Understanding the Indicators of World Happiness

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Kristen Goh

- Studied public health in Bachelors (UC Irvine) and Masters (UC Davis) degrees

- Currently works in a healthcare organization in the Quality Data & Reporting Analytics Dept.

- First experience in coding was in college working on a diabetes research

- Enjoys long walks, baking, exploring forests, and watching crime-mystery tv shows

Jonathan Goh

- Grew up in the Greater Los Angeles Area

- Currently a Certified Occupational Therapist Assistant specializing in pediatrics

- Data Science is the window to using all the data we have to create knowledge and wisdom making meaningful and purposeful life.

- My vision is to improve and grow families/children's lives through my Data Science and Occupational Therapy skills

World Happiness

Why?

- World happiness is an increasingly important topic for policy-making, health programs, and humanitarian organizations.

Goal

- Understand how happiness differs in countries and regions around the world
- Analyze potential indicators that influence happiness

Data Sources

1. World Happiness Report up to 2020 (*linked here*) - Kaggle

- World Happiness Report began in 2012 by the United Nations and is a landmark survey of the stats of global happiness of about 150 countries

2. World Development Indicators (*linked here*)

- Sourced from World Bank's collection of annual development indicators of over 217 economies

3. World Health Statistics (*linked here*) - Kaggle

- Data collected by the World Health Organization (WHO) consisting of health metrics

Methods

Project Phases

Data Wrangling - *Python & Excel*

- Combined the three data sets
- Remove unwanted columns
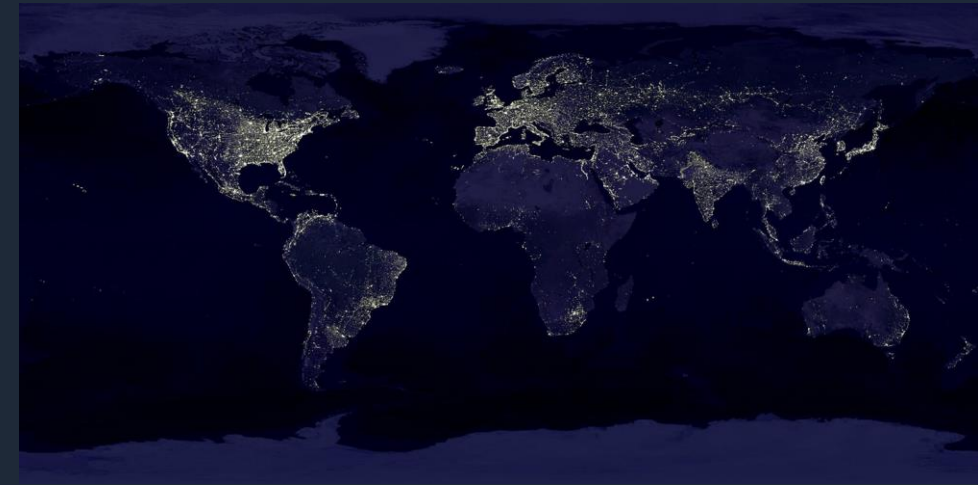- Convert data into a usable format

Data Analysis - *R Studio*

- Test the assumptions
- Run ANOVA & Multiple Linear Regression

Data Visualization - *Tableau, Excel, & R Studio*

- Created graphs and mapped findings

Presentation - *PowerPoint & Google Drive*

Methods

Evaluation Questions

- How does happiness differ between regions?
- How does happiness change over time for different regions?
- What are the countries with the highest happiness scores?
- What country development indicators influence happiness?

Statistical Tests

- Multiple Linear Regression
- ANOVA

Variables

Happiness

- Happiness Score (developed through life evaluations from the Gallup World Poll)

Technology

- Mobile cellular subscriptions (per 100 people)
- Primary reliance on clean fuels and tech (% of pop.)
- Renewable energy consumption

Economy

- Economy (GDP per Capita)
- Business score (range 0-100)

Health

- Health expenditure (% of GDP)
- Health expenditure (% of general gov. expenditure)
- Prevalence of undernourishment
- Basic sanitization services
- Basic drinking water services
- Fertility rate

Misc.

- Secondary education rate
- Rural population (% of total pop.)
- Food insecurity rate

Happiness by Country

- United States ranks #15
- 8 of the 15 countries are from Western Europe
- Mexico and Costa Rica are the only developing countries in the top 15
- Bottom 5 countries are from Africa and Middle East

Happiness Score of the Top 15 Countries

Country	Region	
Switzerland	Western Europe	7.5870
Iceland	Western Europe	7.5610
Denmark	Western Europe	7.5270
Norway	Western Europe	7.5220
Canada	North America	7.4270
Finland	Western Europe	7.4060
Netherlands	Western Europe	7.3780
Sweden	Western Europe	7.3640
New Zealand	Australia and New Zealand	7.2860
Australia	Australia and New Zealand	7.2840
Israel	Middle East and Northern Africa	7.2780
Costa Rica	Latin America and Caribbean	7.2260
Austria	Western Europe	7.2000
Mexico	Latin America and Caribbean	7.1870
United States	North America	7.1190

5 Countries w/ Lowest Happiness Scores

Country	Region	
Rwanda	Sub-Saharan Africa	3.4650
Benin	Sub-Saharan Africa	3.3400
Syria	Middle East and Northern Africa	3.0060
Burundi	Sub-Saharan Africa	2.9050
Togo	Sub-Saharan Africa	2.8390

Happiness by Region

Happiness Score by Region

Region

Region	Avg. Happiness Score
Australia and New Zealand	7.285
North America	7.273
Western Europe	6.739
Latin America and Caribbean	6.113
Middle East and Northern Africa	5.831
Southeastern Asia	5.373
Eastern Asia	5.334
Central and Eastern Europe	5.306
Southern Asia	4.581
Sub-Saharan Africa	4.172

Avg. Happiness Score
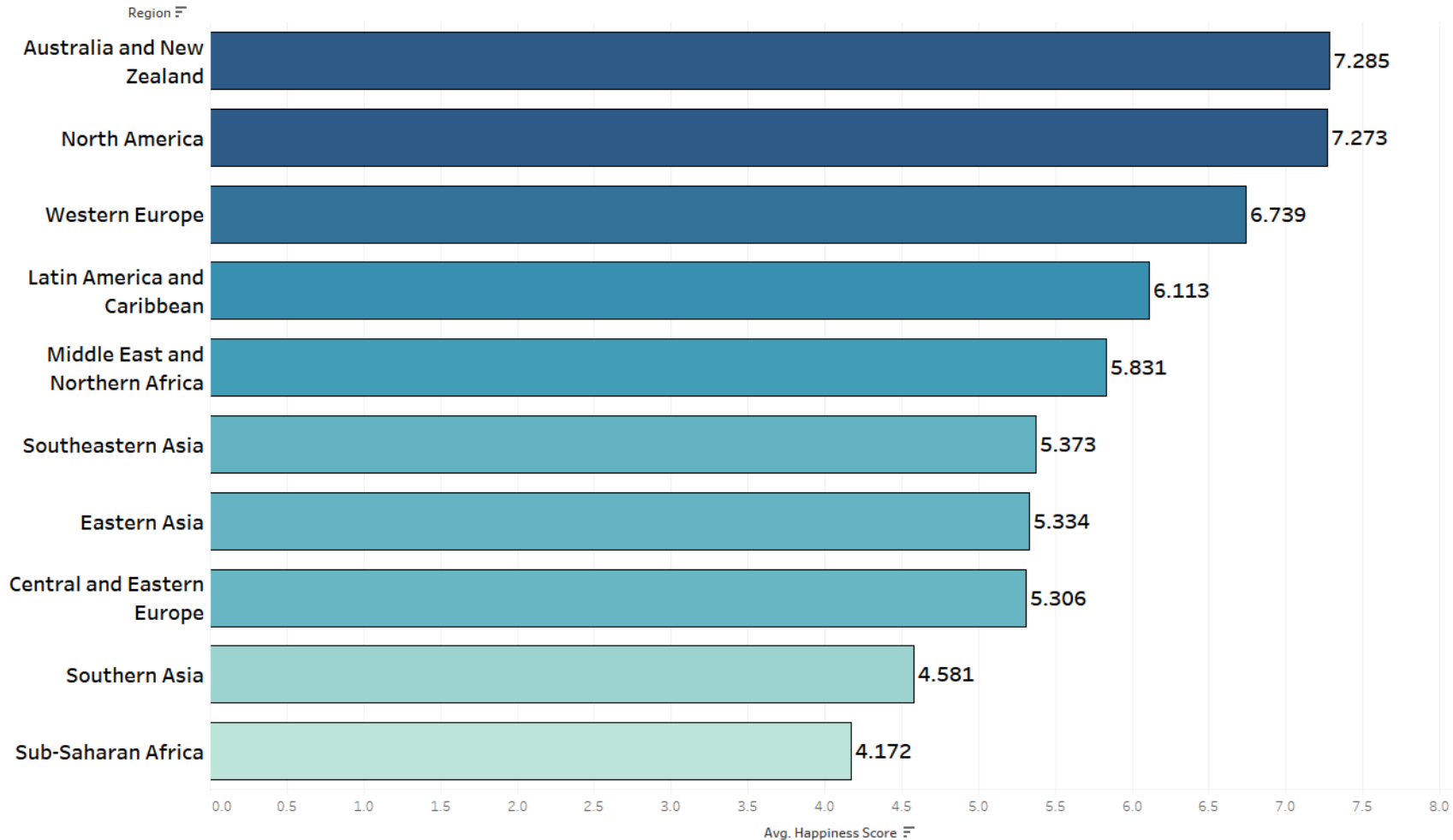
Happiness Score Mapped by Country

Happiness Score by Country

SUM(Happiness Score)
2.839 — 7.587

© 2021 Mapbox © OpenStreetMap
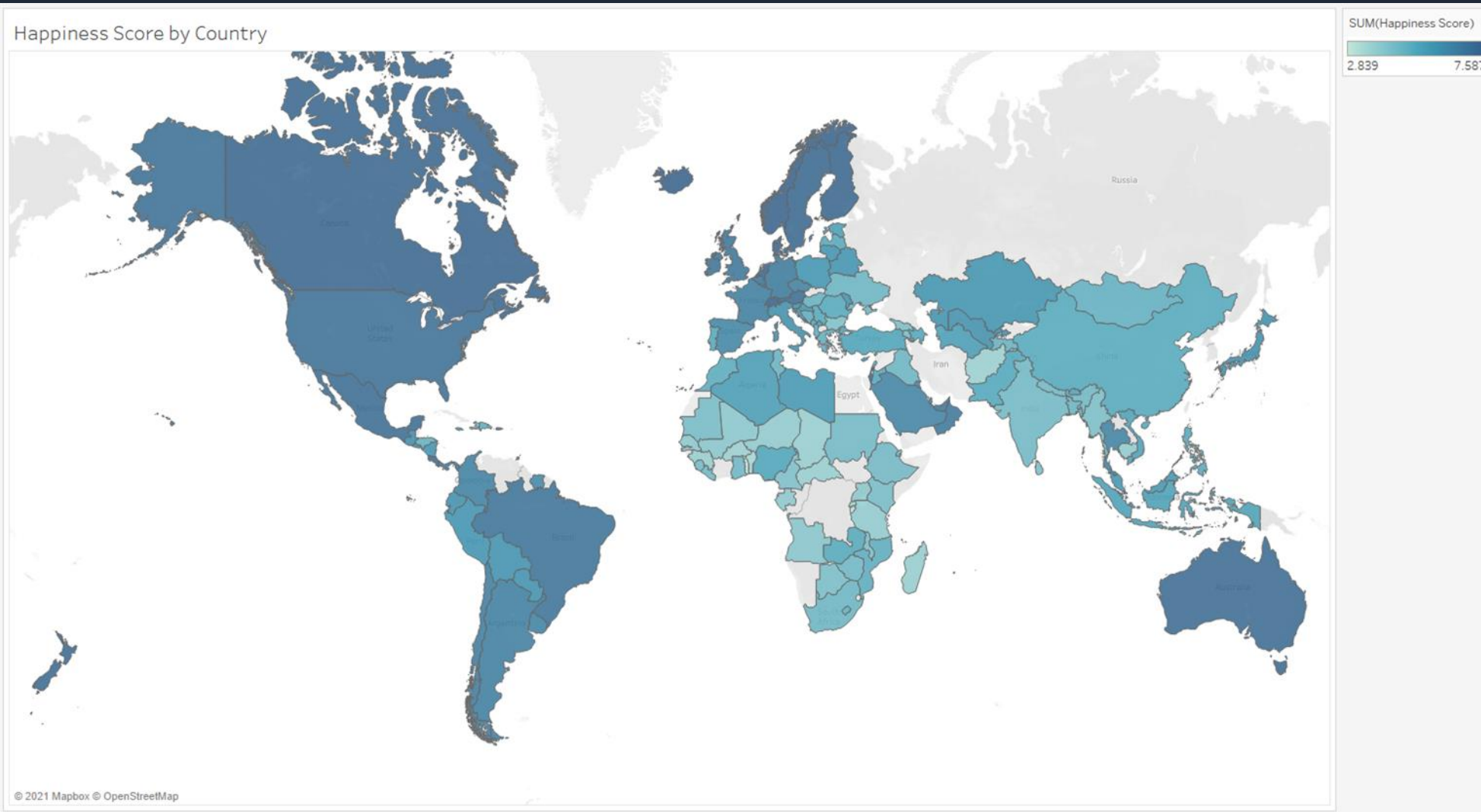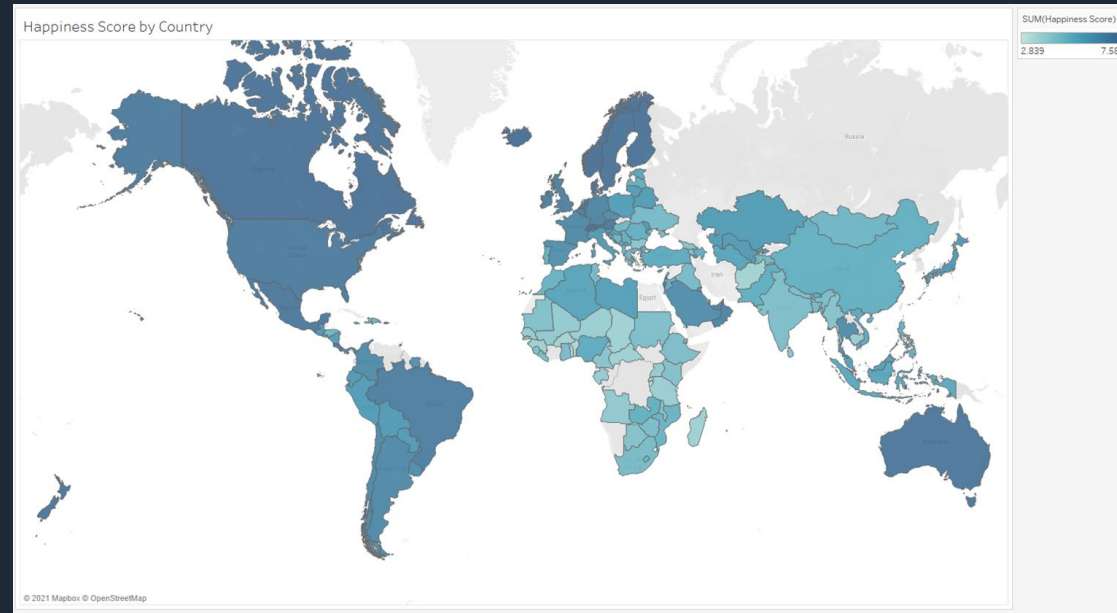
- Darker countries have higher happiness scores
- Greyed out countries were not included in the dataset
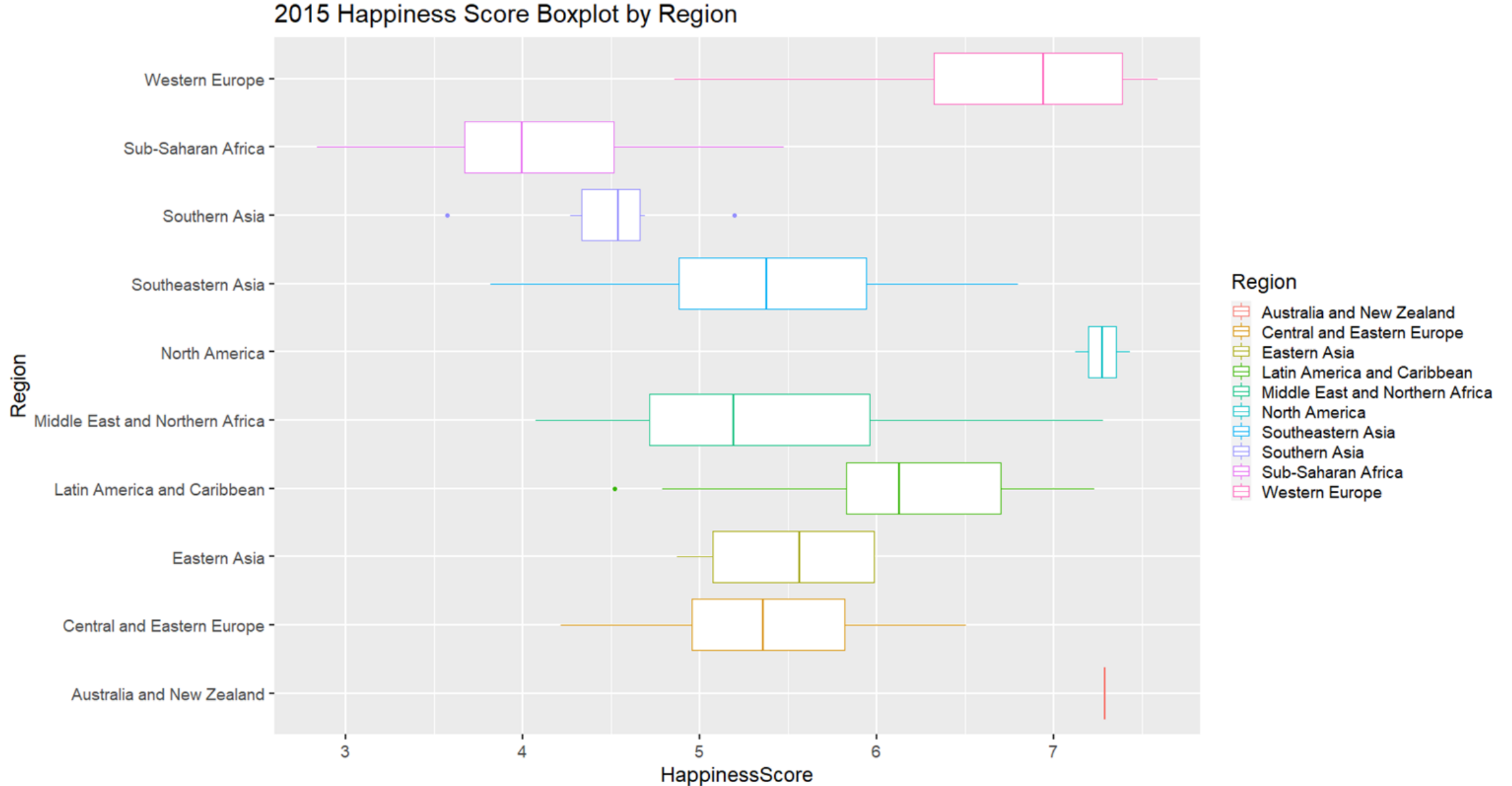
Regional Differences in Happiness

- Some regions differ significantly between each other

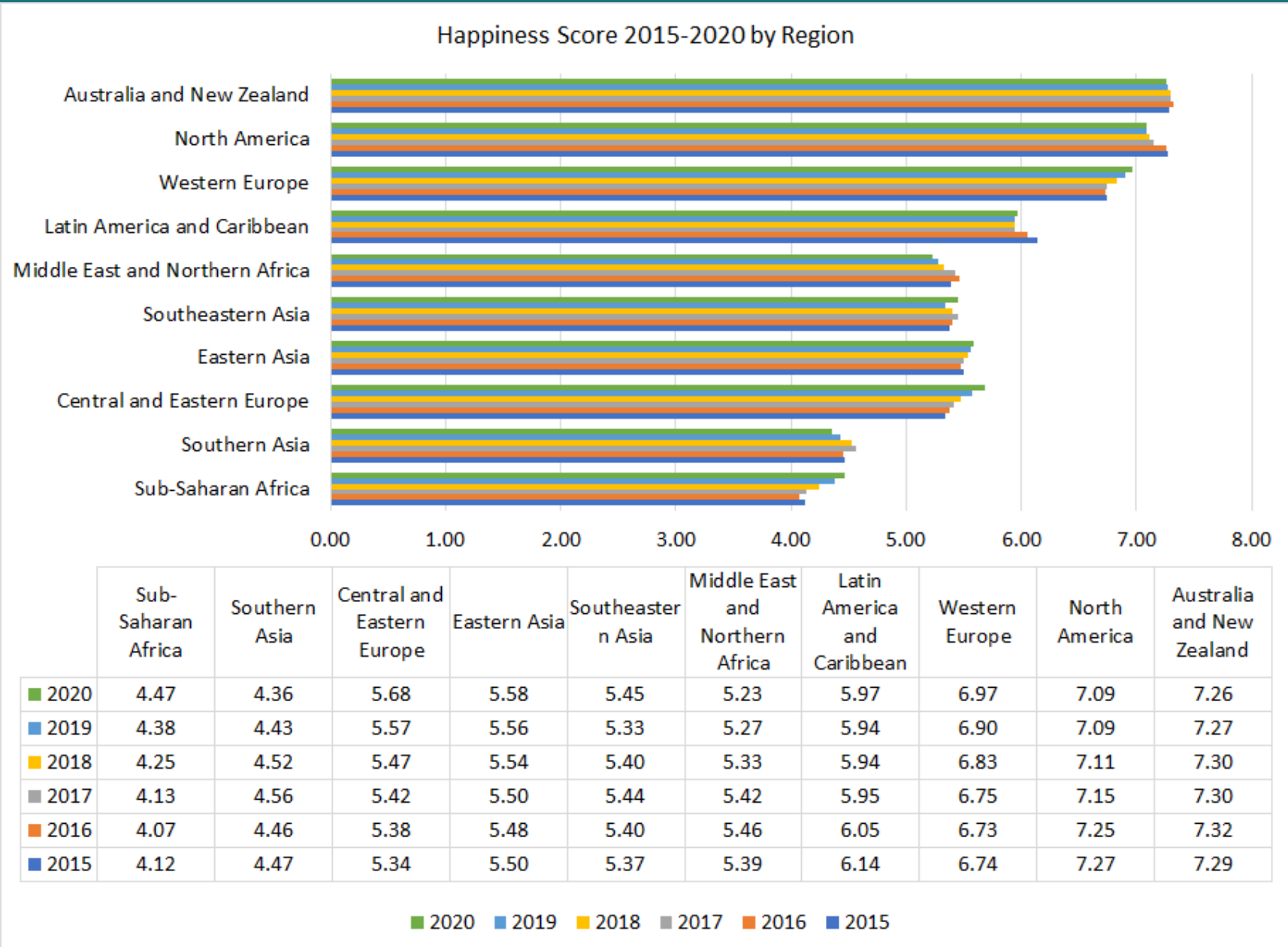- The regions at each end of the spectrum are significantly different

Happiness Score by Country

	Sub-Saharan Africa	Southern Asia	Central & Eastern Europe	Eastern Asia	Southeastern Asia	Middle East & Northern Africa	Latin America & Caribbean	Western Europe	North America	Australia & New Zealand
Sub-Saharan Africa	x									
Southern Asia	-	x								
Central and Eastern Europe	***	-	x							
Eastern Asia	*	-	-	x						
Southeastern Asia	-	-	-	-	x					
Middle East and Northern Africa	**		-	-	-	x				
Latin America and Caribbean	***	**	**	-	-	-	x			
Western Europe	***	***	***	-	-	**	-	x		
North America	-	**	-	-	*	**	-	-	x	
Australia and New Zealand	***	***	***	*	**	***	***	-	-	x

p-value < 0.05= '', <0.01 '**', < 0.001 '***'*

Happiness Scores by Region

2015 Happiness Score Boxplot by Region

2015-2020 Happiness Scores by Region

Happiness Score 2015-2020 by Region

	Sub-Saharan Africa	Southern Asia	Central and Eastern Europe	Eastern Asia	Southeastern Asia	Middle East and Northern Africa	Latin America and Caribbean	Western Europe	North America	Australia and New Zealand
2020	4.47	4.36	5.68	5.58	5.45	5.23	5.97	6.97	7.09	7.26
2019	4.38	4.43	5.57	5.56	5.33	5.27	5.94	6.90	7.09	7.27
2018	4.25	4.52	5.47	5.54	5.40	5.33	5.94	6.83	7.11	7.30
2017	4.13	4.56	5.42	5.50	5.44	5.42	5.95	6.75	7.15	7.30
2016	4.07	4.46	5.38	5.48	5.40	5.46	6.05	6.73	7.25	7.32
2015	4.12	4.47	5.34	5.50	5.37	5.39	6.14	6.74	7.27	7.29

2020 2019 2018 2017 2016 2015

Annual Happiness Score

- Barely any change in overall happiness scores between 2015-2020

Distribution of Happiness Scores by Year
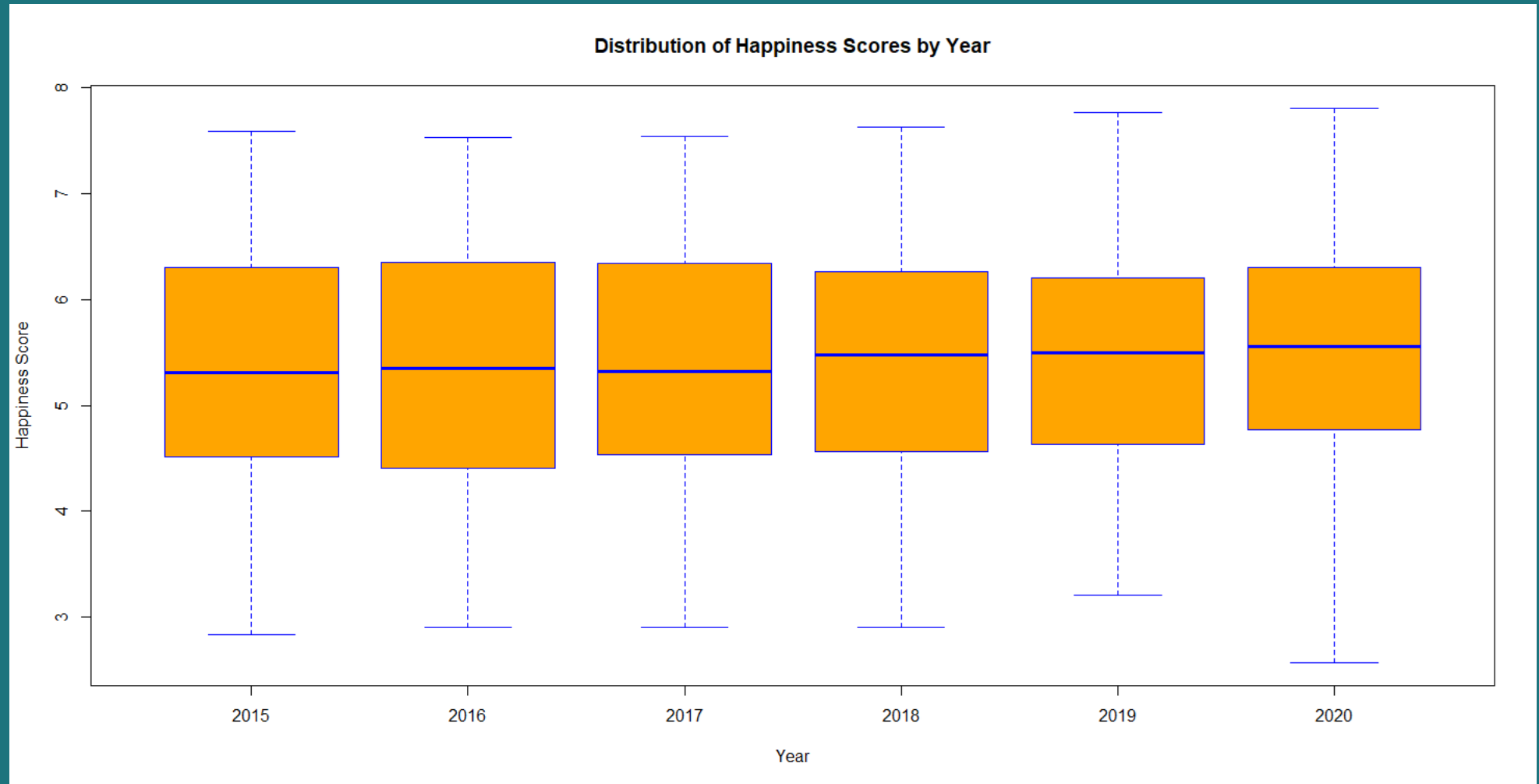
Influential Indicators of Happiness
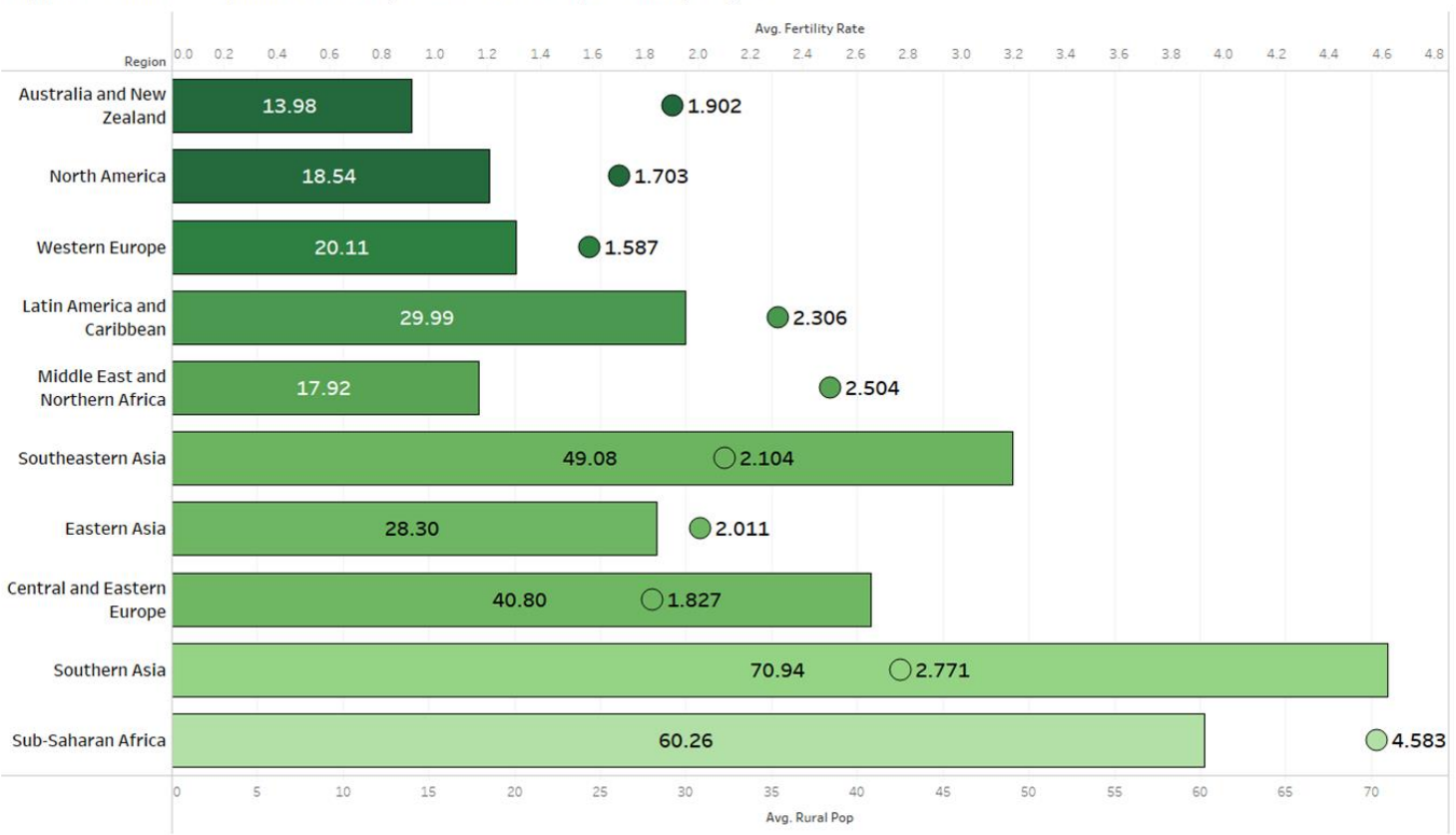
Food	
Undernourishment***	Prevalence of undernourishment (% of population)
FoodInsecurity**	Prevalence of moderate or severe food insecurity in the population (%)
Financial	
HealthExpGov***	Domestic general government health expenditure (% of general government expenditure)
EconomyGDP***	GDP per capita is in terms of Purchasing Power Parity (PPP)
Population Growth/Distribution	
RuralPop**	Rural population (% of total population)
FertilityRate*	Fertility rate, total (births per woman)

p-value < 0.05= '', <0.01 '**', < 0.001 '***'*

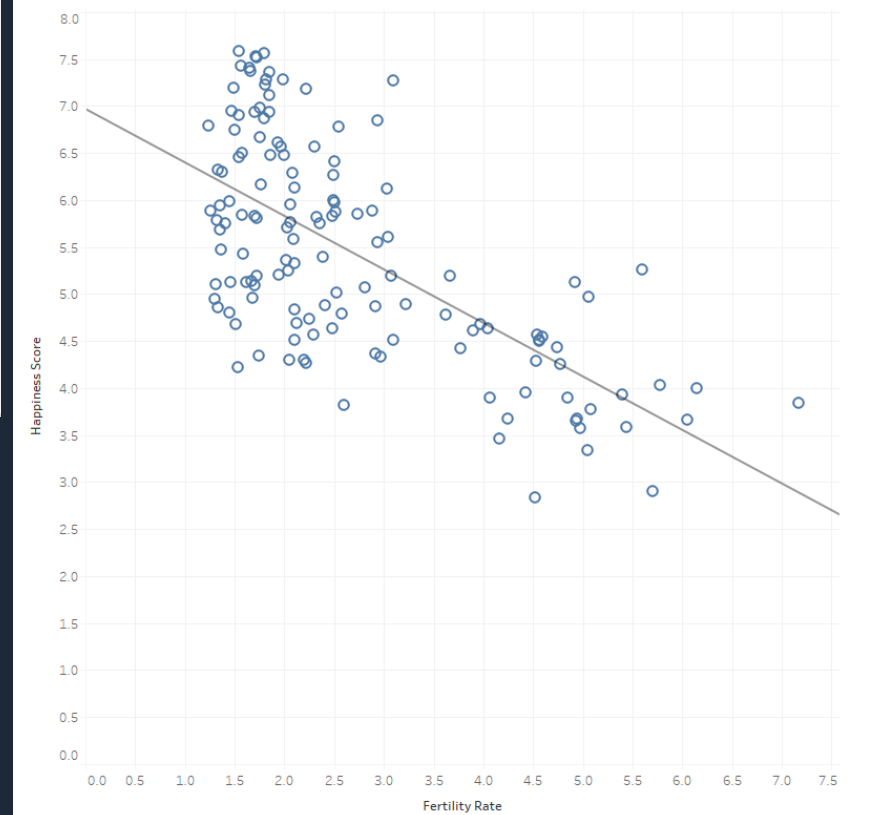Happiness Scores Compared to Food Insecurity and Undernourshment by Region

AVG(Happiness Score)
4.172 — 7.285

Region	Avg. Undernourishment	Avg. Food Insecurity
Australia and New Zealand	2.50	10.40
North America	2.50	7.75
Western Europe	2.74	7.33
Latin America and Caribbean	10.24	28.42
Middle East and Northern Africa	5.83	18.82
Southeastern Asia	10.84	22.85
Eastern Asia	8.17	10.17
Central and Eastern Europe	2.96	14.94
Southern Asia	13.88	35.60
Sub-Saharan Africa	19.32	57.54

Happiness Scores by Health Expenditures of Government Spending

AVG(Happiness Score)
4.172 — 7.285

Region	Avg. Health Exp Gov
Australia and New Zealand	18.06
North America	21.05
Western Europe	14.40
Latin America and Caribbean	14.68
Middle East and Northern Africa	9.13
Southeastern Asia	8.79
Eastern Asia	13.45
Central and Eastern Europe	10.02
Southern Asia	5.14
Sub-Saharan Africa	6.91
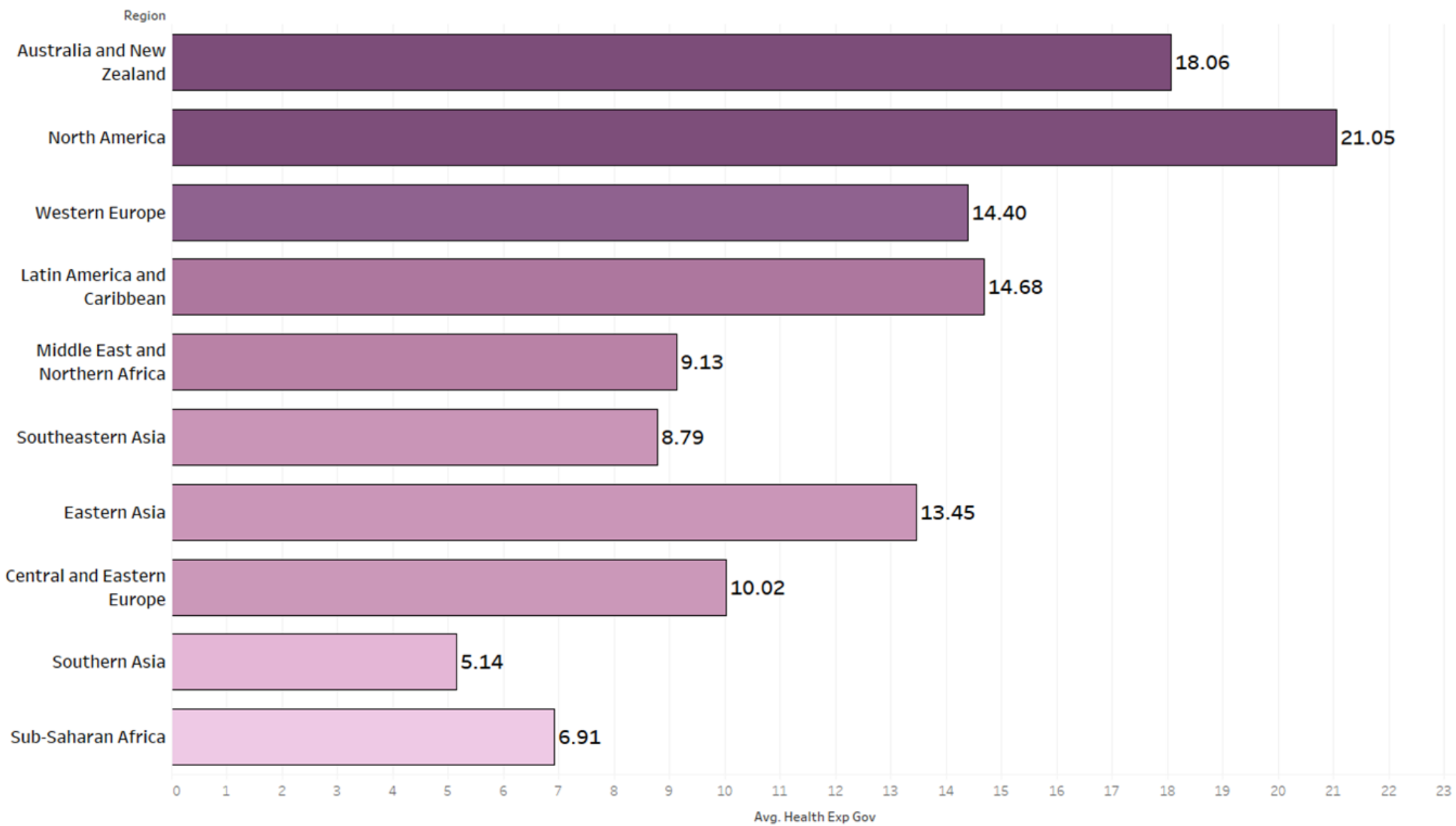
Happiness Scores by Economy (GDP)

AVG(Happiness Score)
4.043 — 7.285

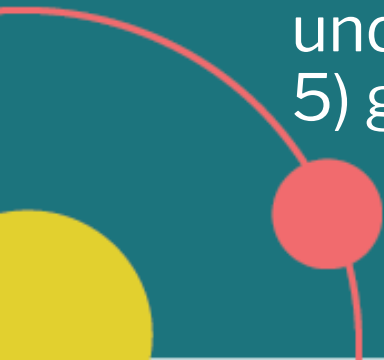| Region	Avg. Economy (GDP per Capita)
Australia and New Zealand	1.292
North America	1.395
Western Europe	1.305
Latin America and Caribbean	0.874
Middle East and Northern Africa	1.180
Southeastern Asia	0.973
Eastern Asia	0.859
Central and Eastern Europe	1.026
Southern Asia	0.584
Sub-Saharan Africa	0.310
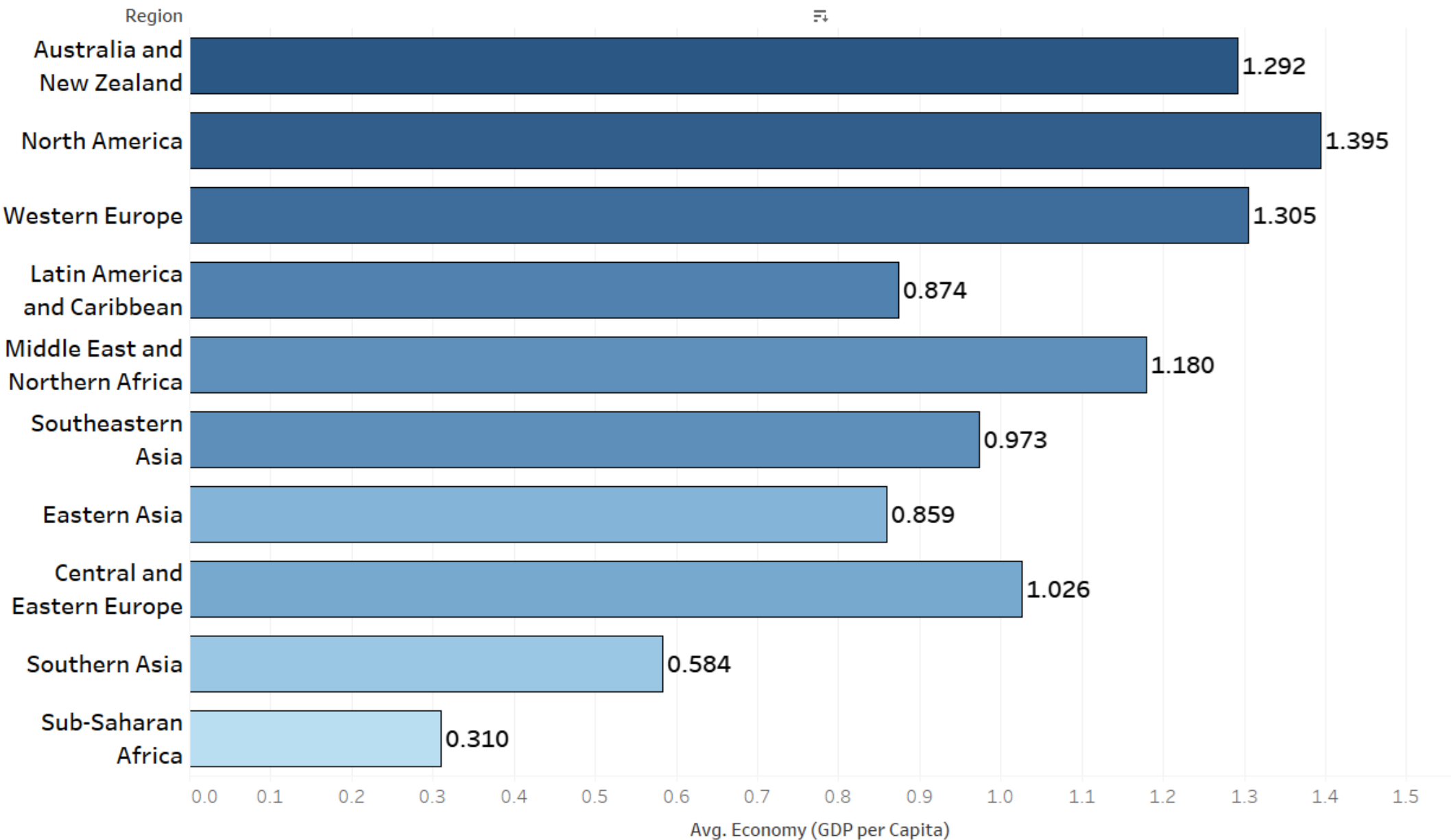
Summary

Change Over Time
- Happiness did not drastically change for any of the regions between 2015-2020

Highest Happiness Scores
- The top 3 countries with the highest happiness scores are: 1) Switzerland, 2) Iceland, 3) Denmark.
- United States was ranked 15th.
- Sub-Saharan Africa was the lowest ranking region.

Influential Variables
- Influential variables that affect happiness: 1) prevalence of undernourishment, 2) food insecurity, 3) rural population, 4) fertility rate, 5) government health expenditures, and 6) economy GDP.

Conclusions

Global Level
- Humanitarian organizations should consider focusing efforts on Sub-Saharan Africa and Southern Asia regions.

National Level
- Policies and programs that support healthcare and food/nutrition likely have a high impact on happiness.
- Rural populations may need greater access and support to healthy foods, healthcare, and financial services.

Individual Level
- If you're thinking about moving abroad, consider moving to Switzerland!

Thank you!

What questions do you have?