Factors Affecting Quality of Life

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Introduction

Background Information

How does one know if they are living their best life? It is difficult to determine as there are countless elements that affect a person and subsequently the way their life is lived. This idea can be assigned the title of "quality of life" as it is a measure of whether or not certain societal expectations that lead to a good life, are being met. This measurement highlights the negative and positive features of life and how it generally affects individuals as a part of a group. However, each individual interprets these expectations in their own way; every inhabitant assigns their own level of importance to these expectations which makes it difficult to establish set and accurate values. Many of these expectations revolve around the location in which one has inhabited; the day-to-day experience of an inhabitant is reliant on what their location can offer and provide them with ("Quality of Life"). These locations can be classified as the different countries around the world as that is how people have been separated leading to the formation of groups that encounter different experiences.

Rationale

The world is constantly changing as different series of events are taking place which have an altered impact on each country. Due to these positive or negative impacts, these countries inevitably fall prey to the socially developed criteria and expectations of the people; these impacts may improve or worsen the standings of these countries. As a result, these locations are persistently falling and rising in ranks of the "best" country. As humans, we seek that of which enables us not only to survive but, to thrive. So, it is human nature to be curious as to which country will be successful in providing the highest level of life satisfaction. Since the quality of life is comprehended by people in their own way, it is interesting to observe which factors are taken into consideration when dubbing a country the "best" place to live.

Thesis

It is hypothesized that many factors can affect a citizen's experience of life. However, the question that remains is which country is the most successful in delivering these demands as measured through the quality of life of its inhabitants. This can be done by finding trends between various factors and the quality of life as the strength or weakness of these relationships will aid in determining its worth as an impactful factor. To classify a country as the "perfect place to live", the effects of different factors on the quality of life of the citizens will be compared in a 34 different countries.

Potential Factors

Due to the fact that the quality of life in a country is interpreted by people in different ways, results in numerous possible factors to determine which country truly ranks the highest. A factor that is hypothesized to hold value in calculating the quality of life is life expectancy. This is significant as an increased amount of time to live is an ultimate goal seeked out by the vast majority of humans, perhaps, resulting in a high quality of life. Another possible factor that can be taken into consideration are the crime rates in a country. This is an important factor as it indicates the level of safety in a country and notes the dangers which might not be ideal for the successful experience of a citizen; criminal activity has an impact on the mental and physical health of the citizens so, countries with high rates of criminal activity could result in a low quality of life (Trueman, 2019). Another potential factor is the population density in a country. A densely populated country results in congestion such as traffic which decreases the chances of open roads and sidewalks. It also limits the distribution of wealth and resources which all leads back to the life of the citizens (Pettinger, 2017). Lasty, unemployment rate can be take into consideration as a factor. This is because everything in this world costs money and without a source of income, a citizen can not purchase necessities such as food, let alone extra benefits which in themselves may improve the

experience of life (Seidel, 2018). These factors have not been used as the final three that will be further investigated and compared to the quality of life, however, they have been used in small comparisons throughout the report. This is because these factors may still contribute to a person's quality of life internally or externally through indirect or direct methods. Those who live in a country that offers them what they desire, tend to be happy, therefore, raising the quality of their life as they are satisfied through the successful completion of their criteria.

List of Other Potential Factors

GDP	Tourism Rates	Drug rates vs how many crimes involve drugs	Unemployment rate
Employment rate	Crime rates	House prices	Salary of government officials
Clean drinking water	Air quality index	Alcohol consumption	Weather
Country defense	Weapons per household	Education	Healthy food production
Recreational infrastructure	Level of happiness	Public transportation	Avg. Income per Person
Population	Life Expectancy	Death Rates	Exercise Habits

Main Factors

The three factors that will be investigated include the number of tourist arrivals, pollution levels, and the affordability of houses in a country. This is because they may not seem to be the most obvious variables that hold significant value in determining the quality of life. The number of tourist arrivals is an exceptionally important variable as it can affect the country's economy, society and environment and ultimately, the citizens. The pollution levels in a country may contribute to the health of the inhabitants as oxygen is a human necessity provided by the air and so, if the quality of air decreases, so does the quality of the oxygen. The third variable that will be analyzed is the affordability of houses in a country. This will indicate how much of the income goes towards paying for a house and subsequently towards leisure activities and goods; it can be argued that these activities and goods contribute to a high quality of life. Series of analyses will display the type of relationship these factors have with the quality of life.

Bias

Obtaining data through online databases leaves opportunity for bias that would over or under represent a parameter. First, the measurement for the quality of life is in the form of an index and this data was retrieved by Numbeo, which is a large database with information from many cities and countries around the world. The method of collecting information for the quality of life can be classified as measurement bias; the factors included in predicting this number are purchasing power index, pollution index, house price to income ratio, cost of living index, safety index, health care index, traffic commute index, and climate index. This does not take into account the numerous other factors that contribute to the quality of life which may over or underestimate the quality of life in these countries. Also, there is measurement bias within these factors themselves which is evident through the safety index as it is difficult to obtain information on how safe a citizen feels in their country. Second, the data used for the tourist arrivals was obtained from Trading Economics. This is also an example of measurement bias as

countries are sending their own numbers of tourist arrivals as opposed to a global organization that calculates these numbers in a fixed formula for each country. This method may be subjective as these countries have the power to change their results and present a skewed tourist arrival number. Third, the measure of pollution levels in these countries was in the form of an index which was found on Numbeo as well. These numbers were obtained through government surveys; this would allow an opportunity for countries to alter their findings as to make their country seem appealing. Also, there is only a small number of factors that were used in calculating the pollution index such as air and water pollution; this does not take into account other factors that may be impactful as well. Lastly, the data used for the affordability ratio was also from Numbeo. The way this data has been collected is an example of measurement bias as it may not have been the most accurate method. This method assumed that all of the mortgage is taken on 20 years for a 90 square metre house. This does not consider mortgages that are not taken on 100% and over longer or shorter periods of time. Also, this method dismisses the chances of smaller or larger homes as the sizes of homes vary not only from country to country but, from city to city as well. Due to this, there will be an inaccurate display of the level of affordability in the multiple countries. It is difficult to gather a large amount of information efficiently which is why indices and averages are utilized, however, this may result in an inaccurate representation.

Topic Variable: Quality of Life

One Variable Analysis

Justification for Choice

It is difficult to convert a citizen's experience of life in their country to a numerical value which is why an index is being used. This quantitative and continuous value will display a rank for each country in terms of the quality of life from highest to lowest. The database from which this data has been obtained, has assigned weights to different factors such as the safety index or the pollution levels in determining the overall quality of life in a country instead of the utilization of a base amount. These countries are categorized in a histogram chart to investigate common factors and trends that are experienced by countries with similar index values.

Figure 1: Histogram Chart - Countries categorized based on their quality of life

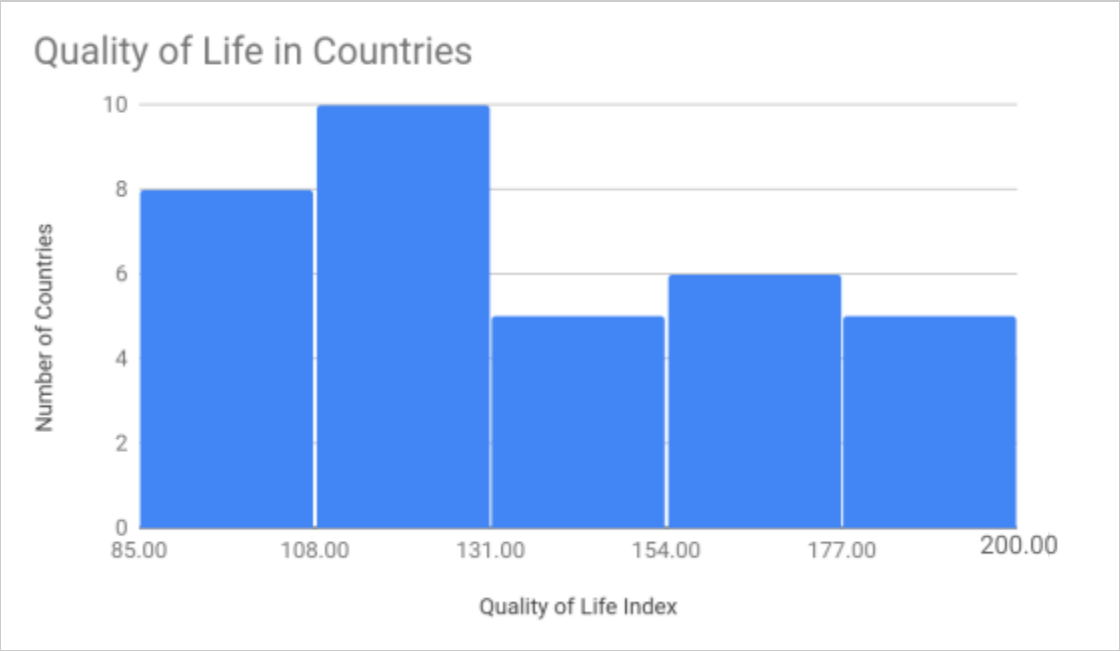


Figure 2: Table - Specified values for certain countries from the histogram

Countries	**Malaysia**	**Argentina**
Quality of Life Index	122.11	122.49
Purchasing Power Index	72.86	52.77
Safety Index	39.15	37.40
Health Care Index	67.59	69.82
Cost of Living Index	38.86	34.36
Property Price to Income Ratio	9.27	20.96
Traffic Commute Time Index	35.66	42.03
Pollution Index	63.02	51.79

Identified Trend

This histogram is bimodally distributed and shows that the modal interval is from the index value of 108 to 131. Two countries that lie within this range are Malaysia and Argentina. These countries have been chosen in this comparison as they have an almost identical quality of life index value. From looking at the values used to calculate this index, it is clear that these countries also share similarities in those values which resulted in a similar index value. A factor that was taken into consideration in determining the quality of life index by the database was the safety index. The safety index values for both these countries are especially close which may be because of their similar crime rates; Malaysia experiences 2.3 homicides per 100,000 people every year and Argentina experiences 5.5. These values are significantly close as there are many other factors that can contribute to the safety experienced by inhabitants of a country.

Figure 3: Table - Measures of central tendencies and spread for quality of life data set

Mean:	135.56
Median:	127.37
Range:	111.55
Quartiles:	**Q1:** 108.36 **Q2:** 127.37 **Q3:** 162.09
Interquartile Range:	**Q3 - Q1** = 53.73
Standard Deviation:	31.54

This table shows the central tendencies and spread of the quality of life index for 34 countries around the world. Since, the mean is only slightly larger than the median, it is indicated that the outliers have not had a large impact on the overall trend. Along with this, the interquartile range value is roughly half of the range value suggesting that both halves of the data are similarly spread. The standard deviation shows that the data has diverged from the mean value moderately. These measurements show that there is somewhat a variance within this data set.

Figure 4: Box and Whisker Plot - Quality of life data set

As shown on the box and whisker plot, the box is greatly elongated which means that 50% of the data is widely spread out. Specifically, the lengthening of the third and fourth quarter indicates that compared to the other quarters, the data values are not as compressed. It is clear where 50% of the data lies which is why the elongation of the last quarter can be a result of an outlier.

Variable 1: Number of Tourist Arrivals

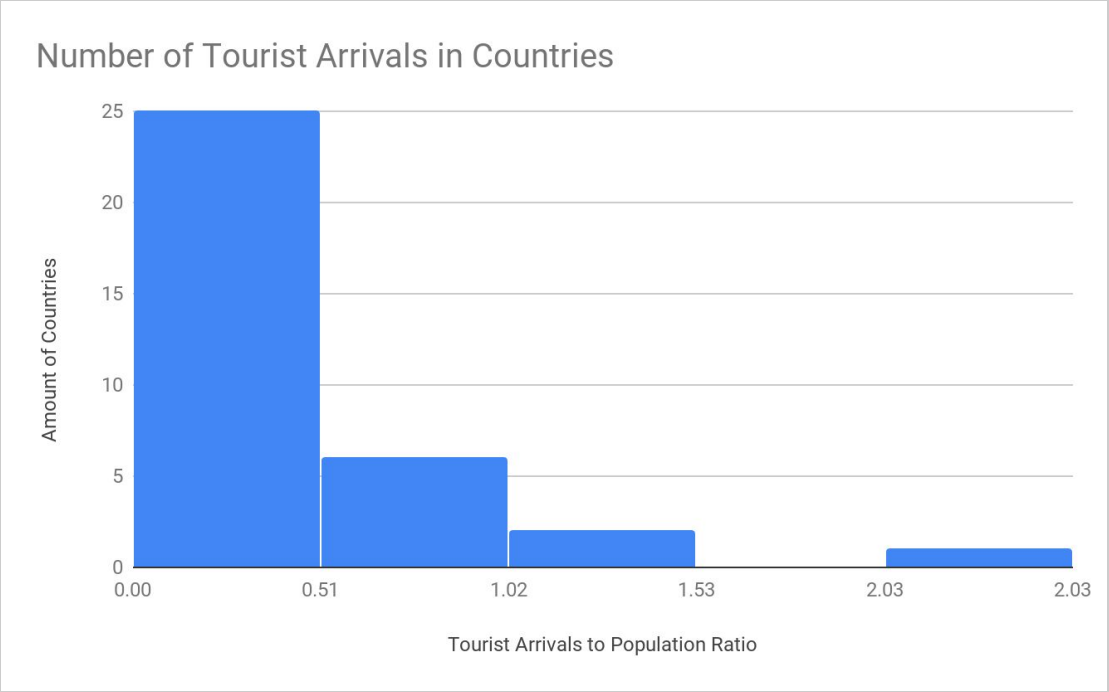
One Variable Analysis

Presumably, the number of tourists a country receives is a factor that impacts the well-being of its residents. It can be assumed that the increase in tourist arrivals positively impacts a country and subsequently, the life of the inhabitants that actually run and make up the country. This variable is investigated further through a series of analyses on 34 different countries around the world.

Justification for Choice

To accurately compare the number of tourist arrivals between countries, this number is compared to the countries population which results in a quantitative and continuous variable. This is to maintain the importance of factors such as the physical size of the country, the number of present inhabitants and subsequently, the population density. In order to do this, the number of tourists a country receives is divided by the country's population which displays the number of tourist arrivals as a ratio of the population. A histogram chart best represents this factor as it clearly categorizes countries by the number of tourists they receive. This information leads to the investigation of common factors within these countries that result in similar tourist arrivals and factors that place countries in the distant ranges as well.

Figure 5: Histogram Chart - Countries categorized by their tourist arrival to population ratio



Identified Trends

As seen from this histogram, the modal interval for these countries are the ratios from 0 to 0.51 and it is displayed to be positively skewed. There are many similarities that can be drawn from these countries that make them lie within this range. For example, Ireland and Panama have ratio values of 0.4181 and 0.4361. First, Ireland has a population of 4,847,139 and Panama has a population of 4,226,197 which are very close to each other. This is caused by the similarity in the physical sizes of these countries; Ireland has a total area of 84,421 kilometres squared and Panama has a total area of 75, 517 kilometres squared which allows for space for roughly the same number of inhabitants. Along with this, they have similar numbers in tourist arrivals with Ireland having a value of 2,026,700 and Panama having a value of 1,843,000. This similarity is due to their immense geographical beauty resulting in multiple rankings on

tourism sites such as Conde Nast Traveler and Lonely Planet. The ratio of these countries are similar due to the resemblance of values in both their populations and their tourist arrivals.

On the other end of this spectrum is Denmark with a ratio of 2.03. This shows that Denmark has many more tourist arrivals compared to the number of inhabitants. This country has a total area of 42,933 kilometres squared which is much smaller than the areas of Panama and Ireland; this accounts for its comparingly smaller population of 5,775,224. The amount of tourists they receive is 11,743,000 which is double their population supporting the ratio value. This histogram displays countries such as Ireland and Panama lower on the scale than Denmark due to the fewer amount of tourists they receive in comparison to their overall population.

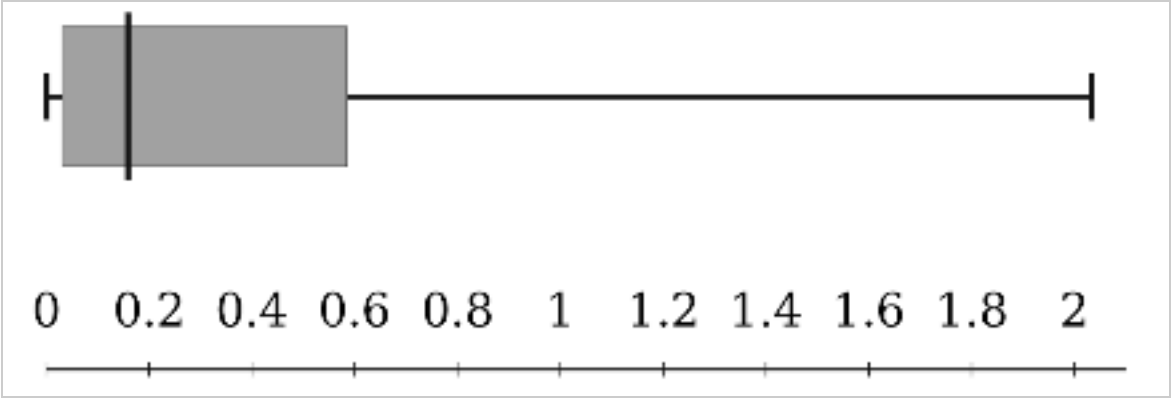
Figure 6: Table - Measures of central tendency and spread for tourist arrival data set

Mean:	0.35
Median:	0.16
Range:	2.03
Quartiles:	**Q1:** 0.03 **Q2:** 0.16 **Q3:** 0.59
Interquartile Range:	**Q3-Q1** = 0.55
Standard Deviation:	0.45

From these numbers, it is evident that the mean value is higher than that of the median by a small amount. This indicates that the outliers have slightly deviated the mean from accurately representing the majority of the data. The significantly large range suggests that the data set has a wide variety of values. It is proven by the moderate interquartile range that the spread of the data within 50% of the points is not extremely small or big. Since, the range value is much larger than the interquartile range, it is evident that

there are a number of outliers. The standard deviation proves that there is variance of data from the average value, perhaps as a result of the outliers. It is evident through these measurements that overall these ratios follow a similar path with the exception of a few outliers.

Figure 7: Box and Whisker Plot - Tourist arrivals to population ratio data set



As shown on the box and whisker plot, the fourth quarter is much longer in comparison to the other three quarters indicating that the values in the fourth quarter are spread out wider. The elongation of the fourth quarter when it is also visible that 50% of the data lies within 0.03 and 0.59, indicates that there are outliers as the cause of this stretch. The first quarter is extremely compressed indicating that the values in that section are not as spread out.

Two Variable Analysis

Correlation

This scatter plot displays the relationship between the number of tourists a country receives. in comparison to their population, to the quality of life experienced by citizens in that country. The independent variable is the tourist arrivals to population ratio as it was hypothesized that any changes to this number will affect the well-being of the inhabitants; as a result, the dependent variable is the quality of life as measured in an index.

Figure 8: Linear Scatter Plot - Comparing tourist arrivals and quality of life with outliers

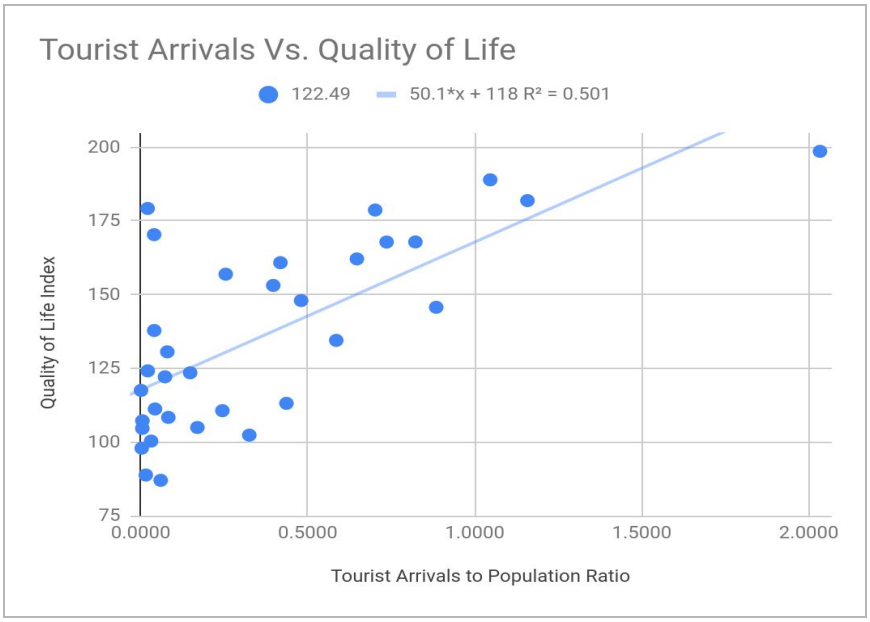


Figure 9: Table - Tourist arrival and quality of life linear trend analysis with outliers

Trendline	Linear
Equation for Line of Best Fit	y = 50.1x + 118
Coefficient of Determination	0.501
Correlation Coefficient	0.71

This table shows the line of best fit which will aid in extrapolation for quality of life and tourist arrival values. The coefficient of determination indicates that roughly 50% of the variance in the quality of life is predicted by changes in the number of tourist arrivals. This is a reasonable amount seeing as there are many other factors that affect the experience of living in a country of which half have been accounted for. The correlation coefficient is above 0.6 indicating that there is a strong positive correlation between the quality of life and the number of tourists which proves that a linear model is an accurate way to present this analysis. This also agrees with the hypothesized end behavior: as the number of tourists increase, so does the quality of life at a constant rate.

Outliers

The outliers that deprived the analysis from accurately representing this relationship are Canada, United States, and Denmark. These countries did not meet some of the characteristics that the majority of the countries met in order to align themselves with the line of best fit.

Figure 10: Linear Scatter Plot - Comparing tourist arrivals and quality of life without outliers

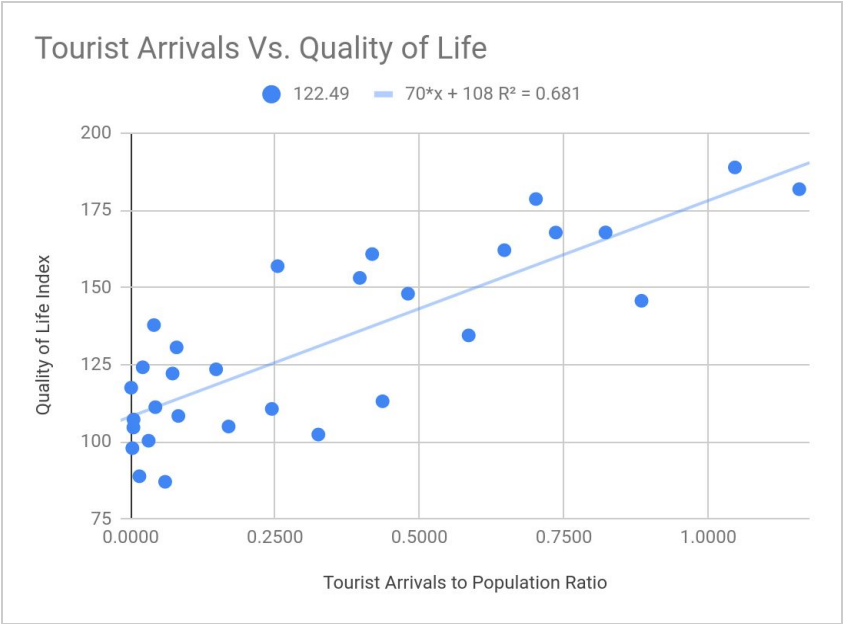


Figure 11: Table - Specified values for the outliers and others

Countries	**Canada**	**United States of America**	**Denmark**
Tourist Arrivals to Population Ratio	0.0401	0.0206	2.0333
Quality of Life Index	170.32	179.2	198.57

The number of tourist arrivals for both Canada and United States is on the lower end of the scale with a high quality of life index value, which makes these countries outliers from the rest of the data. The characteristics that categorize Canada and the U.S as an outlier are very similar as demonstrated through the closeness of their indexes; overall, they are simply more developed than most countries and as a result, have numerous other factors increasing their quality of life. In Canada's case, the low number of

tourist arrivals suggests that tourism may not be a major contributor to its quality of life. This is evident as Canada's tourism sector only grew by 1.5% and Canada was unable to include international tourist arrival gains to the international travel market due to insignificant numbers ("Canada and the Global Market Tourism Marketplace"). However, other factors such as unemployment rate may raise the quality of life for Canadians as only 5.5% are unemployed. Comparing this rate to South Africa who was the highest unemployment rate of 27.6%, Canada has a low rate. As for the U.S, their immense population of 329,093,110 and a total area of 9,834,000 kilometres squared renders even a large number of tourist arrivals almost unimpactful through the ratio in comparison to the effects of other, more powerful sectors of the U.S. An example of on of these sectors is their real estate, renting, and leasing as it accounts for 13% of the global GDP ("The Biggest Industries in the United States"). Both of these countries have high quality of life index values despite their low tourist arrival numbers which is why they are outliers in this data set.

On the other hand, it seems accurate that a significant cause affecting the high quality of life index value in Denmark maybe the large number in tourist arrivals. A potential reason for this is the large amount of job opportunities that are provided as a result; in 2016, CruiseCopenhagen, one of their tourist attractions, had a crew of around 289,000 people just in itself. In addition, this attraction generated 273, 989, 047 dollars which could be used in healthcare, incomes, education etc. which theoretically, would benefit the citizens. The appearance of a larger ratio for Denmark is only partly due to their many tourist arrivals and more so because of their small population; this causes the ratio to rise as the ratio exhibits the number of tourists over the total population of the country. However, in comparison to their size and population, the number of their tourists is still larger which is why it would make sense that this could still have a positive impact. Overall, there are many differences in these countries that place them far from the majority which lead measurements off the track of the trendline.

Figure 12: Table - Tourist arrival and quality of life linear trend analysis without outliers

Trendline	Linear
Equation for Line of Best Fit	y = 70x + 108
Coefficient of Determination	0.681
Correlation Coefficient	0.82

In comparison with the table of values that includes outliers, this trend analysis table represents the majority of the data more accurately. The coefficient of determination has increased which proves that the outliers pulled the trend away from an accurate representation of this relationship and it also reinforces that the number of tourist arrivals may in fact, have a strong relationship with the well-being of the citizens. The updated value shows that 68% of the change in quality of life is predicted by the change in the number of tourist arrivals instead of 50%. Along with this, the correlation coefficient has increased as well. This number suggests a much stronger positive correlation between these variables without the outliers and fit a linear model much more precisely; the end behaviour of this relationship also agrees with the linear model as the number of tourists increase so does the quality of life at a constant rate.

Causal Relationship

The relationship between the quality of life in a country and the number of tourists it experiences can be seen as a presumed relationship. This is due to numerous other factors that contribute to the well-being of an inhabitant. However, tourism still may have a fairly strong, positive effect on the lifestyle indirectly and directly. An example of this is the effect it can have on the country's economy as business activity such as additional job opportunities, increase due to an enlarging number of tourist arrivals ("Tourism Management"). In addition, with the arrival of tourists comes the addition of "new" money due to the transportation expenses and tourist sites which can go towards the average person's

discretionary income. This is evident as the money produced by tourism accounts for around 5% of global Gross Domestic Product ("The Advantages and Disadvantages of Tourism"). Second, tourism also affects the environment as the awareness to maintain and protect a country's natural beauty is increased, therefore, resulting in a physically pleasing surrounding for its inhabitants. Lastly, a positive impact on the social aspect of a country is also a result of the increase in tourist arrivals as the idea of upgrading facilities such as roads, recreational locations, parks, etc. is presented and pushed for. There are many benefits for country's citizens that a great number of tourist arrivals introduce.

However, many other quantitative and qualitative factors that may also affect the well-being of an inhabitant such as unemployment rates. An example of this is Hungary as it has a low rate of 3.4% with a high quality of life index value of 134.47. This suggests that a large amount of the population has jobs which allow them to pay for not only necessities, but extra benefits as well. In addition, life expectancy can also be taken into consideration with tourist arrivals as a significant factor. This is suggested as in Ireland this value is 81 years with a quality of life index value of 160.82 and a tourist arrival to population ratio of 0.4181; it can be presumed that the high quality of life can be a result of not only one, but both of these factors. As for a few of the qualitative countless other factors which include freedom of speech, family life, emotional security, quality of education, health services, safety, etc. may also have a great impact on an how an individual experiences life in their country. Through one and two variable analysis, it is proven that the number of tourists a country receives has a correlation with how citizens experience life in that country, however, this is only one of the numerous other factors which is why it is difficult to determine this as a single or highly prominent cause.

Variable 2: Pollution Levels

One Variable Analysis

Introduction

There are many factors that contribute to how a citizen experiences life in their country. It can be hypothesized that the quality of the air where these citizens live can greatly impact their daily lives. It is presumed that clean air is a basic right and requirement to a human's health which has made it an extremely obvious criteria leading to it being overlooked. It is difficult to compare the pollution levels of countries as the amount of pollution in a country can not necessarily be measured. In order to assign a value to the amount of pollution in a country, an index has been used; this index uses a scale to rank these countries from lowest to highest in terms of their level of pollution with 0 being the least amount and 100 being the most. In order to truly understand the importance of clean air that is a source of oxygen, a comparison between pollution levels and the quality of life has been done.

Justification for Choice

The use of an index as measurement for pollution levels results in a quantitative and continuous variable. A histogram has been made to categorize countries in terms of their pollution index values. This will allow for an accountability of the countries that lie in the same index interval as potential similarities will be investigated for.

Figure 13: Histogram Chart - Countries categorized by their pollution levels

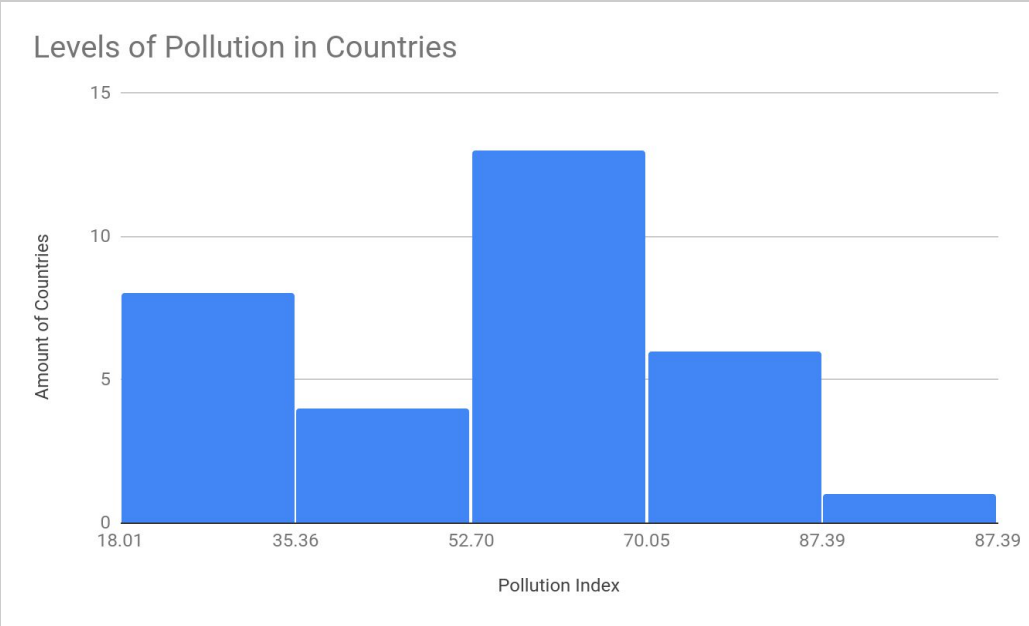


Figure 14: Table - Specified values for certain countries from the histogram

Countries	**Colombia**	**Indonesia**	**Lebanon**
Pollution Index Value	61.74	62.78	87.39
Population Density (number of people/km squared)	43	140	583
PM 2.5 Annual Concentration	23.1	21	

Identified Trends

As it can be seen from this histogram, the modal interval is from 52.70 to 70.05 and the data is somewhat normally distributed. This interprets that the majority of countries do not have a small amount

of pollution nor a large amount of pollution as this is interval lies perfectly in the middle of the extreme ends. Two countries that lie within this range are Colombia and Indonesia. Both of these countries have lesser pollution levels in comparison with the extremely high values may be because of their low population density; since the population of these countries are relatively proportionate to the country's area, it makes sense that pollution is not being generated by a great number of inhabitants in a small area. However, these pollution levels are still significantly high. This is suggested by the fact that both of these countries are home to several active volcanoes; on average, volcano eruptions release around 60 million tons carbon dioxide each year (Siegel, 2017). This indicates that a cause for the large pollutions levels may also be due to the existence of these active volcanoes. In addition, Indonesia and Columbia are considered to be developing countries which indicates that they may not possess the advanced technology that other countries do, to provide them with the most eco-friendly way to obtain or create things such as energy. To compare the causes of pollution in these countries, their PM 2.5 levels will be evaluated. These countries have extremely similar PM 2.5 levels which shows that they share certain productions of pollution such as emissions from vehicles, biomass burning for cooking and heating in households ("Columbia Perspective: Air Pollution") ("Air Pollution: A Threat to Children's Health in Indonesia"). Using Indonesia and Colombia as examples in the modal interval, it is apparent that certain aspects are shared within that interval which result in similar pollution levels.

Due to characteristics that are not shared by any of the other countries, Lebanon is placed in an entirely new and isolated interval. A potential reason for this is the great population density of this country; the population of Lebanon is 6, 064, 830 and the area is 10, 452 kilometres squared. The disproportions of this may suggest that with a large amount of people comes a large production of pollution which is even more significant and impactful if occured in a small area. This is evident as in Lebanon, the average concentration of a harmful pollutant, Nitrogen Dioxide, is 50 micrograms per cubic metre of air which exceeds the World Health Organization's recommendation by 18 units. Nitrogen

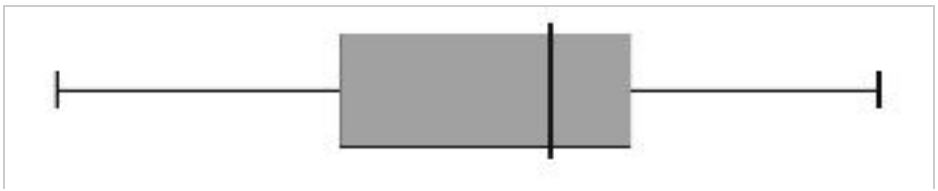
Dioxide is mostly produced by the burning of fossil fuels such as the use of motor vehicles ("Air pollution threaten health in Beirut"). This aligns with the hypothesis of Lebanon's great population density being a result of its large pollution levels as the greater the amount of people living in a country, the greater chance of a large vehicle utilization rate. There are many contributors to Lebanon's pollution levels that make it extensively greater than those of the other countries.

Figure 15: Table - Measures of central tendencies and spread for pollution level data set

Mean:	55.36
Median:	59.73
Range:	69.38
Quartiles:	**Q1:** 41.89 **Q2:** 59.73 **Q3:** 66.48
Interquartile Range:	**Q3-Q1** = 24.59
Standard Deviation:	19.71

From these numbers, it is clear that the mean value is similar to the median indicating that there are not any drastic outliers. Along with this, the range suggests that there is a moderately wide variety of values in this data set. This point is reiterated as the moderate interquartile range suggests that this 50% of the data is not spread out or compressed substantially. Since, the range value is greater than the interquartile range by a relatively small amount, it is evident that the points farthest away from the mean are not actually extremely far compared to the rest of the data. The standard deviation suggests that the data has diverged by a small amount from the average value. These measurements demonstrate that the points in this data set follow a similar trend with only slight variances.

Figure 16: Box and Whisker Plot - Pollution levels data set



From this box and whisker plot, it is visible that the first quarter is longer than the rest; this indicates that the values in this quarter are spread out wider. It can also be said that 50% of the data lies within the values 41.89 and 66.48. However, since the length of the first and fourth quarter are much longer than the length between the interquartile range, it can be said the there is a possible outlier in this situation as 50% of the data lies within that range.

Two Variable Analysis

Correlation

The following scatter plot displays the relationship between the pollution levels in a country and the quality of life of the inhabitants with the inclusion of outliers. The independent variable is the pollution levels as it is presumed that as this value increases, the well-being of the residents will decrease. This makes the quality of life the dependent variable as a country's welfare can be impacted by the independent variable.

Figure 17: Linear Scatter Plot - Comparing pollution levels and quality of life with outliers

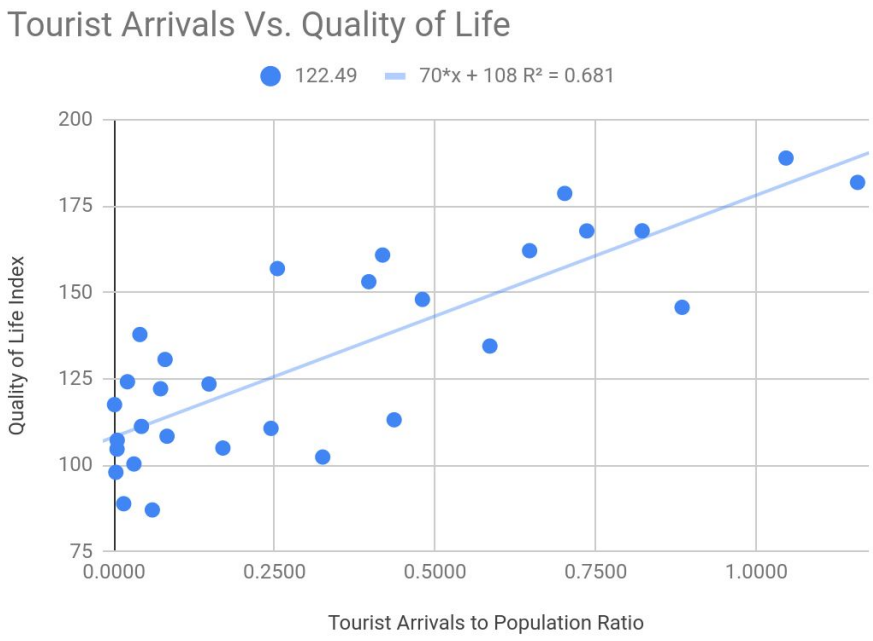


Figure 18: Table - Pollution levels and quality of life linear trend analysis with outliers

Trendline	Linear
Equation for Line of Best Fit	y = -1.38x + 212
Coefficient of Determination	0.746
Correlation Coefficient	-0.859

This table shows the line of best fit which will be used to predict the quality of life index value in correspondence to pollution levels and vice versa that have not been evaluated in this data set. The coefficient of determination indicates that around 75% of the variance in the quality of life is predicted by changes in the pollution index value. This is a considerable amount as there are countless other factors that affects individual's lifestyle in their country. The correlation coefficient is above 0.6 indicating that there is a strong negative correlation between these variables. It also indicates that this relationship follows a linear model extremely well aligning with the end behavior: as the pollutions levels increase, the quality of life will decrease at constant rate.

Outliers

There are not many outliers that can obviously be seen visually from the scatterplot which is why a linear regression analysis was performed. From this, it is gathered that Brazil is almost 2 standard deviations away from the mean, while Qatar is almost triple the amount. This is shown through the residual plot as it makes it clear which points are visually farthest from the mean.

Figure 19: Residual Plot - Pollution levels and quality of life

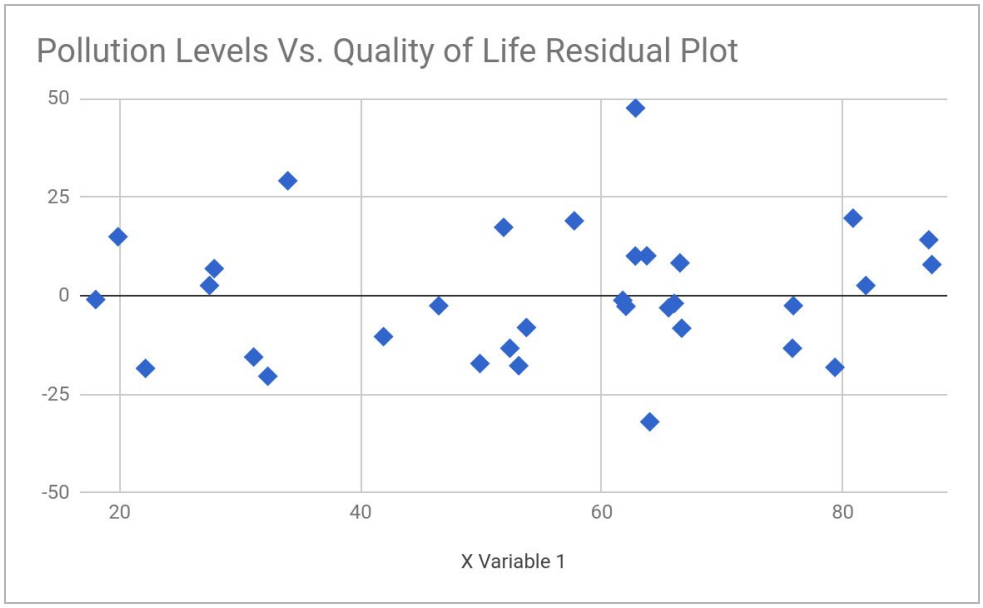


Figure 20: Linear Scatter Plot - Comparing pollution levels and quality of life without outliers

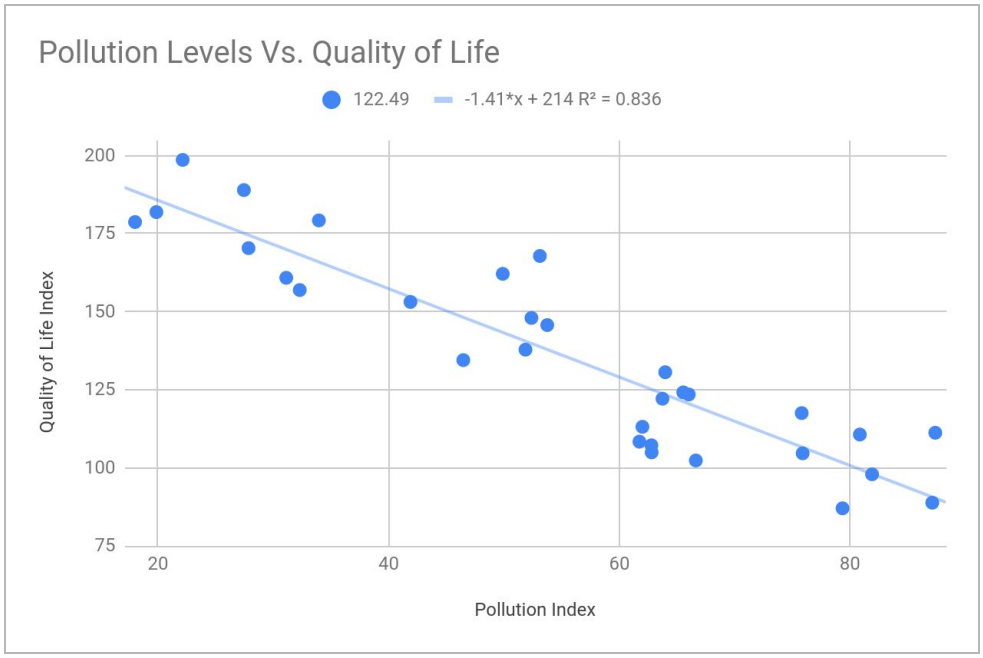


Figure 21: Table - Specified values for certain countries from the scatter plot

Countries	**Brazil**	**Qatar**
Pollution Index	57.72	66.48
Quality of Life Index	100.33	167.84
Standard Residuals	-1.98	2.95

It is seen that Qatar has a high quality of life despite its high pollution index value. This suggests that there may be other factors that drive Qatar to be a country in which its citizens are happy for the most part. One factor may be their extremely low rate of unemployment; the population in the country is 2,743,901 and of this amount, 2,115,478 people are employed. This translates to an unemployment rate of roughly 0.1% which is substantially small. In addition, life expectancy in Qatar is also high with the age being 79 years which is significant as Monaco has the highest life expectancy of 89 years. It is hypothesized that due to factors such as these, Qatar has a high quality of life which is not dragged down by its high pollution levels.

On the other hand, Brazil has low pollution levels yet, the quality of life is also low. This indicates that there are factors in Brazil that lower the quality of its citizens lives. One may be the poverty levels in Brazil; around 2,000,000 people out of the whole population of 212, 392, 717 control half of the country's land. This unequal distribution of land makes it very difficult for others to improve in their economic stature (Thomas, 2017). Along with this, Brazil also has extremely high crime rates, especially homicide; in 2016, their murder rate was 29.9 killings per 100,000 people which increased to 30.9 in 2017. To compare, the murder rate in the United States was five killings per 100,000 people. This displays one aspect of unsafety in Brazil. These factors indicate why low pollution levels are not a main cause of the low quality of life in Brazil. Both Qatar and Brazil appear to be outliers in this data set, however, in completely different ways.

Figure 22: Table - Pollution levels and quality of life linear trend analysis without outliers

Trendline	Linear
Equation for Line of Best Fit	y = -1.4x + 214
Coefficient of Determination	0.836
Correlation Coefficient	-0.91

This trend analysis does not contain any outliers which compared to the analysis with outliers, represents this data set more accurately. It is clear that a linear trendline best fits this data set as it represents the end behavior of this relationship as the pollution levels increase the quality of life in that country decrease. Using the new equation, predictions for data points that are not currently included in this data set can be discovered increasingly more accurately. The coefficient of determination value has fairly increased which suggests that now, 84% instead of 75% of the change in quality of life is predicted by the change in the pollution levels in countries. This is even more significant as established previously, the quality of life in a country can be affected by a countless number of variables. Along with this, the correlation coefficient has increased as well. The revised value of -0.91 again, represents a strong, negative correlation between these two variables as a linear trend. These improvements are a result of the exclusion of outliers that created a moderate divergence in the overall trend line.

Causal Relationship

The impact on the quality of life in a country as a result of the change in pollution levels can be recognized as a presumed causal relationship. This is due to the numerous other factors that may also affect how an individual experiences life in their country. As suggested by this analysis, the pollution levels in a country may be a contributor to its quality of life. This is because air is a supply of oxygen

which is essential for the survival of humans; the quality of air matters greatly as it something encountered in the everyday atmosphere of a human. High levels of pollution are contributors to the human health issues such as cardiovascular diseases, chronic bronchitis, emphysema and many more; an estimation of 18,000 deaths are as a result of air pollution each year. As specifically in 2016, around 6,500,000 deaths that occurred worldwide were found to be linked to air pollution. This is evident as nitrogen dioxide gas causes lung inflammation, respiratory infections, premature death and much more. This gas is released by motor vehicles, industrial plants and power plants (Darcin, 2017); in 2015, around 1,200,000,000 cars were being used worldwide and in 2016, 88,100,000 cars were purchased (Sulkowski, 2017). This shows that there is an extreme usage of vehicles and subsequently, an extreme production of nitrogen dioxide potentially leading to unhealthy inhabitants. This is especially evident in Vietnam as it has a low quality of life index value of 88.82 and a fairly high pollution index value of 87.13. Motorbikes release exceptionally more air pollution than cars in the form of carbon monoxide ("Carbon Footprint of Motorcycles Vs. Cars") and Vietnam is ranked as one of the top users of motorbikes in the world. As a result, six out of the ten diseases that have the highest mortality rates in Vietnam are connected to these high levels of pollution. It is proven that high levels of pollution can cause many health problems which in turn, may negatively impact a citizens quality of life.

In addition, volatile organic compounds (VOC) are emitted from common things used or created in countries such as household heating, gas fields, fossil fuel combustion, etc; energy that is produced by fossil fuels like natural gas and oil, makes up over 70% of the usage of global energy. This shows how heavily VOSs are relied upon which increases their utilization and as a result increases the amount of these dangerous substances; these compounds cause discomfort to humans in their everyday lives with issues like headaches, skin allergies, nausea and even greater problems such as liver and kidney damage (Darcin, 2017). It is evident that pollution has many negative impacts on human health and perhaps subsequently, their experience of life.

Pollution levels may contribute to the well-being of citizens of a country, however, there are many other factors involved in this relationship. As an example, Norway has an extremely low pollution index value compared to the other countries of 19.86 and a high quality of life index value of 181.86. This suggests that the low pollution levels may contribute to the high quality of life, however, there are many other factors that may contribute as well. This includes high education rates as evident through the 82% of inhabitants aged 25 to 65 as they have completed post-secondary education ("Happy Index Planet: Norway"). Along with this, Norway has installed policies that take care of families; the elderly receive a state pension of 1000 dollars per month whereas in Canada, the elderly only receive 587 dollars ("15 Reasons Why Living in Norway is Awesome"). As for a qualitative factor, Norway has a beautiful geographic setting with many incredible locations like Trolltunga and Kjeragbolten (Miller, 2017). Through these example it is suggested that along with pollution levels, other factors may also have a hand in determining the quality of life of citizens.

Variable 3: House Affordability

One Variable Analysis

Introduction

It can be said that the quality of life of citizens in their country is affected by numerous factors. It is hypothesized that there is a relationship between the prices of houses and the well-being of the residents; it can be presumed that the more expensive houses can get for its residents, the worse their experience of life becomes. This variable is investigated deeper through series of analysis and research on a variety of countries around the world.

Justification for Choice

It is difficult to compare the prices of homes from country to country as their financial status differs. To make this comparison equitable, the average monthly mortgage for a house has been divided by the average monthly income and converted to a percentage to create a quantitative and continuous variable. This creates a number that displays the percentage of the income that is utilized in paying for a house. So, the higher this number is, the less affordable the homes are in correspondence with the incomes. This value will aid in investigating how “expensive” homes are for its inhabitants. A histogram has been made to categorize the different countries based on their house affordability percentage. This will group countries based on their affordability which will allow for an investigation to find similarities and differences between these groups.

Figure 23: Histogram Chart - Countries categorized by their house affordability

Figure 24: Table - Specified values for certain countries from the histogram

Countries	**Belgium**	**Netherlands**	**Argentina**
Average Monthly Mortgage	1697.47	1546.93	1289.39
Average Monthly Income	2955.09	2269.64	722.29
Inflation Rate	2.08	2.9	55.8
Affordability Ratio	44.12	46.93	566.2

Identified Trends

This histogram displays the modal interval for the affordability ratio as values from 0.00 to 120.00. Also, it displays the data as positively skewed. This shows that the majority of countries have affordable house prices compared to its citizens' incomes. Two countries that lie within this range are Belgium and Netherlands with similar affordability ratios. This is evident through there almost identical mortgage and income values; roughly 45% of the incomes go towards paying for homes in both of these

countries. This is a reasonable number as it is still less than 50%, leaving a significant amount for other expenses to be paid for the month. The affordability may be a result of the low inflation rates for both of these countries as consumer purchases are encouraged due to the rational prices and the corresponding incomes.

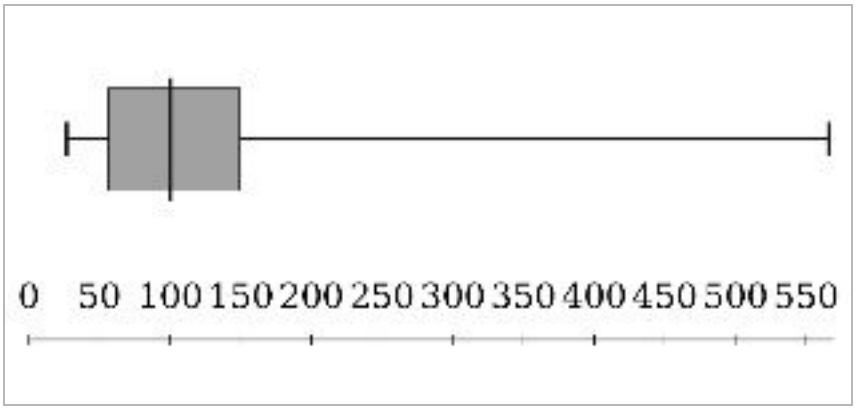
On the other end of this spectrum is Argentina. The mortgage for a home in Argentina is substantially greater than the income; houses are extremely more expensive for the citizens as 566% of their monthly income goes towards the monthly mortgage. This translates to the income not nearly being enough to contribute to paying for a home. This is due to the tremendous increase in the inflation rate to 55.8% in April 2019; economists had suspected that the peso currency in Argentina was overvalued and it would depreciate slowly over a long period of time. However, in April 2018, the value of 20 pesos was equivalent to one US dollar which plummeted to 30 pesos in July 2018. As a result, the inflation rate increased from 24% at the beginning of 2018 to 31.5% in August of the same year and is now more than doubled. As a solution, the central bank of Argentina increased the interest rates to 45% explaining the enormous monthly mortgage prices (Cohen, 2018). As for the low incomes, in 2018, Argentina experienced a horrific drought that eliminated their soybean harvests decreasing their soybean crop production by 37% (Donley, 2018). This had a significantly negative impact on Argentina's economy as soy takes over 56% of the cultivated land and of this, 98% goes towards exports making up 50% of the total agricultural exports in Argentina ("Fact Sheet - Agribusiness in Argentina"). This can explain how Argentina's economy fell by 6.7% in June 2018 and subsequently forcing the incomes to decrease immensely as well (Donley, 2018). These series of unfortunate events can account for the high house mortgage values and the low incomes which result in low affordability as presented through the high percentage value.

Figure 25: Table - Measures of central tendencies and spread for house affordability data set

Mean:	129.23
Median:	100.13
Range:	539.39
Quartiles:	**Q1:** 56.55 **Q2:** 100.13 **Q3:** 149.15
Interquartile Range:	**Q3-Q1** = 92.6
Standard Deviation:	109.75

From this data, it is evident that the mean is relatively greater than the median which indicates that there are outliers that have slightly brought the mean measurement away from accurately representing the majority of the data. In other words, the majority of the countries exhibits values lower than the mean. The range is a large number indicating that there is a wide variety of data points in this set. Moreover, the interquartile range is significantly smaller than the overall range which suggests the possibility of outliers on either ends of the scale such as Argentina. Lastly, the large standard deviation reiterates the possibility of outliers as this value suggests that the points have deviated from the mean significantly.

Figure 26: Box and Whisker Plot - House affordability data set



As displayed on the box and whisker plot, it is evident that the fourth quarter is much longer than the rest indicating a wide set of data in that section. The first, second and third quarters are much shorter suggesting that the points in these sections are compressed. This presents the possibility of major outlier that has elongated the last section as 50% of the data is known to lie within the range of 56.55 and 149.15.

Two Variable Analysis

Correlation

These scatter plots display the relationship between the house affordability for a citizen and their quality of life with the inclusion of outliers in a quadratic and linear trend. The independent variable is the house affordability calculated by dividing the average monthly income for a country by their average monthly mortgage and then converting it to a percent. The dependant variable is the quality of life as it is hypothesized that the house affordability will impact the citizens experience in their country as it changes. Subsequently, the independent variable is the house affordability percentage.

Figure 27: Linear Scatter Plot - Comparing house affordability and quality of life with outliers

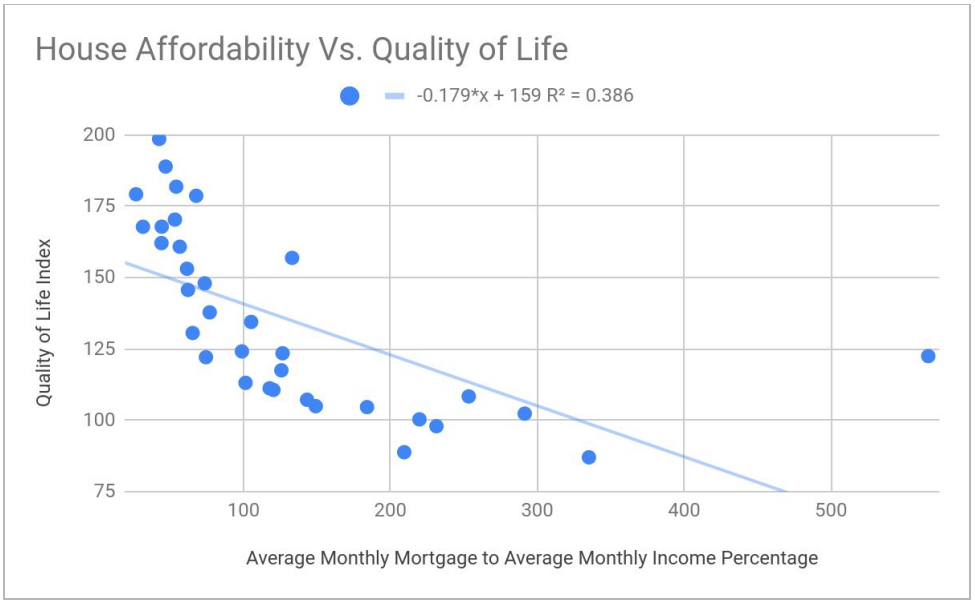


Figure 28: Table - House affordability and quality of life linear trend analysis with outliers

Trendline	Linear
Equation for Line of Best Fit	y = -0.179x + 159
Coefficient of Determination	0.386
Correlation Coefficient	-0.621

Figure 29: Quadratic Scatter Plot - Comparing house affordability and quality of life with outliers

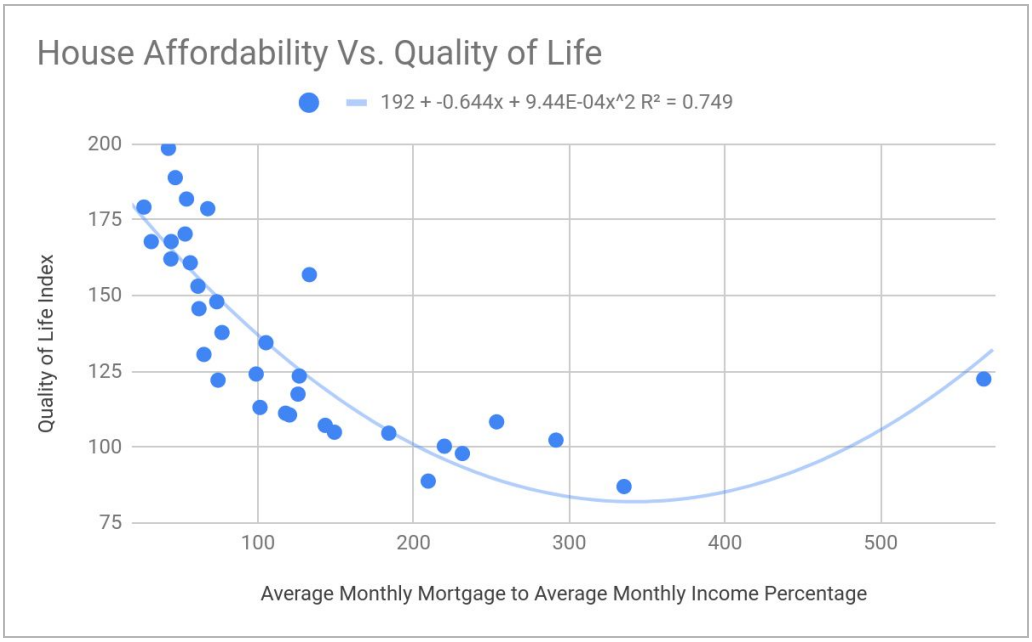


Figure 30: Table - House affordability and quality of life quadratic trend analysis with outliers

Trendline	Quadratic
Equation for Line of Best Fit	y = 192 -0.644x + 9.44E-4*x^2
Coefficient of Determination	0.749

The first table shows a linear trend analysis for the relationship between the level affordability of a house and the quality of life in that country. The second table shows a quadratic trend for this

relationship. The line of best fit for both of these trends will be used for extrapolation if predictions for other countries are needed. The coefficient of determination for the linear trend indicates that around 39% of the variance in the quality of life is predicted by changes in the house affordability level whereas for the quadratic trend, this value is 75%. The quadratic value is greater than the linear value as Argentina is very clearly an outlier in this data set that happens to create a parabolic shape. However, the linear trendline is an accurate representation of the end behaviour of this relationship because as houses become more expensive for the incomes of the citizens, the quality of life for that country should decrease at a constant rate. Whereas, a quadratic trendline suggests that the quality of life will be high when the houses are extremely cheap and when they are extremely expensive. This contradicts the hypothesis which states that an affordable house will result in a high quality of life and an unaffordable house will result in a low quality of life. The correlation coefficient in the linear analysis is above 0.6 indicating a strong negative correlation between these variables. It also reiterates that this relationship is a strong fit to a linear trend even with outliers.

Outliers

The previous series of analyses for this variable did not make all of the outliers easily visible. The outliers are Argentina and Denmark as they meet certain criteria that drive them away from the general trend of the majority of the data. This causes an inaccurate representation of most of the data that follows roughly the same trend.

Figure 31: Linear Scatter Plot - Comparing house affordability and quality of life without outliers

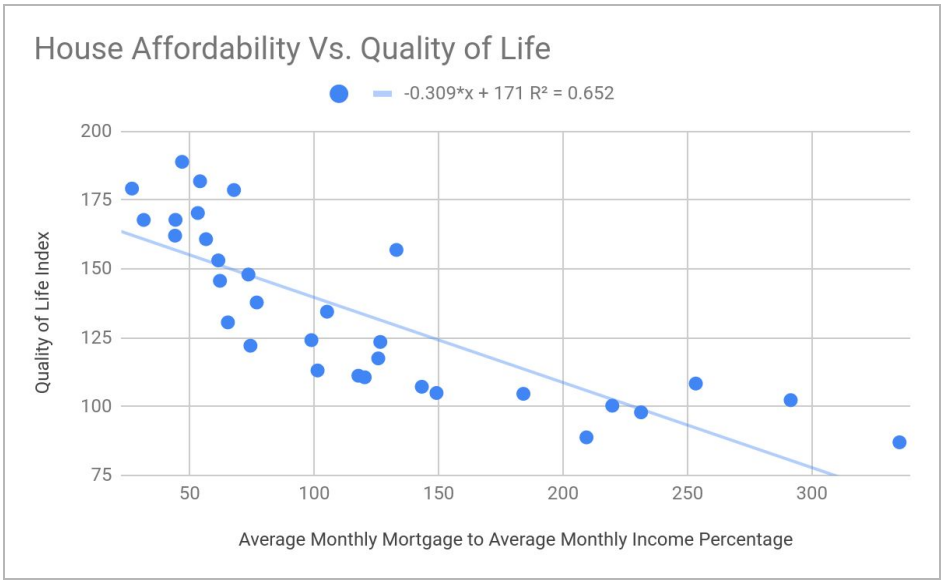


Figure 32: Table - Specified values for outliers

Countries	**Argentina**	**Denmark**
Affordability Ratio	566.2	42.54
Population	45,101,781	5,749,000
Quality of Life Index	122.49	198.57
Standard Residuals	2.63	1.92

It is clear that Argentina is an outlier for the scatter plot, however, a linear regression shows that Denmark is also an outlier with an almost doubled standard residual value. Argentina is an outlier due to a relatively high quality of life despite its enormous affordability percentage of 566.2. This indicates that there may be other and more significant factors that actually increase the quality of life in Argentina. An example of this could be the declining crime rates in Argentina; in 2014, there were a total of 3,227 homicides which decreased to 2,605 in 2016 (“Crime Statistics - Argentina”). To put these numbers into

perspective, a comparison can be done with Ukraine as it has roughly the same population of 43, 795, 220 and a lower quality of life index value of 102.34. The number of homicides in Ukraine have went from 2,336 to 2,845 suggesting an explanation for their low quality of life. In addition, Argentina has a life expectancy of 78.37. This is close to Malaysia as it has a quality of life index value of 122.11 and a life expectancy of 75.64. It can be hypothesized that the quality of life index values are almost identical due to the similarity in their life expectancy values. Lastly, Argentina has an extremely low population density of 16 people per kilometre squared which can be compared to Macau that has a density of 21, 081. A low population density can increase the quality of life as it decreases congestion, pollution, traffic, etc. (Pettinger, 2017). It can be presumed that there are many factors that counteract the drawbacks of the low affordability of houses in Argentina.

Another outlier in this relationship is Denmark; it is just as affordable as many other countries yet, it has a comparingly higher quality of life. This is because Denmark has many other factors increasing the quality of life that the other countries with the same affordability lack. A comparison can be done with Belgium as it has a lower quality of life of 162.09 but, a similar affordability rate of 44.12; Denmark has a population density of 134 people per kilometre squared whereas Belgium has a higher number of 377. Qatar can also be used in comparison as it has lower quality of life index value of 167.84 and an almost identical affordability percentage of 44.29. The quality of education provided by countries can be hypothesized to have an effect on the quality of life as well; the education expenditure in Denmark expressed as a ratio of its population is 0.0047 whereas for Qatar this ratio is 0.0017. In addition, Qatar has a greater population density of 233 people per kilometre squared and a greater homicide rate of 8.10 cases per 100,000 people. Through these series of comparisons, it is displayed that although some countries may have homes as affordable as in Denmark, they still have a deficiency of numerous other beneficial factors.

Figure 33: Table - House affordability and quality of life linear trend analysis without outliers

Trendline	Linear
Equation for Line of Best Fit	y = -0.309x + 171
Coefficient of Determination	0.652
Correlation Coefficient	-0.808

Another trend analysis has been completed, however, this time it has been done with the exclusion of outliers as to represents this data set more accurately. The new equation will be beneficial in predicting points that are not in this data set with precision. The coefficient of determination has increased from the previous linear coefficient which suggests that now around 65% of the change in quality of life is predicted by the change in house affordability rates. This value is still smaller than the coefficient of the quadratic trend only because of the outliers, however, it still reiterates the idea that a considerable amount of change in the quality of life is predicted by the change in the house affordability percentage. Also, the correlation coefficient has improved representing a much stronger, negative correlation between these two variables. By removing the outliers from this data set, the trend analysis displays a much more accurate representation of this relationship.

Causal Relationship

The affordability of a house in a country and the quality of life of its citizens can be be said to have a presumed causal relationship. This is because there are countless other variables that may impact the life experienced by citizens in their country. However, as displayed by this analysis, the affordability of a house may also be a factor in determining the quality of life in a country.

The rule of thumb for budgeting suggests that 50% of income should be targeted towards paying for necessities such as groceries, housing, utilities, etc. 30% should go towards "wants" such as shopping, dining out, hobbies, etc. and the remaining 20% is recommended to be put aside as savings (Pant, 2019). As shown in the data set, there were many countries that had an affordability percentage of over 100% which translates into the monthly mortgage being more than the monthly income. In this case, these countries had an income that was too low and a low income results in a low credit score. Even if these countries applied for a loan, their poor credit score would be an obstacle that would be very difficult to overcome and as a result the loan would be declined ("What credit score do I need for a mortgage?"). If this is the case, theoretically all of the money would go towards housing and there would be nothing left to pay for the remainder of the criteria.

It is hypothesized that food, water and shelter contribute to the well-being of a human, however, so do the "wants". The National Health Interview Survey that took part from 2014 to 2016 displayed the negative impacts of unaffordability for low income people as categorized through those who earn 200% or less of the federal poverty level. First, the obesity rates in low income adults are 36% whereas in high income adults it is 28%; this may be a result of the lack of opportunity for physically active leisure activities. In addition, low income people have a 7% chance of psychological distress which is 6% greater than that of the higher income people. Along with this, around 23% of low income people lack a consistent source of quality healthcare as their limited amount of money is already going towards other important things (Cunningham, 2018). This suggests the importance of not only human necessities such as water but also, leisure activities and high quality healthcare as they improve physical and mental health. However, a part of the income can not be put towards these activities if most of the income is already put towards housing. This suggest that as the affordability of homes decreases, the quality of life in that country may decrease as well.

This is not the only factor that is suggested to impact the experience of life for an inhabitant as many other variables may be taken under consideration. For example, although the United States of America has low affordability percentage of 26.81 (high house affordablity) and a high quality of life index value of 179.2, there are other factors that may also be a cause of this high quality of life; the United States has a life expectancy of 79.38 compared to Norway who has a high quality of life index value of 181.86 and a life expectancy of 81.12. This suggests that life expectancy may be another potential factor in determining the quality of life in the United States. Also, the United States has a low unemployment rate of 3.6% compared to Mexico who has one of the largest unemployment rates with a value of 18.5%. The United States also has a low population density of 35 people per kilometre squared which can be put into perspective by Macau who has the highest population density with a number of 21, 081. Lastly, United States also has a very low homicide rate of 5.4 murders per 100,000 people whereas Honduras has one of the highest rates of 90.4 murders per 100,000 people. It can be hypothesized that many of the listed factors can be contributors the quality of life in a country alongside the house affordability rate.

Conclusion

Summary

The variables that were hypothesized to impact the quality of life were shown to have moderate to strong relationships through series of analyses. First, the analysis of the number of tourist arrivals a country experiences and the quality of life in that country, displayed a strong positive correlation as a linear trend; the trend displayed that as the amount of tourist arrivals increased, the quality of life index would increase as well. Research also shows that the tourist arrival numbers affected the country's economy, environment and society which lead back to each and individual citizen in one way or another.

Second, the observations from the relationship between the level of pollution and the quality of life in the corresponding country suggested a strong negative correlation as a linear trend; it was clear from the analysis that as the pollution index increased, the quality of life for the country would decrease. A potential reason for this is that pure oxygen is a requirement for human survival and any contamination would result in various health problems.

Finally, an analysis of the house affordability and the quality of life in those countries shows a strong negative relationship between these variables as a linear trend; the analysis displayed the relationship as the more affordable homes were (as the house affordability percent decreased), the higher the quality of life in that country would be. This was due to the majority of income being forced towards mortgage payment and instead of necessities that would maybe otherwise increase the quality of life.

To answer the thesis, the country that was found to be the "best" in this analysis was Denmark. This is because the quality of life index value was the largest for Denmark in comparison with the other countries; in other words, the database from which this data set was received, ranked Denmark the highest in the form of an index. As suggested by our analysis, Denmark had the highest number of tourist arrivals in comparison with their population as the ratio displayed the arrivals number as double their population. Also, Denmark had one of the lowest levels of pollution; from the database, Denmark was ranked the

third least in terms of the amount of pollution that contaminated the air in comparison with the other countries. Lastly, Denmark had the third lowest house affordability ratio which meant that their houses were extremely affordable in correspondence with their average income. These series of analyses show that Denmark is exceeding the rest of these countries in terms of these variables which may be a reason as to its number one ranking of quality of life. This shows that many factors which may include the three explored in this report, have been beneficial or ideal for the citizens in Denmark which resulted in a high level of satisfaction in their lives and ultimately assigning Denmark the title of the "perfect" country.

Problems

The main issues encountered in this report, revolved around the datasets that were utilized in the various variable analyses. First, it was acknowledged that the number of tourist arrivals on their own could not be used as a comparative factor from country to country. This is because each country varies in population, size and subsequently population density which would result in an unfair comparison. The solution for this problem was that the population of the country would be taken into consideration in the calculating the values; the number of tourist arrivals would be displayed as a ratio of the total population of the corresponding country. In addition, the other factors - size and population density - were taken into account in specific comparisons between two countries as these values could not have easily been calculated in the ratio.

Another problem that was confronted in this report, was about the affordability ratio data points. At the start, the dataset that was selected was thought to be a ratio of average house prices to the average income in a country. However, after research, it was revealed that this was not the case; the data was actually calculating the affordability of apartment properties. As a solution, another dataset was searched for and found. The new dataset aligned with the hypothesis as it compared house prices as monthly

mortgages to the average monthly income. The issues that were faced in this report had the potential of deviating this report from its true purpose, however, careful considerations aided in preventing this.

Reflections

In our opinion, the results of these comparisons are fairly accurate. As inhabitants of Canada which is globally recognized as a "good" place to live, it is accurate that tourists can have an impact on the way our lives are experienced. Visually, our country seems economically stable as our homes receive satisfactory incomes, material goods are not correspondly expensive etc. Also, our country has overall done a good job in maintaining the natural beauty of the environment, especially in British Columbia. Lastly, we have maintained recreational or leisure facilities, roads etc. As suggested by the research, all of these benefits may partially be caused by the amount of tourist arrivals in Canada. From living in Canada and visiting other countries such as Pakistan, we can compare that the air is much cleaner in Canada. This is something that is felt internally and you yourself can indicate where you "feel" better. This is significant as we breathe air constantly and any contamination will easily be detected in the form of poor health. Also, incomes that are brought into our homes are enough to pay for our houses that still leave a remainder for things that would increase our quality of life such as luxurious foods, movies, recreational activities etc. From living in a "nice" country, we witness the effects of these benefits and advantages first hand. We know how these variables affect us personally, which is why we can understand that the changes in these variables would affect the quality of life.

Suggestions

It is acknowledged that quality of life is affected by numerous quantitative and qualitative factors. These factors can be obtained through numerical calculations or surveys and then put into a graph to study correlations. However, after this step, it would also be interesting and beneficial to study which of these

factors are the most important in the eyes of the citizens as afterall, they are the ones who determine the definition of quality of life; some may prefer material goods and high income whereas others would prefer beautiful and clean scenery. As established, each citizen has their own values which would result in a difference in important factors. So, investigating the reasonings behind this would also aid in creating a quality of life value that is much more accurate.

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Appendices

Terms

Bimodal Distribution - a type of distribution of data in which there are multiple modal intervals

Crime Rates - a count of crimes in a location expressed as the number of crimes per 100,000 people

Extrapolation - an estimation of unknown values with the assumption of the continuation of an existing trend

Index - a measurement that compares subjects to each other and assigns them a rank correspondingly

Life Expectancy - the average period of time an individual is expected to live

Measurement Bias - a collection method of data that causes an over or under representation of a parameter

Modal Interval - the interval in a graph which contains the most number of subjects

Normal Distribution - a type of distribution of data that is symmetrical about the mean

PM 2.5 (Particle Pollution) - small pollutant particles that make the air seem hazy reducing visibility and clearity

Population Density - a measurement displaying the population per unit area

Positively Skewed - a type of distribution of data in which the mean appears to the right of the mode

Unemployment Rates - the number of unemployed workers displayed as a percent of the total labour force

Volatile Organic Compounds (VOC) - dangerous organic chemicals with high vapour pressures at room temperature

Raw Data Table

Countries	Quality of Life Index	Tourist Arrivals to Population Ratio	Pollution Index	Average Monthly Mortgage to Average Monthly

				Income Percentage
Argentina	122.49	0.0075	52.35	19.02
Belgium	162.09	0.6470	49.89	7.18
Brazil	100.33	0.0310	57.72	18.72
Bulgaria	130.59	0.0795	63.98	8.72
Canada	170.32	0.0401	27.85	7.66
Chile	124.14	0.0209	65.54	13.51
China	97.92	0.0029	81.91	29.09
Colombia	108.36	0.0825	61.74	18.85
Denmark	198.57	2.0333	22.14	6.93
Greece	137.82	0.0403	51.86	9.84
Hungary	134.47	0.5852	46.47	12.58
India	117.51	0.0008	75.81	11.33
Indonesia	107.2	0.0050	62.78	13.81
Iran	87.02	0.0597	79.35	16.87
Ireland	160.82	0.4181	31.12	7.9
Italy	145.69	0.8844	53.75	9.97
Lebanon	111.21	0.0427	87.39	13.44
Macedonia	110.64	0.2444	80.85	13.65
Malaysia	122.11	0.0725	63.74	9.77
Mexico	123.48	0.1479	66.02	10.19
Netherlands	188.91	1.0462	27.45	7.38
Norway	181.86	1.1576	19.86	8.4
Pakistan	104.63	0.0047	75.89	14.06
Panama	113.12	0.4361	62	12.67
Poland	147.98	0.4801	52.38	10.27
Countries	**Quality of Life Index**	**Tourist Arrivals to Population Ratio**	**Pollution Index**	**Average Monthly Mortgage to Average Monthly Income Percentage**

Qatar	167.84	0.8222	66.48	5.74
Russia	104.94	0.1695	62.8	12.39
Singapore	156.91	0.2544	32.29	21.56
Slovakia	153.1	0.3966	41.89	10.27
Sweden	178.67	0.7017	18.01	10.26
Ukraine	102.34	0.3249	66.63	14.35
United Arab Emirates	167.81	0.7360	53.11	4.4
United States	179.2	0.0206	33.95	3.58
Vietnam	88.82	0.0151	87.13	19.66