Computer Project #2
Happiness Score and Healthy Life Expectancy

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Course # FOUNDATIONS OF BUSINESS STATISTICS

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1. Scope

1.1. Source and Description of Data

This report uses “The World Happiness Report” to study well-being. “The World Happiness Report examines factors contributing to human happiness, how countries rate their happiness, and the importance of measuring happiness.” The report averages responses from about 1,000 surveys conducted in each country over the past three years. This year’s report is a collaboration between Gallup, the Oxford Wellbeing Research Centre, the UN Sustainable Development Solutions Network, and the WHR’s Editorial Board. The Cantril ladder is used to collect this data. The Cantril ladder is a scale from 0 to 10, with 10 being the best life and 0 being the worst life. Respondents are asked to rate their current life on a scale of 0 to 10.

For the detailed dataset used next, the element is country (136 countries), and the complete list of variables is as follows: records of happiness score or "ladder score," social support, healthy life expectancy, freedom of life choices, generosity, perception of corruption, and GDP per capita.

- ✧ Report: https://worldhappiness.report/about/
- ✧ Dataset: https://worldhappiness.report/data/

1.2. Statement of the Research Objective

The primary objective of this project is to select a sample of 30 countries from a population of 136 countries and develop a 95% and a 99% confidence interval for my sample findings. The secondary objective of the project is to use regression and correlation analysis and explore a possible relationship between Happiness Score and Healthy life expectancy. In 6, we will add social support to do the multivariate regression.

2. Sampling Procedure

This research focuses on happiness scores and healthy life expectancy in 136 countries worldwide, as shown in Table 1. Therefore, since there is no need to stratify or cluster by country, Simple Random Sampling is used. This method uses Excel's “=RANDBETWEEN (1, 136)” function. Since there are 136 data elements in this case, 1 to 136 are entered into the function. Using this method, 30 countries are selected. The results are shown in Table 2. With this method, if the same number is selected, the calculation is recalculated and the function is repeated until a different number is obtained.

3. Confidence Intervals and Test of Significance

Usually, when the standard deviation is unknown and standard errors are used, the default is to use the t-distribution, but if the sample size is 30 or more, the central limit theorem allows the sample mean to approximate a normal distribution, so the Z-distribution can be used. In this chapter, we are investigating confidence intervals and tests of significance, and the sample size is 30, so we use the Z-distribution as an approximation.

3.1. Developing a 95% Confidence Interval for Healthy Life Expectancy

Table 3 uses the Traditional Method (Excel) to calculate the data for the 30 countries selected by Simple Random Sampling explained in 2. Here, the sample mean X-bar = 65.65, sample standard deviation S = 4.63, and sample size n = 30 are used, which is information obtained from Table 3. Furthermore, the following results were obtained from Za/2 = 1.960 to develop the 95% Confidence Interval.

the 95% Confidence Interval	Output
M.E	1.66
High End of Interval	67.31
Low End of Interval	63.99

I am 95% confident that the average Healthy life expectancy by all countries is between 63.99 to 67.31 years old. Additionally, I am 95% sure that my sample average (X-bar=65.65 years old) differs from the average of all countries by no more than 1.66 years old.

3.2. Checking if the Population Average for Happiness Score within the Confidence Interval

First, we calculate the Happiness Score 95% Confidence Interval. Table 4 shows sample data for the Happiness Score. From there, X-bar=5.58, S=1.25, n=30. Furthermore, the following results were obtained from Za/2 = 1.960 to develop the 95% Confidence Interval.

the 95% Confidence Interval	Output
M.E	0.45
High End of Interval	6.03
Low End of Interval	5.13

I am 95% confident that the average Happiness Score by all countries is between 5.13 to 6.03. Additionally, I am 95% sure that my sample average (X-bar=5.58) differs from the average of all countries by no more than 0.45.

Next, we investigate the 95% Confidence Interval of the population's Happiness Score. Table 5 shows the data on the population's Happiness Score. From it, we can see that $\mu = 5.54$, $\sigma = 1.14$, and $N = 136$.

Furthermore, the following results were obtained from Za/2 = 1.960 to develop the 95% Confidence Interval.

the 95% Confidence Interval	Output
M.E	0.19
High End of Interval	5.73
Low End of Interval	5.35

From the results, we can see that the confidence interval based on the sample data we just examined [5.13, 6.03] completely contains the confidence interval based on the population Happiness Score [5.35, 5.73]. This indicates that the mean value of the sample data (X-bar=5.58) is very close to the mean value of the population (μ=5.54) and falls within the range estimated for the population mean at the 95% confidence level. Thus, since the 95% confidence interval of the sample data and the 95% confidence interval of the population overlap, we can conclude that the mean value of the sample is not significantly different from the mean value of the population.

3.3. Calculating Sample Size for Halving the Margin of Error for Healthy Life Expectancy (3.1)

From the calculations in 3.1, we find that the margin of error for the sample size Healthy Life Expectancy is 1.66. If we halve this margin of error, the margin of error for Healthy Life Expectancy becomes 0.83. For Healthy Life Expectancy to cut the margin of error in half, we should increase the sample size to 120 countries.

3.4. Developing a 99% Confidence Interval for Healthy Life Expectancy

Table 3 uses the Traditional Method (Excel) to calculate the data for the 30 countries selected by Simple Random Sampling explained in 2. Here, the sample mean X-bar = 65.65, sample standard deviation S = 4.63, and sample size n = 30 are used, which is information obtained from Table 3. Furthermore, the following results were obtained from Za/2 = 2.576 to develop the 99% Confidence Interval.

the 99% Confidence Interval	Output
M.E	2.18
High End of Interval	67.83
Low End of Interval	63.47

I am 99% confident that the average Healthy life expectancy by all countries is between 63.47 to 67.83 years old. Additionally, I am 99% sure that my sample average (X-bar=65.65 years old) differs from the average of all countries by no more than 2.18 years old.

3.5. Calculating Sample Size for Reducing the Margin of Error by 20% for Healthy Life Expectancy (3.4)

From the calculations in 3.4, we find that the margin of error for the sample size Healthy Life Expectancy is 2.18. If we reduce this margin of error by 20%, the margin of error for Healthy Life Expectancy becomes 1.744. For Healthy Life Expectancy to cut the margin of error by 20%, we should increase the sample size to 47 countries.

4. Hypothesis Testing

4.1. Testing the Population Mean of Happiness Score with the P-Value Method

In 4.1, using the P-Value method, we verify whether the population mean of the Happiness Score (μ) is 1.3 times or more than the sample mean. (α= 0.05). As shown in Table 4, the X-bar of the Happiness Score is 5.58, so 1.3 times is 7.254. We then set Ho and Ha.

Ho: μo≥7.254 The population average is at least 1.3 times as large as my sample average.

Ha: μo<7.254 The population average is less than 1.3 times as large as my sample average.

Next, we calculate the P value. Table 4 shows sample data for the Happiness Score. From there, X-bar=5.58, S=1.25, n=30. The results of calculations based on this information are as follows.

	P-Value		(1- P-Value)
P-Value (Lower Tail- Form A)	0%		100%

Since the P-value is 0%, which is less than 5%, we reject the null hypothesis (Ho) and conclude the alternative hypothesis (Ha). There is a 100% chance that the population average is less than 1.3 times as large as my sample average is correct, which means that the sample statistic (X-Bar) is significant.

4.2. Testing the Population Mean of GNI per Capita with P-Value Method

In 4.2, use the P-value method for Logged GDP per capita and test a claim that the population average is exactly 1.1 times as large as my sample average. (α= 0.05). Since X-bar=9.65, 1.1 times 9.65 is 10.615. Ho and Ha are as follows.

Ho: μo=10.615 the population average is exactly 1.1 times as large as my sample average.

Ha: μo≠10.615 The population average differs from 1.1 times as large as my sample average.

Next, we calculate the P value. Table 6 shows sample data for the Logged GDP per capita. From there, X-bar=9.65, S=0.93, n=30. The results of calculations based on this information are as follows.

	P-Value		(1- P-Value)
P-Value (2 Tails- Form C)	0%		100%

Since the P-value is 0%, which is less than 5%, we reject the null hypothesis (Ho) and conclude the alternative hypothesis (Ha). There is a 100% chance that the population average differs from 1.1 times as large as my sample average is correct, which means that the sample statistic (X-Bar) is significant.

5. Regression and Correlation Analysis

In 5, we use Regression and Correlation Analysis to analyze the relationship between happiness score and healthy life expectancy. Let Y be the happiness score and X be the healthy life expectancy.

5.1. Scatter Plot Visualization

In 5.1 we develop a scatter diagram and comment if there appears to be a linear or a non-linear relationship between the Happiness Score and the Healthy life expectancy.

Graph 1 shows a scatter diagram between the Happiness Score and the Healthy life expectancy. For a sample of 30 randomly selected countries, it appears that there direct linear relationship between “Happiness Score” and “Healthy life expectancy”.

5.2. Estimation of Regression Line

In 5.2 we estimate the regression line. Calculate and interpret my findings in detail.

As shown in Table 7, we can see that b0 = -6.93 and b1 = 0.19. If we do not have any Healthy life expectancy, the happiness score is expected to be -6.93. For every additional unit increase in Healthy life expectancy, the Happiness Score is estimated to increase by 0.19.

5.3. Goodness of Fit

In 5.3 we calculate the coefficient of determination and comment on the goodness of fit.

As shown in Table 7, we can see that R Square is 49.79%. For a sample of 30 randomly selected countries, the linear model provides a medium fit to observed data. 49.79% of variations in the happiness score are explained by the variations in the healthy life expectancy. 50.21% of variations in the happiness score are explained by variations in other influencing factors, such as social support, freedom to make life choices, etc.

5.4. Strength of linear relationship

In 5.4 we calculate and interpret the estimated correlation coefficient. Comment on the measure of strength of the linear relationship. As shown in Table 7, we can see that R is 70.56%. For a sample of 30

randomly selected countries, there is a direct strong linear relationship between “happiness score” and “healthy life expectancy”.

5.5. Test of the Strength

In 5.5 we test the significance of the strength of the linear relationship between the two variables at a 1% level of significance. Interpret my findings in detail. First, we explain the settings for Ho and Ha. All data is based on Table 7.

Ho: P=0

For all countries, there is NO direct strong linear relationship between “happiness score” and “healthy life expectancy”

(Our sample finding (r)=70.56% is insignificant)

Ha: P≠0

For all countries, there is a direct strong linear relationship between “happiness score” and “healthy life expectancy”

(Our sample finding (r)=70.56% is significant)

Since our P-Value (0.00%) is less than α =0.01, therefore: Reject the Ho and conclude the Ha. There is strong evidence that there is a direct strong linear relationship between “happiness score” and “healthy life expectancy” (Our sample finding (r)=70.56% is significant)

5.6. Test of the Significance

In 5.6 we test the significance of the linear relationship between the two variables at a 1% level of significance. Interpret your findings in detail. First, we explain the settings for Ho and Ha. All data is based on Table 7.

Ho: β＝0

For all countries, there is NO significant linear relationship between happiness score and healthy life expectancy.

(Our sample finding b1=0.19 is insignificant)

Ha: β≠0

For all countries, there is a significant linear relationship between happiness score and healthy life expectancy.

(Our sample finding b1=0.19 is significant)

Since our P-Value (0.00%) is less than α =0.01, therefore: Reject the Ho and conclude the Ha. There is strong evidence that for all countries, there is a significant linear relationship between happiness score and healthy life expectancy. (Our sample finding b1=0.19 is significant)

5.7. Prediction Step

In 5.7 we use the estimated regression equation and forecast the Happiness Score for France. First, looking at France's healthy life expectancy in Table 1, we see 72,300. Next, as analyzed in 5.2, we see that the estimated regression equation is **Y^ = -6.93 + 0.19 X**. Substituting France's healthy life expectancy into this, we get Y^ = -6.93 + 0.19 (72.3) = 6.807. If the healthy life expectancy for France is 72.300, we expect France to make a 6.807 Happiness Score.

5.8. Develop a Forecast

In 5.8 we develop and interpret a 95% confidence interval for my forecast. The Lower 95% and Upper 95% are all as shown in Table 7. The formula is:

Lower: Y^=-11.81+0.12(72.3) =-3.134

Upper: Y^=-2.06+0.26(72.3) =16.738

I am 95% sure that, the healthy life expectancy for France is 72.300, it is going to make between -3.134 to 16.73 Happiness Score.

5.9. Verify with Actual Data

In 5.9 we use the above confidence interval and verify if the actual Happiness Score for France falls inside the predicted interval. If we check the actual Happiness Score of France in Table 7, we can see that it is 6.661. Therefore, we can see that the Happiness Score of France is within the confidence interval between -3.134 to 16.73 Happiness Score, as calculated in 5.8.

6. Multivariate Regression Analysis

In step 6, multiple regression analysis is performed based on the analysis items in step 5, with the addition of the item of social support. Y is happiness score, X1 is social support, and X2 is healthy life expectancy. The results are shown in Table 8.

6.1. Estimated Regression Line

In 6.1 we estimate the multivariate regression equation between Happiness Score and the combination of Healthy life expectancy and social Support. Referring to Table 8, the following

predictions can be made. If social support and Healthy life expectancy are zero, the happiness score is estimated to be -0.22.

Slope (b1): Δ Y / Δ X1 =7.85

For every additional unit increase in Social Support, the Happiness Score is expected to increase by 7.85, holding Healthy Life Expectancy constant.

Slope (b2): Δ Y / Δ X2 = -0.01

For every additional unit increase in Healthy Life Expectancy, the Happiness Score is expected to decrease by 0.01, holding Social Support constant.

6.2. Test of the Significance of Each Coefficient

In 6.2 we test the significance of the linear relationship between the Happiness Score and the Social Support at a 1% level of significance. First, create the Ho and Ha settings based on Table 8. The following results are obtained.

Ho: β1= 0 For all countries, there is NO significant linear relationship between Happiness Score and Social Support. The sample finding regarding Social Support (b1= 7.85) is insignificant

Ha: β1≠ 0 For all countries, there is a significant linear relationship between Happiness Score and Social Support. The sample finding regarding Social Support (b1= 7.85) is significant

P-values of 0.00% are less than 0.01, Decision: Reject the Ho and conclude the Ha. There is strong evidence that for all countries, there is a significant linear relationship between Happiness Score and Social Support. The sample finding regarding Social Support (b1= 7.85) is significant.

6.3. Test of the Significance of Each Coefficient

In 6.3 we test the significance of the linear relationship between the Happiness Score and the Healthy life expectancy at a 1% level of significance. First, create the Ho and Ha settings based on Table 8. The following results are obtained.

Ho: β2= 0 For all countries, there is NO significant linear relationship between Happiness Score and Healthy life expectancy. The sample finding regarding Healthy life expectancy (b2= -0.01) is insignificant

Ha: β2≠ 0 For all countries, there is a significant linear relationship between Happiness Score and Healthy life expectancy. The sample finding regarding Healthy life expectancy (b2= -0.01) is significant

P-Values of 86.08% is more than 0.01, Decision: Fail to Reject the Ho and can NOT conclude the Ha. With a P-value of 86.08%, there is insufficient evidence to conclude that for all countries, there is a significant linear relationship between Happiness Score and Healthy life expectancy. The sample finding regarding Healthy life expectancy (b2= -0.01) is insignificant

6.4. Test of the Significance of the Multivariate Model as whole

In 6.4, we test the significance of the linear relationship between the Happiness Score and the combined effects of Healthy Life Expectancy and Social Support at a 1% level of significance. First, create the Ho and Ha settings based on Table 8. The following results are obtained.

Ho: β1, β2= 0 For all countries, there is NO significant linear relationship between Happiness Score and the combination of Healthy Life Expectancy and Social Support. The sample finding (b1=7.85, b2=-0.01, are insignificant)

Ha: β1, β2, ≠ 0 For all countries, there is a significant linear relationship between Happiness Score and the combination of Healthy Life Expectancy and Social Support. The sample finding (b1=7.85, b2=-0.01, are significant)

P-values of 0.00% are less than 0.01, Decision: Reject the Ho and conclude the Ha. There is strong evidence that for all countries, there is a significant linear relationship between Happiness Score and the combination of Healthy Life Expectancy and Social Support. The sample findings (b1=7.85, b2=-0.01, are significant).

7. Appendix

Table 1 is data on happiness score or "ladder score," social support, healthy life expectancy, freedom of life choices, generosity, perception of corruption, and GDP per capita. in each Country

Country	Happiness Score	Social support	Healthy life expectar	Freedom to make life choices	Generosity	Perceptions of corruptio	Logged GDP per capita	Country 2	Happiness Score 2	Social support2	Healthy life expectancy 2	Freedom to make life choices2	Generosity2	Perceptions of corruptio	Logged GDP per capita2
Finland	7.804	0.969	71.150	0.961	-0.019	0.182	10.792	Bolivia	5.684	0.811	63.599	0.868	-0.063	0.846	8.985
Denmark	7.586	0.954	71.250	0.934	0.134	0.196	10.962	Russia	5.661	0.889	64.947	0.719	-0.030	0.801	10.210
Iceland	7.530	0.983	72.050	0.936	0.211	0.668	10.896	Bosnia and Herzegovina	5.633	0.880	67.275	0.746	0.206	0.918	9.616
Israel	7.473	0.943	72.697	0.809	-0.023	0.708	10.639	Colombia	5.630	0.822	69.350	0.804	-0.104	0.834	9.584
Netherlands	7.403	0.930	71.550	0.887	0.213	0.379	10.942	Dominican Republic	5.569	0.827	64.399	0.850	-0.099	0.657	9.811
Sweden	7.395	0.939	72.150	0.948	0.165	0.202	10.883	Ecuador	5.559	0.806	69.000	0.802	-0.108	0.833	9.270
Norway	7.315	0.943	71.500	0.947	0.141	0.283	11.088	Peru	5.526	0.798	69.850	0.794	-0.119	0.892	9.402
Switzerland	7.240	0.920	72.900	0.891	0.027	0.266	11.164	Philippines	5.523	0.780	62.038	0.919	-0.060	0.732	8.979
Luxembourg	7.228	0.879	71.675	0.915	0.024	0.345	11.660	Bulgaria	5.466	0.918	66.500	0.801	-0.057	0.911	10.087
New Zealand	7.123	0.952	70.350	0.887	0.175	0.271	10.662	Nepal	5.360	0.748	61.847	0.808	0.146	0.783	8.256
Austria	7.097	0.888	71.150	0.855	0.102	0.497	10.899	Armenia	5.342	0.790	67.789	0.796	-0.155	0.705	9.615
Australia	7.095	0.934	71.050	0.890	0.198	0.496	10.821	Tajikistan	5.330	0.836	62.226	0.832	-0.060	0.522	8.237
Canada	6.961	0.929	71.400	0.874	0.153	0.420	10.773	Algeria	5.329	0.855	66.549	0.571	-0.117	0.717	9.300
Ireland	6.911	0.905	71.300	0.874	0.092	0.358	11.527	Hong Kong S.A.R. of China	5.308	0.817	77.280	0.687	-0.026	0.385	10.966
United States	6.894	0.919	65.850	0.800	0.137	0.689	11.048	Albania	5.277	0.718	69.150	0.794	-0.007	0.878	9.567
Germany	6.892	0.896	71.300	0.846	0.030	0.420	10.879	Indonesia	5.277	0.804	63.048	0.880	0.531	0.876	9.385
Belgium	6.859	0.915	70.899	0.825	0.001	0.549	10.844	South Africa	5.275	0.907	56.989	0.730	-0.087	0.902	9.478
Czechia	6.845	0.953	69.050	0.903	0.040	0.859	10.611	Congo (Brazzaville)	5.267	0.605	56.850	0.730	-0.004	0.739	8.095
United Kingdom	6.796	0.882	70.300	0.852	0.253	0.454	10.704	North Macedonia	5.254	0.805	66.500	0.769	0.131	0.902	9.703
Lithuania	6.763	0.939	67.397	0.748	-0.145	0.805	10.568	Venezuela	5.211	0.839	64.050	0.659	0.128	0.811	5.527
France	6.661	0.909	72.300	0.819	-0.100	0.553	10.701	Laos	5.111	0.679	60.946	0.919	0.091	0.703	8.962
Slovenia	6.650	0.951	71.052	0.913	0.014	0.771	10.588	Georgia	5.109	0.716	64.950	0.786	-0.254	0.649	9.646
Costa Rica	6.609	0.872	70.000	0.895	-0.070	0.768	9.952	Guinea	5.072	0.649	54.185	0.659	0.125	0.787	7.880
Romania	6.589	0.848	67.051	0.856	-0.172	0.929	10.339	Ukraine	5.071	0.878	64.550	0.795	0.240	0.907	9.314
Singapore	6.587	0.878	73.800	0.878	0.063	0.146	11.571	Ivory Coast	5.053	0.572	55.953	0.733	0.003	0.746	8.576
United Arab Emirates	6.571	0.826	66.243	0.942	0.096	0.584	11.145	Gabon	5.035	0.746	58.252	0.642	-0.187	0.786	9.537
Taiwan Province of China	6.535	0.884	69.600	0.804	-0.129	0.681	10.797	Nigeria	4.981	0.740	54.891	0.718	0.073	0.911	8.496
Uruguay	6.494	0.913	67.500	0.895	-0.065	0.575	10.037	Cameroon	4.973	0.686	55.847	0.686	0.015	0.846	8.217
Slovakia	6.469	0.953	68.838	0.753	-0.016	0.898	10.353	Mozambique	4.954	0.692	51.530	0.851	0.047	0.660	7.116
Saudi Arabia	6.463	0.884	64.399	0.894	-0.081	0.691	10.715	Iraq	4.941	0.718	63.415	0.646	-0.005	0.876	9.098
Estonia	6.455	0.946	69.650	0.929	0.032	0.409	10.541	Morocco	4.903	0.553	63.901	0.787	-0.231	0.811	8.973
Spain	6.436	0.932	72.350	0.782	-0.066	0.711	10.540	Iran	4.876	0.778	66.600	0.593	0.173	0.747	9.610
Italy	6.405	0.882	72.050	0.711	-0.074	0.842	10.634	Senegal	4.855	0.629	59.999	0.772	0.011	0.846	8.155
Kosovo	6.368	0.844	65.195	0.861	0.259	0.866	9.359	Mauritania	4.724	0.644	60.475	0.622	-0.013	0.657	8.591
Chile	6.334	0.889	70.300	0.792	-0.011	0.823	10.114	Burkina Faso	4.638	0.663	55.461	0.696	0.095	0.771	7.667
Mexico	6.330	0.804	65.800	0.856	-0.094	0.768	9.850	Namibia	4.631	0.787	56.851	0.669	-0.126	0.830	9.121
Malta	6.300	0.923	71.600	0.886	0.119	0.729	10.661	Turkiye	4.614	0.796	68.663	0.475	-0.077	0.795	10.307
Panama	6.265	0.896	68.950	0.855	-0.133	0.878	10.305	Ghana	4.605	0.641	58.763	0.777	0.139	0.881	8.596
Poland	6.260	0.925	69.049	0.765	-0.031	0.736	10.453	Pakistan	4.555	0.601	57.313	0.766	0.008	0.787	8.540
Nicaragua	6.259	0.853	65.650	0.877	0.021	0.625	8.618	Niger	4.501	0.590	56.550	0.788	0.032	0.734	7.091
Latvia	6.213	0.937	66.400	0.818	-0.056	0.830	10.370	Tunisia	4.497	0.730	67.000	0.576	-0.213	0.907	9.244
Bahrain	6.173	0.844	65.825	0.944	0.117	0.737	10.776	Kenya	4.487	0.690	58.499	0.696	0.288	0.852	8.458
Guatemala	6.150	0.812	62.900	0.856	-0.057	0.837	9.116	Sri Lanka	4.442	0.826	67.150	0.787	-0.030	0.808	9.491
Kazakhstan	6.144	0.931	65.802	0.853	0.000	0.721	10.166	Uganda	4.432	0.794	58.913	0.701	0.114	0.857	7.716
Serbia	6.144	0.873	67.088	0.845	0.204	0.816	9.854	Chad	4.397	0.722	53.125	0.677	0.221	0.807	7.261
Cyprus	6.130	0.826	72.802	0.724	-0.060	0.860	10.611	Cambodia	4.393	0.747	61.900	0.958	0.073	0.857	8.385
Japan	6.129	0.894	74.349	0.799	-0.237	0.640	10.616	Benin	4.374	0.437	56.095	0.743	-0.043	0.576	8.103
Croatia	6.125	0.917	68.950	0.757	-0.093	0.925	10.341	Myanmar	4.372	0.787	61.388	0.727	0.491	0.658	8.404
Brazil	6.125	0.836	65.749	0.801	-0.009	0.738	9.582	Bangladesh	4.282	0.544	64.548	0.845	0.005	0.698	8.685
El Salvador	6.122	0.755	65.597	0.918	-0.108	0.620	9.089	Gambia	4.279	0.584	57.900	0.596	0.364	0.883	7.648
Hungary	6.041	0.943	67.500	0.758	-0.059	0.839	10.419	Mali	4.198	0.593	55.403	0.713	-0.028	0.846	7.655
Argentina	6.024	0.891	67.200	0.823	-0.089	0.814	9.959	Egypt	4.170	0.726	63.503	0.732	-0.183	0.580	9.367
Honduras	6.023	0.766	64.063	0.843	0.097	0.843	8.635	Togo	4.137	0.595	57.449	0.657	0.024	0.740	7.673
Uzbekistan	6.014	0.875	65.301	0.938	0.230	0.638	8.948	Jordan	4.120	0.729	67.600	0.770	-0.150	0.687	9.130
Malaysia	6.012	0.799	65.662	0.877	0.160	0.758	10.169	Ethiopia	4.091	0.782	60.698	0.720	0.273	0.789	7.739
Portugal	5.968	0.878	71.250	0.902	-0.196	0.878	10.429	Liberia	4.042	0.596	56.700	0.735	0.154	0.830	7.277
South Korea	5.951	0.812	73.650	0.717	-0.046	0.701	10.693	India	4.036	0.608	60.777	0.897	0.072	0.774	8.759
Greece	5.931	0.835	71.150	0.568	-0.240	0.793	10.288	Madagascar	4.019	0.650	58.050	0.522	0.075	0.742	7.290
Mauritius	5.902	0.888	63.850	0.813	-0.028	0.775	9.957	Zambia	3.982	0.694	55.032	0.791	0.098	0.818	8.074
Thailand	5.843	0.874	68.450	0.850	0.289	0.910	9.751	Tanzania	3.694	0.653	59.401	0.838	0.182	0.554	7.857
Mongolia	5.840	0.933	60.500	0.701	0.190	0.849	9.372	Comoros	3.545	0.471	59.425	0.470	-0.014	0.727	8.075
Kyrgyzstan	5.825	0.911	66.852	0.934	0.181	0.904	8.486	Malawi	3.495	0.531	58.475	0.750	0.005	0.749	7.302
Moldova	5.819	0.857	65.299	0.840	-0.080	0.901	9.499	Botswana	3.435	0.753	54.725	0.742	-0.215	0.830	9.629
China	5.818	0.836	68.689	0.882	-0.041	0.727	9.738	Congo (Kinshasa)	3.207	0.652	55.375	0.664	0.086	0.834	7.007
Vietnam	5.763	0.821	65.502	0.939	-0.004	0.759	9.287	Zimbabwe	3.204	0.690	54.050	0.654	-0.046	0.766	7.641
Paraguay	5.738	0.906	65.900	0.891	0.021	0.843	9.510	Sierra Leone	3.138	0.555	54.900	0.660	0.105	0.858	7.394
Montenegro	5.722	0.890	67.100	0.805	0.063	0.844	9.813	Lebanon	2.392	0.530	66.149	0.474	-0.141	0.891	9.478
Jamaica	5.703	0.867	66.600	0.822	-0.106	0.875	9.165	Afghanistan	1.859	0.341	54.712	0.382	-0.081	0.847	7.324

Table 2 is based on Table 1, which shows that 30 countries were selected using Simple Random Sampling.

nu	Country	Happiness Score	Social support	Healthy life expectancy	Freedom to make life choices	Generosity	Perceptions of corruption	Logged GDP per capita
29	Slovakia	6.469	0.953	68.838	0.753	-0.016	0.898	10.353
49	Brazil	6.125	0.836	65.749	0.801	-0.009	0.738	9.582
35	Chile	6.334	0.889	70.300	0.792	-0.011	0.823	10.114
54	Uzbekistan	6.014	0.875	65.301	0.938	0.230	0.638	8.948
46	Cyprus	6.130	0.826	72.802	0.724	-0.060	0.860	10.611
107	Pakistan	4.555	0.601	57.313	0.766	0.008	0.787	8.540
101	Senegal	4.855	0.629	59.999	0.772	0.011	0.846	8.155
136	Afghanistan	1.859	0.341	54.712	0.382	-0.081	0.847	7.324
125	India	4.036	0.608	60.777	0.897	0.072	0.774	8.759
76	Philippines	5.523	0.780	62.038	0.919	-0.060	0.732	8.979
34	Kosovo	6.368	0.844	65.195	0.861	0.259	0.866	9.359
65	Vietnam	5.763	0.821	65.502	0.939	-0.004	0.759	9.287
109	Tunisia	4.497	0.730	67.000	0.576	-0.213	0.907	9.244
45	Serbia	6.144	0.873	67.088	0.845	0.204	0.816	9.854
135	Lebanon	2.392	0.530	66.149	0.474	-0.141	0.891	9.478
27	Taiwan Province of China	6.535	0.884	69.600	0.804	-0.129	0.681	10.797
3	Iceland	7.530	0.983	72.050	0.936	0.211	0.668	10.896
42	Bahrain	6.173	0.844	65.825	0.944	0.117	0.737	10.776
99	Morocco	4.903	0.553	63.901	0.787	-0.231	0.811	8.973
48	Croatia	6.125	0.917	68.950	0.757	-0.093	0.925	10.341
10	New Zealand	7.123	0.952	70.350	0.887	0.175	0.271	10.662
89	Laos	5.111	0.679	60.946	0.919	0.091	0.703	8.962
116	Ghana	4.605	0.641	58.763	0.777	0.139	0.881	8.596
11	Austria	7.097	0.888	71.150	0.855	0.102	0.497	10.899
63	Moldova	5.819	0.857	65.299	0.840	-0.080	0.901	9.499
66	Paraguay	5.738	0.906	65.900	0.891	0.021	0.843	9.510
47	Japan	6.129	0.894	74.349	0.799	-0.237	0.640	10.616
84	Indonesia	5.277	0.804	63.048	0.880	0.531	0.876	9.385
73	Dominican Republic	5.569	0.827	64.399	0.850	-0.099	0.657	9.811
26	United Arab Emirates	6.571	0.826	66.243	0.942	0.096	0.584	11.145

Table 3. Healthy life expectancy of the numerical values for each item using sample data

Table 3	Sample Data
Healthy life expectancy	
Mean	65.65
Standard Error	0.85
Median	65.79
Mode	#N/A
Standard Deviation	4.63
Sample Variance	21.46
Kurtosis	-0.02
Skewness	-0.33
Range	19.64
Minimum	54.71
Maximum	74.35
Sum	1969.53
Count	30

Table 4 Happiness Score of the numerical values for each item using sample data

Table 4	Sample Data
Happiness Score	
Mean	5.58
Standard Error	0.23
Median	5.92
Mode	#N/A
Standard Deviation	1.25
Sample Variance	1.57
Kurtosis	2.44
Skewness	-1.37
Range	5.67
Minimum	1.86
Maximum	7.53
Sum	167.37
Count	30

Table 5 Happiness Score of the numerical values for each item using population data

Table 5	population data
Happiness Score	
Mean	5.54
Standard Error	0.10
Median	5.69
Mode	#N/A
Standard Deviation	1.14
Sample Variance	1.31
Kurtosis	0.06
Skewness	-0.47
Range	5.95
Minimum	1.86
Maximum	7.80
Sum	754.04
Count	136.00

Table 6 Logged GDP per capita of the numerical values for each item using sample data

Table 6	Sample Data
Logged GDP per capita	
Mean	9.65
Standard Error	0.17
Median	9.50
Mode	#N/A
Standard Deviation	0.93
Sample Variance	0.87
Kurtosis	-0.26
Skewness	-0.31
Range	3.82
Minimum	7.32
Maximum	11.15
Sum	289.45
Count	30

Table 7 Calculate Simple Linear regression-r-statistics using Excel (for 30 randomly selected countries)

SUMMARY OUTPUT								
Regression Statistics		1-R Square						
Multiple R	70.56%							
R Square	49.79%	50.21%						
Adjusted R Square	0.479939654							
Standard Error	0.902254783							
Observations	30							
ANOVA								
	df	SS	MS	F	Significance F	1-P-value		
Regression	1	22.60065455	22.6006545	27.7627595	0.00%	100.00%		
Residual	28	22.79378344	0.81406369					
Total	29	45.39443799						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-6.93	2.380177444	-2.91249174	0.70%	-11.81	-2.06	-11.80781961	-2.056674662
Healthy life expectancy X	0.19	0.036168011	5.26903781	0.00%	0.12	0.26	0.116483805	0.264657429
	Y^ = -6.93 + 0.19 X.				Y=-11.81+0.12()	Y=-2.06+0.26()		

Table 8 Calculate multivariate regression-r-statistics using Excel (for 30 randomly selected countries)

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	92.17%								
R Square	84.95%								
Adjusted R Square	83.84%								
Standard Error	0.503006345								
Observations	30								
ANOVA									
	df	SS	MS	F	Significance F	1-P-value			
Regression	2	38.56302265	19.2815113	76.21	0.00%	100.00%			
Residual	27	6.831415334	0.25301538						
Total	29	45.39443799							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	1-P-value
Intercept	-0.22	1.572977936	-0.14187168	88.82%	-3.45	3.00	-3.450645156	3.004323107	11.18%
Social supportX1	7.85	0.988262931	7.94282873	0.00%	5.82	9.88	5.821855158	9.877351238	100.00%
Healthy life expectancy X2	-0.01	0.031887954	-0.1770601	86.08%	-0.07	0.06	-0.071074762	0.059782593	13.92%
	Y^=-0.22+7.85X1+-0.01X2								