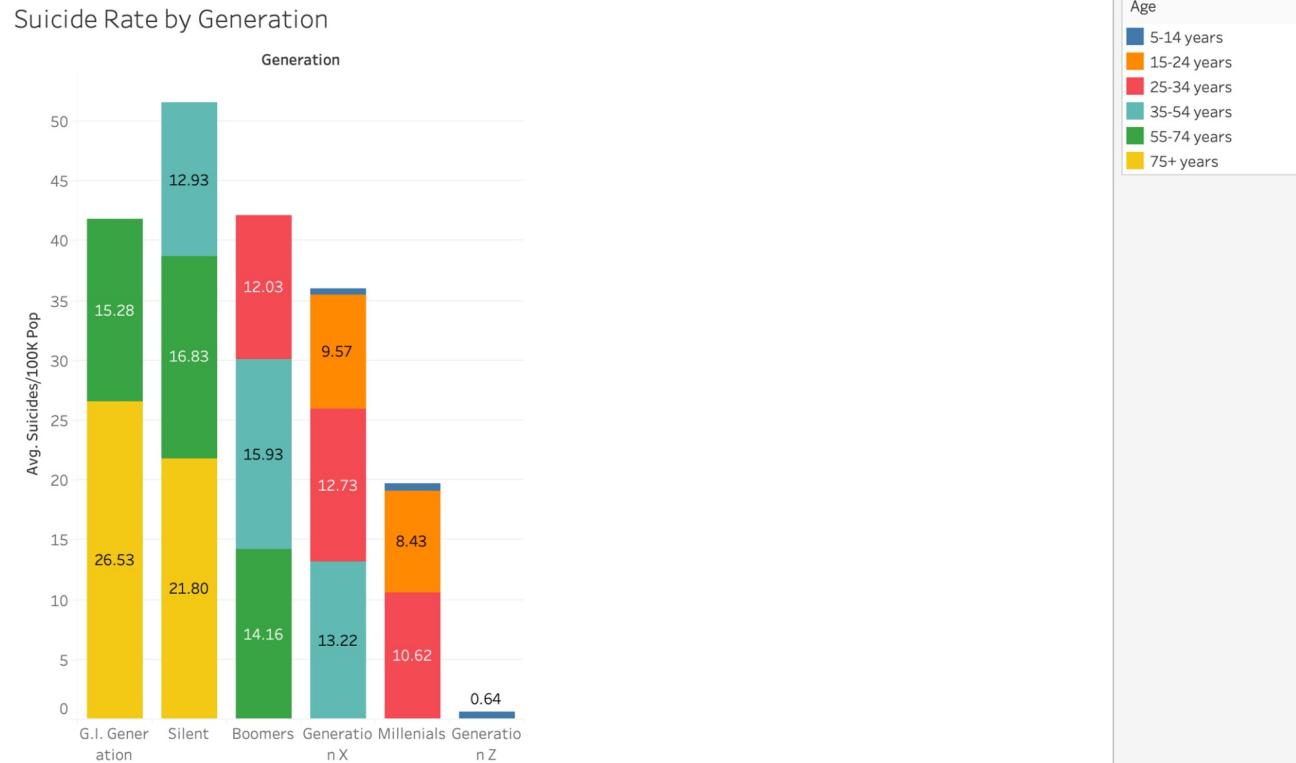
Generation X — born 1965-1980

Generation Y — born 1981-1996

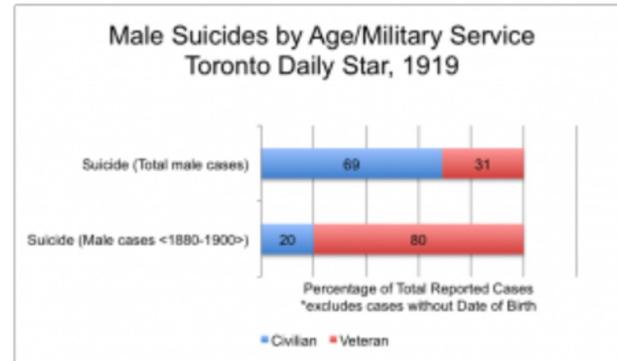
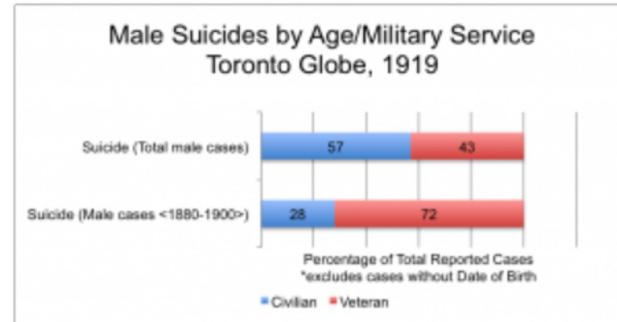
This demographic is more commonly referred to as “Millennials” because they became adults at the turn of the millennium.

Generation Z — born 1997-2012

Stacked bar chart of suicide number between different generation



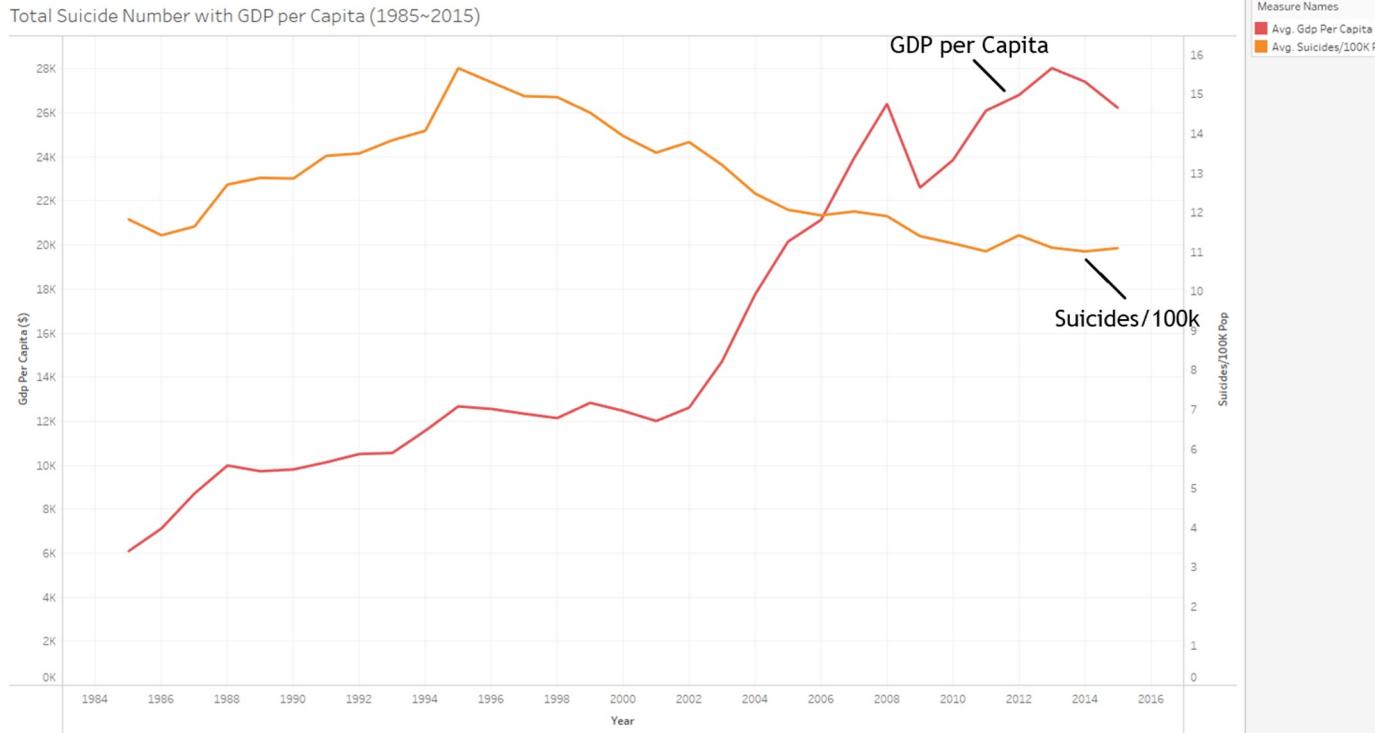
Suicide number of returned soilders and citizens



4. GDP

Let's start with the first set of slides

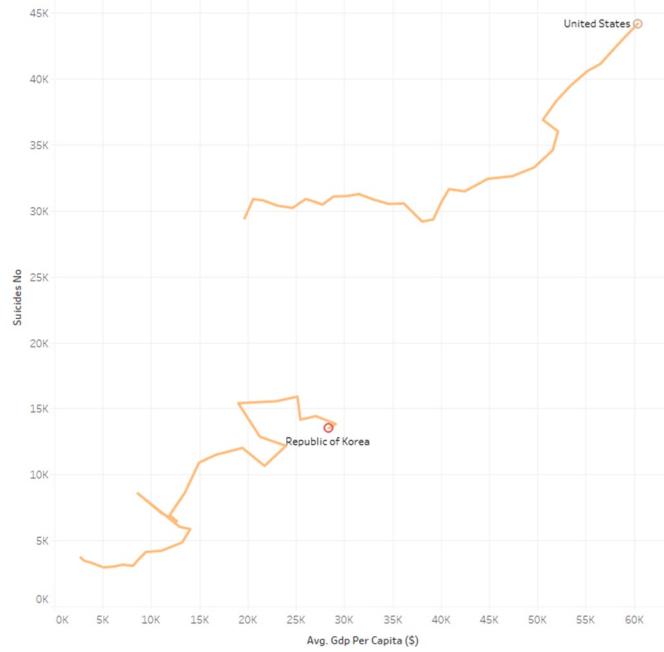
Global GDP per Capita with suicide rate change over time



It is a common assumption that wealth is an essential source of happiness. Thus, we assume a growth trend of economic will result in the decreasing of the suicide rate. And we can see in the visualization that the suicide rate keep dropping since 1995 while the GDP per Capita has maintained a growth trend. Here, we can infer that the increasement of personal wealth have a positive effect on reducing the suicide rate.

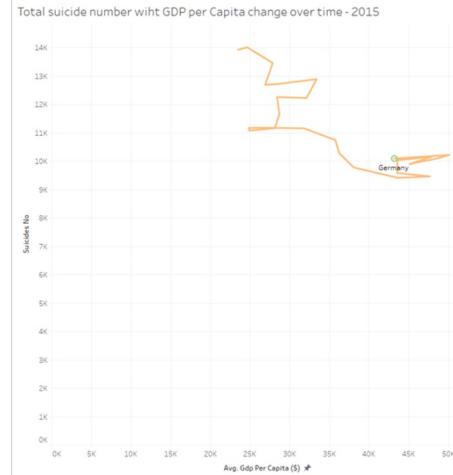
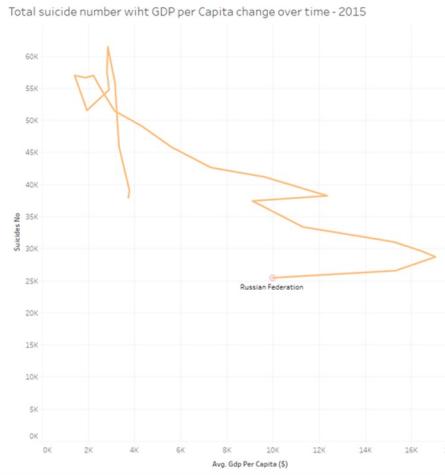
Different pattern of suicide rate with GDP per Capita

Total suicide number with GDP per Capita change over time - 2015



We can see the number of suicide number keep growing even though these countries' GDP per Capita are growing. We can find a common phenomenon of these two countries that living expenses and pressure are pretty high

Different pattern of suicide rate with GDP per Capita



But on the other hand, the Russia and Germany's total suicide number keep dropping as the growth of GDP per Capita.

Data Frame Manipulation

```
df_selected3 = pd.DataFrame(df_selected2,columns=['country','year','sex','age','suicides/100k pop','gdp_per_capita ($)'])

suicide = df_selected3[['country','year','sex','age','suicides/100k pop']].set_index(['country','age','sex','year']).unstack()

gdp = df_selected3[['country','year','sex','age','gdp_per_capita ($)']].set_index(['country','age','sex','year']).unstack()

gdp
```

0.3s

0.3s

0.4s

0.4s

		gdp_per_capita (\$)																						
country	age	sex	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	...	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
			Argentina	15-24 years	female	8232	8563	9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206
male	8232	8563			9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981	
25-34 years	female	8232		8563	9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981	
	male	8232		8563	9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981	
United States	35-54 years	female	8232	8563	9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981	
		male	8232	8563	9057	9126	8546	8462	7900	2840	3668	4683	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981	
	
		5-14 years	male	31518	32928	34644	36164	38072	39218	40018	40845	42468	44867	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387
75+ years	female	31518	32928	34644	36164	38072	39218	40018	40845	42468	44867	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		
	male	31518	32928	34644	36164	38072	39218	40018	40845	42468	44867	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		

Data Frame Manipulation

df2
✓ 0.6s

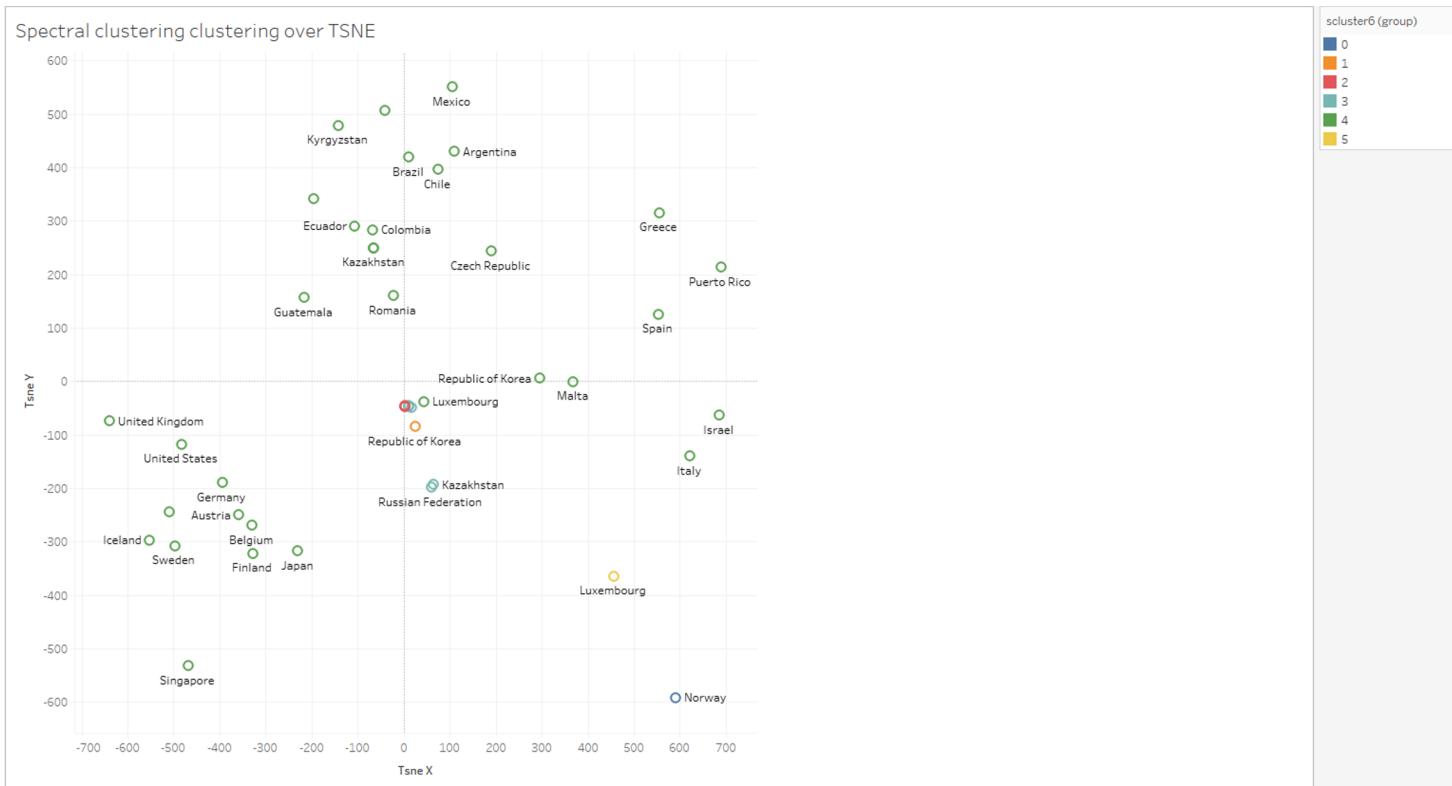
			suicides/100k pop												gdp_per_capita (\$)											
country	age	sex	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	...	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
Argentina	15-24 years	female	3.31	3.36	3.57	3.56	3.13	3.57	5.09	4.84	5.49	4.88	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
		male	8.90	8.79	8.13	10.08	10.82	14.00	15.58	16.27	19.15	19.59	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
	25-34 years	female	2.59	2.14	2.91	2.07	1.95	2.41	3.05	3.28	2.41	3.37	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
		male	9.06	9.25	8.66	10.05	10.42	12.72	14.02	14.94	16.02	15.19	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
	35-54 years	female	3.52	4.38	4.04	3.55	3.36	4.09	4.88	4.45	4.45	4.16	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
		male	9.06	9.25	8.66	10.05	10.42	12.72	14.02	14.94	16.02	15.19	...	6475	7918	9843	8961	11273	13946	14203	14206	13400	14981			
	
	United States	5-14 years	male	1.33	1.14	1.17	1.20	0.96	1.16	1.02	0.95	0.92	0.90	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		
		55-74 years	female	5.38	5.19	5.06	4.97	4.77	4.77	4.95	5.01	5.06	5.18	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		
			male	25.06	24.95	24.19	23.44	22.25	20.82	22.51	23.19	22.69	22.25	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		
		75+ years	female	5.47	4.81	5.07	5.17	4.59	4.05	3.85	4.08	3.77	3.81	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		
			male	48.25	46.54	44.70	45.15	41.71	42.40	40.55	40.83	37.87	37.11	...	49666	51585	52128	50563	51989	53452	55170	56520	58531	60387		

408 rows × 42 columns

Clustering Result

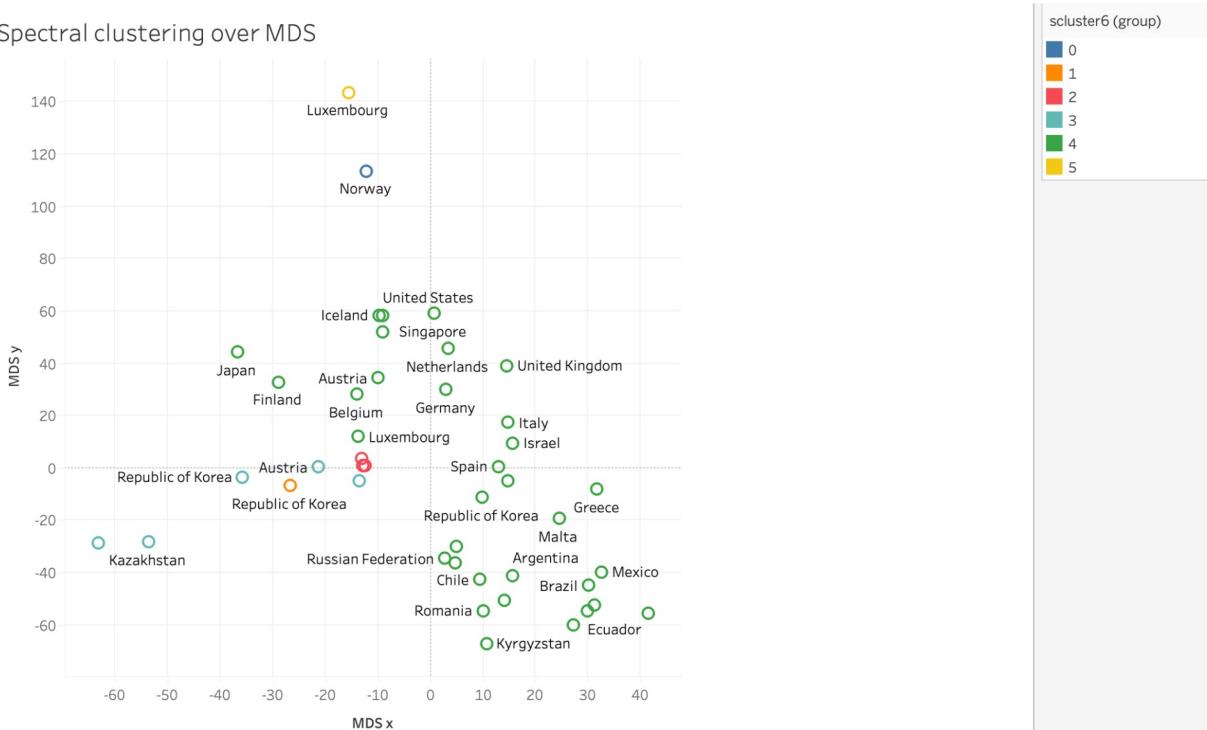
projections									
✓ 0.6s									
			MDS_x	MDS_y	tsne_x	tsne_y	scluster6	kmeans6	
country	age	sex							
Argentina	15-24 years	female	2.798962	-3.211801	14.134146	-51.382793	4	1	
		male	-0.704244	-3.785559	-4.793473	-10.169197	4	3	
	25-34 years	female	3.274783	-3.136510	14.750704	-50.226067	4	1	
		male	0.076748	-3.645471	-4.026812	-10.507538	4	3	
	35-54 years	female	3.081998	-3.171100	14.038592	-50.349087	4	1	
		male	0.000000	0.000000	0.000000	0.000000	0	0	
United States	5-14 years
		male	2.721790	5.348007	-36.829071	21.834692	4	0	
	55-74 years	female	1.303138	5.169910	-34.077114	19.973164	4	0	
		male	-4.157538	4.377119	4.127614	58.229427	4	4	
	75+ years	female	1.880721	5.223965	-35.482243	20.487671	4	0	
		male	-8.116273	3.767702	17.133347	36.251846	4	4	

Clustering Visualization

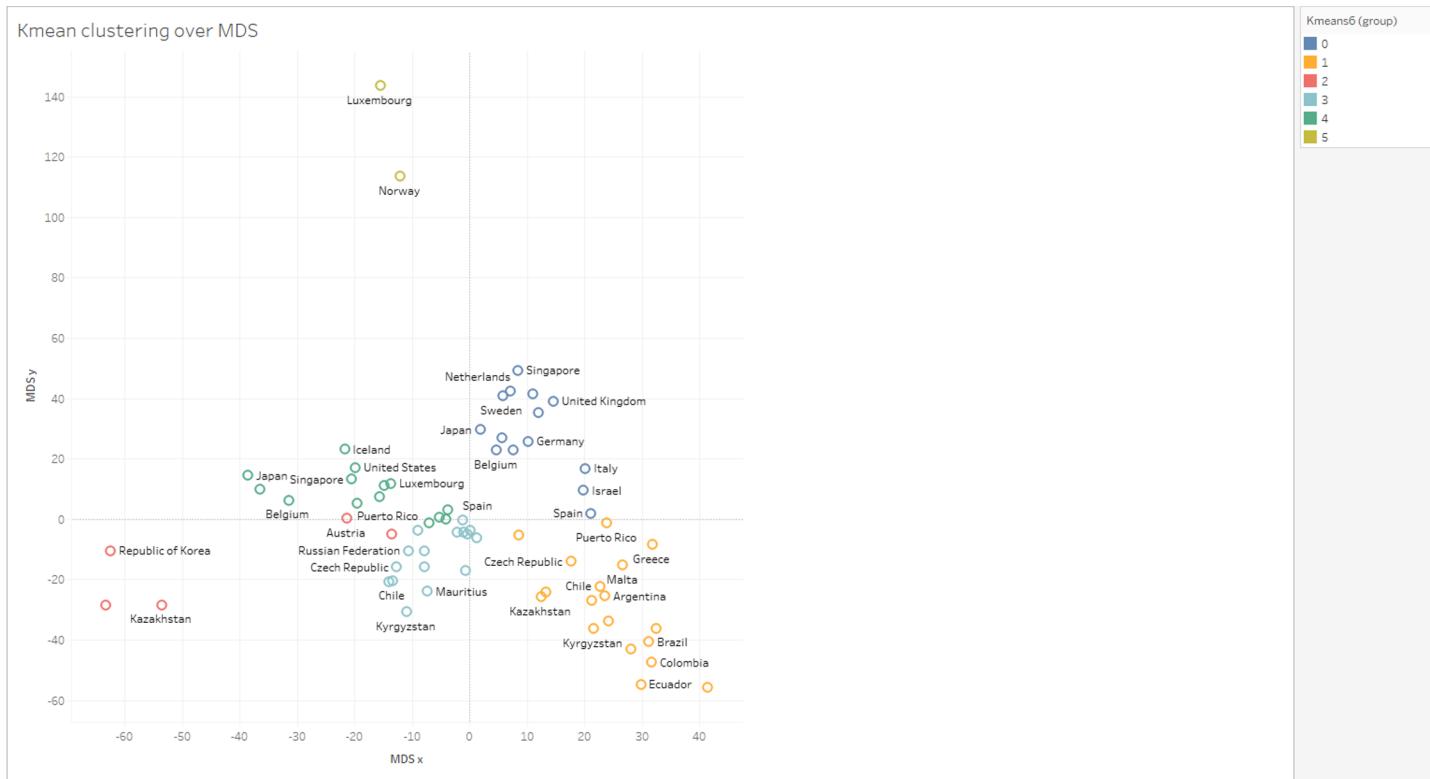


Clustering Visualization

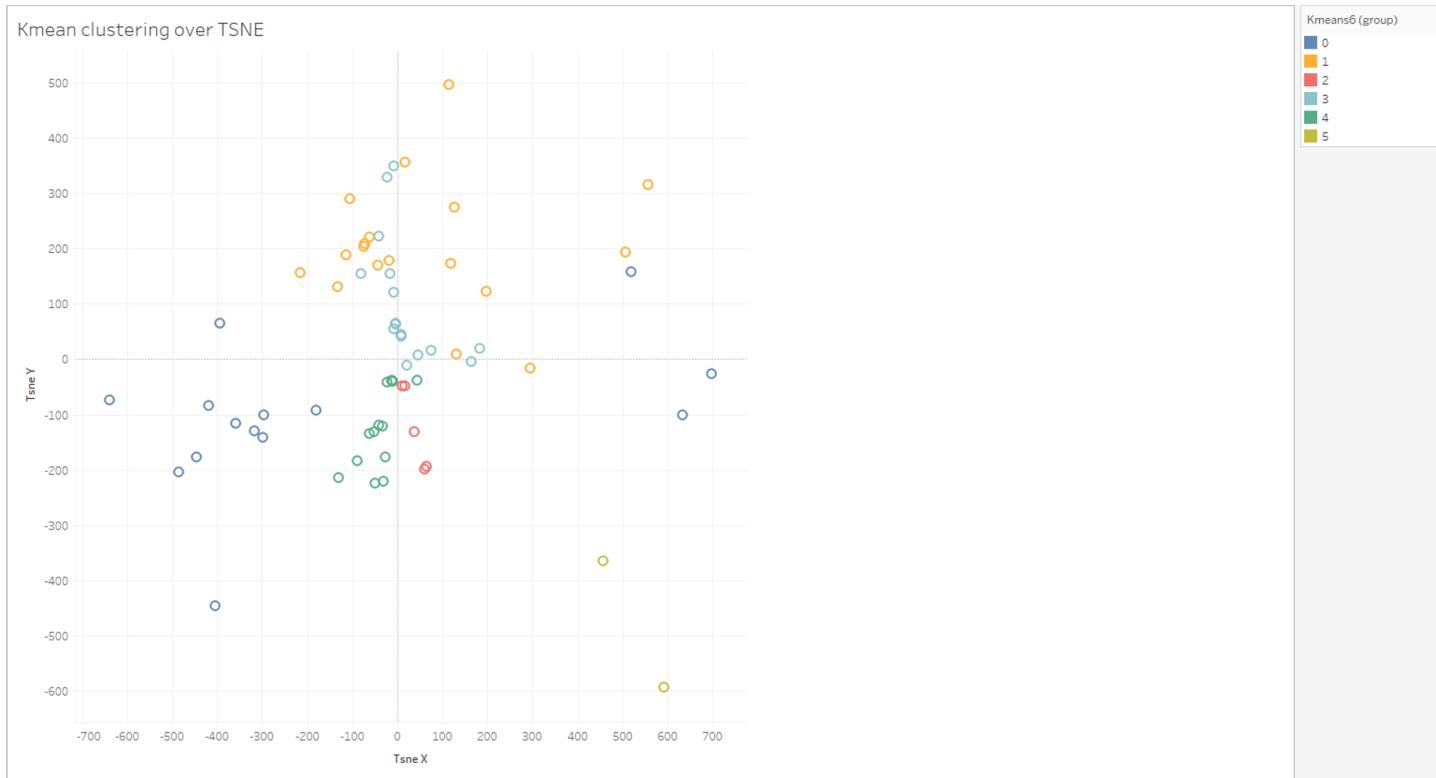
Spectral clustering over MDS



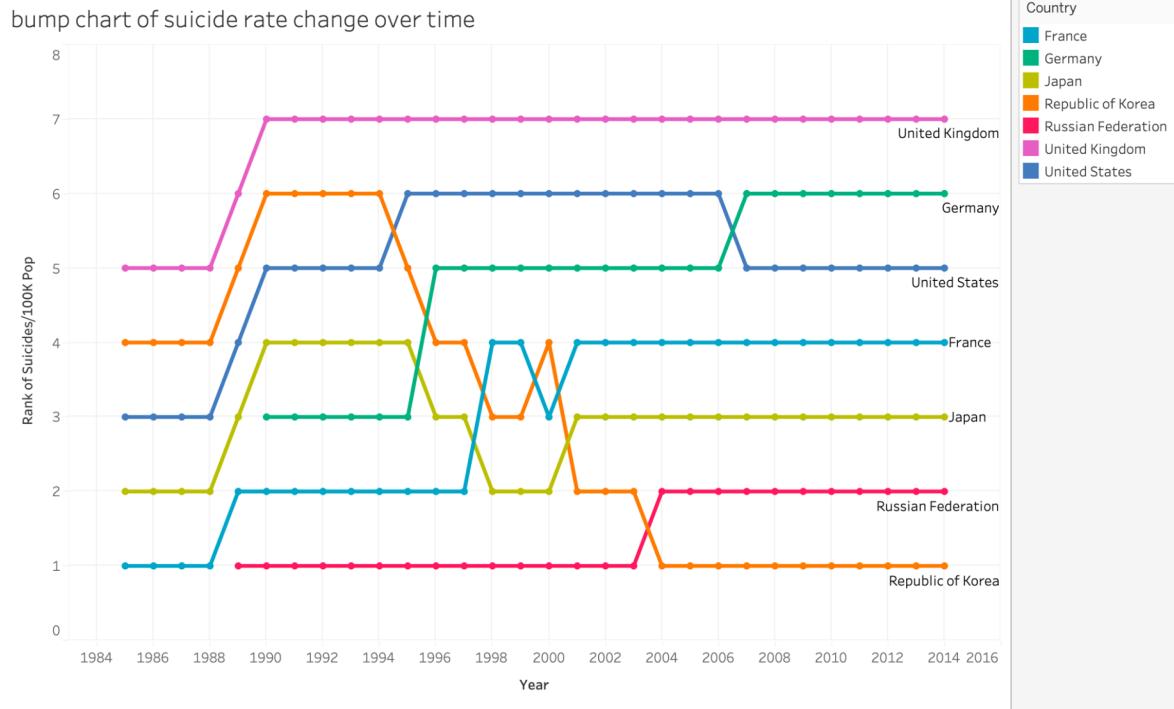
Clustering Visualization



Clustering Visualization



Bump Chart of Suicide Rate Change over Time





Summary

There will be always someone there for you, so
DO NOT GIVE UP!

Thank you!

Any questions?