The Effect of Cyclones on Climate Awareness and Happiness

Group 12

November 12th, 2024

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Abstract

Our objective was to investigate the correlation that exists between cyclones, and climate awareness on overall global happiness. We had utilized the cyclone data set, happiness data set as well as the climate awareness data set through graphical interpretations, allowing for the identification of trends between countries and between data metrics.

Firstly, we examined the link between wealth and happiness through the inspection of the log GDP per capita metric, and the life ladder metric evident in the life ladder happiness data set. Secondly, we explored the frequency of hurricanes per continent, which we later applied to draw conclusions as to how the frequency of hurricanes in each continent affects climate awareness and happiness. Finally, we directly studied climate awareness and happiness, which was achieved by manipulating the climate awareness data set to create an awareness score, which allowed us to effectively compare life ladder to climate awareness.

To provide a summarize of our findings, we detected that countries in which we see higher wealth rates tend to be more content, based on the life ladder score against wealth. Furthermore, North America has overwhelmingly seen the most hurricanes in contrast to other continents, which is expected due to the geographical nature of North America's position and the surrounding bodies of water. Lastly, in comparing happiness and climate awareness, we discovered that the continent of Europe tends to have happier and more climate aware individuals. In the reverse, it was identifiable that Asia and Africa tends to be ranked rower on the life ladder, and ranked lower on our climate awareness scale.

Through our exploration methods we were able to infer that climate awareness and cyclones happiness does have a correlation effect on happiness. However, there lie other factors that possess stronger correlations such as the individual wealth of a country and the amount of social inequality pertaining to that country. Ultimately, our investigations were productive in the sense that we were able to understand the trends that tie into natural disasters, the rise in rates of climate change and our individual happiness.

Introduction

In this report, we are going to delve into the correlation between cyclones, climate awareness and the way in which happiness levels fluctuate based on the occurrences of cyclones and as a country becomes more aware of climate change. To establish a context on these topics, we can dive into the historical and cultural effects of Hurricane Katrina on New Orlens and the wider United States. Hurricane Katrina was responsible for the death of over 1800 indivduals, causing economic catastrophy that resulted in damages of $108 billion. Societally, Hurricane Katrina gravely decreased a sense of trust in the U.S. government, while increasing

social tensions between minorities, and caused a drastic increase in disaster resilience. From this, we can draw the conclusion that hurricanes as well as other natural disasters may have a great impact on a country's national security and economic stability.

Moreover, we are applying exploratory techniques by visualizing the graphical representations of these data sets in order to conduct an effective comparison between the information sets. 2Ultimately, our findings will depict how cyclones and hurricanes will play a role in determining happiness levels and the rates of climate awareness, which will convey the analysis of correlation and potentially causation.

Data Description

Cyclones Data

The data comes from NOAA Cyclone/Hurricane Data contains record of tropical storms over the past 173 years.

In order to clean/tidy the data, we separated each different type of data entry into a unique column, filtered out irrelevant data entries, converted the location data to a readable format, and classified the storms.

Climate Awareness Data

The data come from 2022 Climate Change Opinion Survey and detail climate change opinion records how aware the population of various countries are about climate change, going forward this data set will be referred to as 'climate awareness'.

In order to clean the data, we type of data entry into a unique column, filtered out irrelevant data entries, and removed outdated entries.

Happiness Data

The data come from World Happiness Report Score (from 2023 report) and records various statistics about countries that are believed to impact the overall happiness of a country and gives them an overall happiness score, going forward this data set will be referred to as 'happiness'.

In order to clean/tidy the data, we separated each different removed repeated data, filtered out countries without a lifeladder score, and filtered out the outdated entries.

Exploratory Data Analysis

To achieve our goals, we explored many insights of the data, but in this report we will emphasize three. The first insight consists of wealth and happiness. Our second insight is related to the frequency of hurricanes based on continents and to tie it all together, our final insight will be associated with happiness & climate awareness.

The first aspect that we were interesting in inspecting was how the metric logarithmic GDP per capita relates to the life ladder metric in the happiness data set. In order to achieve this, we isolated the columns of countries, log_gdp_per_capita, and life ladder. To allow for analysis by continent, we utilized an inner-joined with the climate awareness data and happiness data. This granted us the ability to facet our graph by continent. The graphical representation that we believed best suited the data is a line chart, in which log_gdp_per_capita was placed on the x axis, whereas the y axis depicted the life ladder.

To summarize the findings from each continent, North America exists in a GDP range from 8 to 11, while having a life ladder happiness score that skews to the higher end of the life ladder range. South America, on the other hand, lacks data, therefore, making it difficult to draw a conclusion on its relationship between GDP and happiness. Moreover, we can make an educated assumption that South America may have poor data collection processes due to the fact that the average GDP pertaining to South American countries tends to be low.

Similarily, Oceania falls short in terms of identify patterns and trends associated with GDP per capita and life ladder happiness, however, this may be due to the inherent relative lack of countries in the continent of Oceania. Moving forward, the continent with the relatively lowest wealth and happiness levels is Africa. Skewing to the lower lefthand corner of the graph, our findings coincide with the socio-economic and economic inequality in Africa. Contrastingly, Europe skews to the upper righthand corner of the graph indicative of the fact that on average, most European countries have higher levels of wealth and happiness.Finally, Asia tends to lie in the middle of both ranges with distinct outliers.

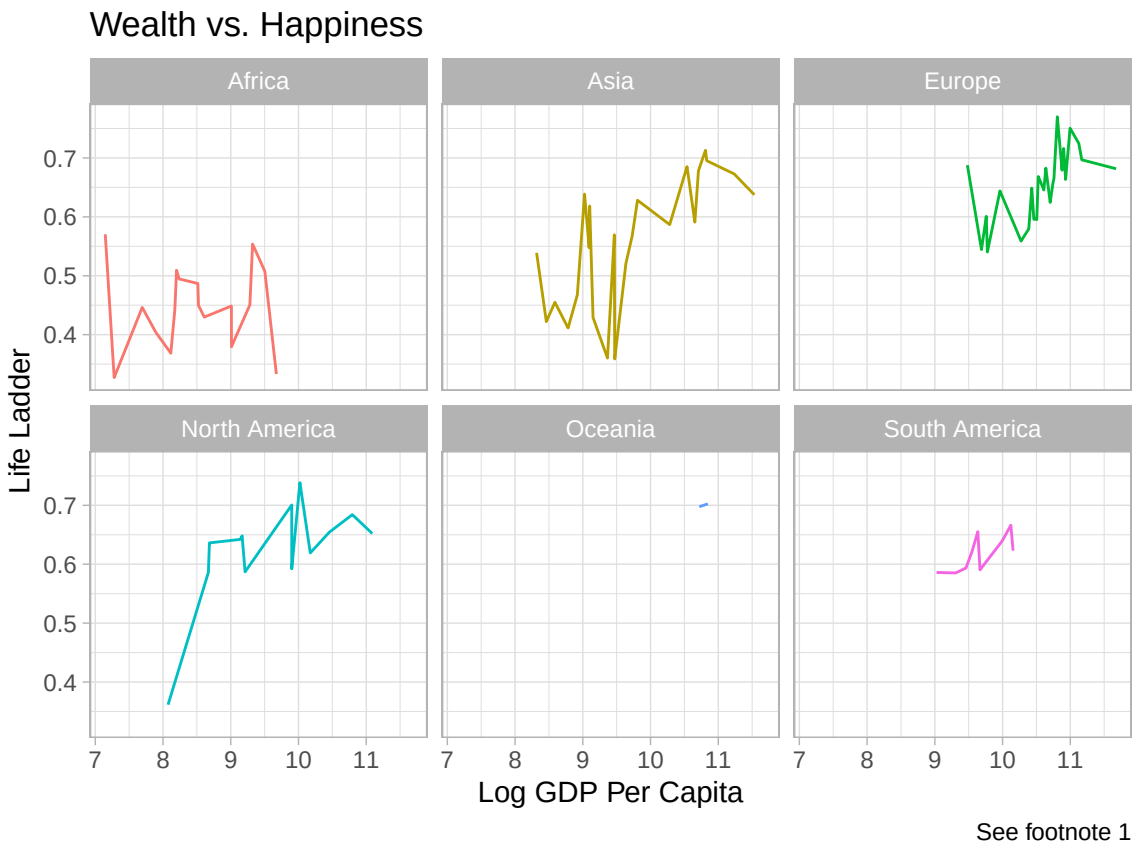

Figure 1: The correlation between how aware people are of climate change and how happy they are

The next insight that we found is shown in Hurricane Observations Count by Continent. To create this graph, we first had to use the coordinates of latitude and longitude to correspond the general coordinates of the 6 continents excluding Antarctica. We did this by creating our own function in which multiple ifelse statements were implemented to create a column corresponding to the continents. This allowed us to create the bar graph which we ordered by frequency of hurricanes. From this bar graph, we can see that North America overwhelmingly has the highest amount of hurricanes due to its proximity to the Atlantic basin and the equator, based on its geographical placement. As a result of the ranges that we used for latitude and longitude, select countries lie between continents and resultantly, conclusions cannot be effectively drawn from them.

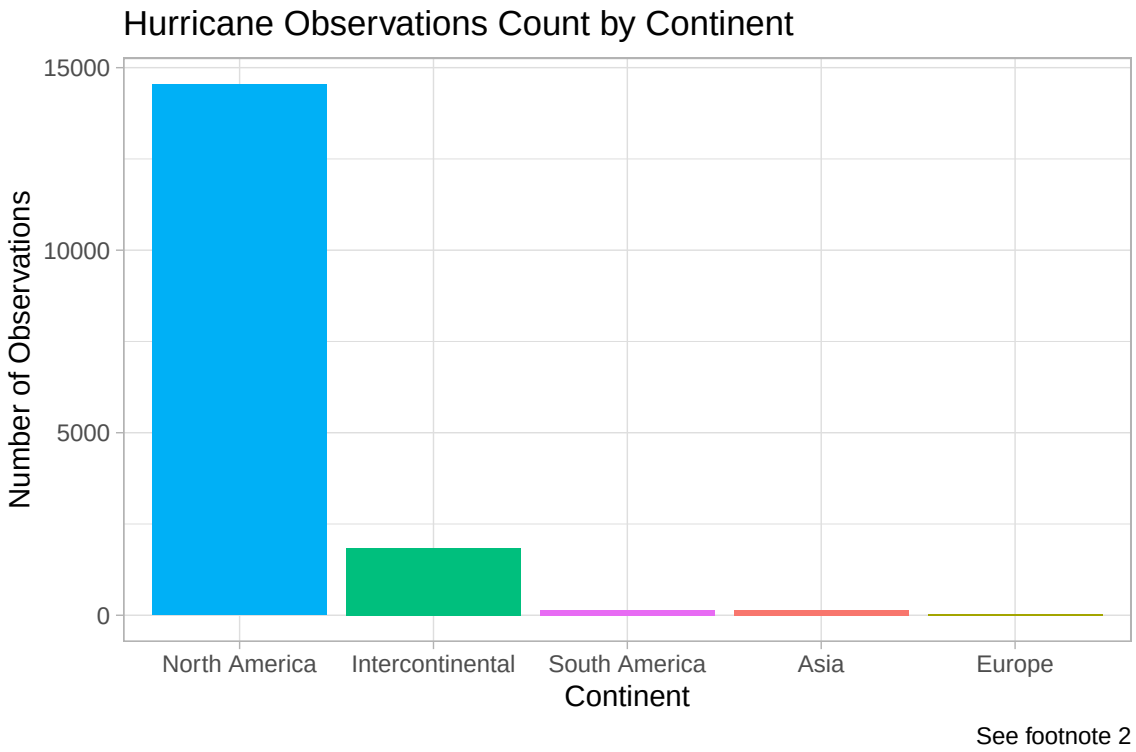

Figure 2: Number of Hurricane Observations by Continent

Finally, we will calculate the the correlation between climate change awareness and the life ladder scores of a country. This was completed using a summary statistic table in which we created an awareness score for countries to effectively compare it to happiness. The method is further explained in the insight regarding the table below the graph. We created a scatterplot in which the independent variable was climate awareness, and the dependent variable was life ladder. Moreover, we created a line of best fit for which we calculated the correlation coefficient to be 0.5072062, which indicates a strong correlation. Finally, we also colored the scatter plot by continents, which is visible in the legend, and emphasized Canada's placement which is skewed to the higher end of climate awawareness and happiness.

This insight is supported by the summary statistics in table. In this table, we calculated the awareness scores of countries by attributing a weight to each level of awareness, such that if everyone voted they are not aware, the score would be a 0. Moreover, if everyone voted that they are a little aware, then score would be a 0.33. If everyone voted that they are moderately aware, the score would be a 0.66. Finally, if everyone voted that they were very aware, the score would be a 1. This allows for the relationship between awareness and life ladder to be conveyed in an effective manner, allowing for a correlation to be identified. We also chose to color countries by continents in order to further analyze trends associated with countries.

Country	Continent	Aware Rating	Life Ladder
Albania	Europe	0.470	0.544
Algeria	Africa	0.409	0.554
Angola	Africa	0.411	0.379
Argentina	South America	0.515	0.639
Armenia	Asia	0.458	0.568
Australia	Oceania	0.648	0.702
Austria	Europe	0.706	0.664
Azerbaijan	Asia	0.514	0.521

Bangladesh	Asia	0.418	0.411
Belgium	Europe	0.616	0.694
Benin	Africa	0.338	0.442
Bolivia	South America	0.435	0.586
Bosnia and Herzegovina	Europe	0.608	0.601
Botswana	Africa	0.467	0.333
Brazil	South America	0.574	0.655
Bulgaria	Europe	0.592	0.559
Burkina Faso	Africa	0.389	0.446
Cambodia	Asia	0.338	0.422
Cameroon	Africa	0.364	0.495
Canada	North America	0.649	0.684
Chile	South America	0.534	0.623
Colombia	South America	0.412	0.590
Costa Rica	North America	0.527	0.738
Croatia	Europe	0.689	0.596
Cyprus	Europe	0.541	0.607
Czechia	Europe	0.488	0.683
Denmark	Europe	0.649	0.750
Dominican Republic	North America	0.397	0.592
Ecuador	South America	0.477	0.585
El Salvador	North America	0.391	0.648
Finland	Europe	0.760	0.770
France	Europe	0.653	0.656
Germany	Europe	0.719	0.679
Ghana	Africa	0.320	0.430
Greece	Europe	0.615	0.580
Guatemala	North America	0.337	0.642
Haiti	North America	0.293	0.361
Honduras	North America	0.375	0.586
Hungary	Europe	0.753	0.597
India	Asia	0.461	0.468
Indonesia	Asia	0.417	0.569
Iraq	Asia	0.397	0.548
Ireland	Europe	0.626	0.682
Israel	Asia	0.538	0.678
Italy	Europe	0.596	0.625
Jamaica	North America	0.407	0.587
Japan	Asia	0.595	0.591
Jordan	Asia	0.429	0.429
Kenya	Africa	0.414	0.450
Kosovo	Europe	0.379	0.688
Kuwait	Asia	0.384	0.713
Lebanon	Asia	0.424	0.359
Libya	Africa	0.391	0.597
Lithuania	Europe	0.669	0.655
Malawi	Africa	0.535	0.327
Malaysia	Asia	0.400	0.587
Mexico	North America	0.494	0.701
Morocco	Africa	0.434	0.449

Mozambique	Africa	0.345	0.570
Nepal	Asia	0.438	0.539
Netherlands	Europe	0.613	0.725
New Zealand	Oceania	0.583	0.698
Nicaragua	North America	0.405	0.636
Nigeria	Africa	0.330	0.487
North Macedonia	Europe	0.580	0.540
Norway	Europe	0.633	0.725
Oman	Asia	0.424	0.685
Pakistan	Asia	0.389	0.455
Panama	North America	0.442	0.654
Paraguay	South America	0.386	0.621
Peru	South America	0.493	0.594
Philippines	Asia	0.536	0.618
Poland	Europe	0.600	0.668
Portugal	Europe	0.596	0.595
Qatar	Asia	0.418	0.637
Romania	Europe	0.568	0.649
Saudi Arabia	Asia	0.439	0.695
Senegal	Africa	0.453	0.509
Serbia	Europe	0.632	0.644
Singapore	Asia	0.544	0.665
South Africa	Africa	0.470	0.508
Spain	Europe	0.536	0.646
Sri Lanka	Asia	0.512	0.360
Sweden	Europe	0.606	0.716
Switzerland	Europe	0.675	0.697
Tanzania	Africa	0.416	0.404
Thailand	Asia	0.422	0.628
Trinidad and Tobago	North America	0.489	0.619
Tunisia	Africa	0.422	0.451
United Arab Emirates	Asia	0.461	0.673
United Kingdom	Europe	0.635	0.666
United States	North America	0.639	0.652
Uruguay	South America	0.517	0.666
Uzbekistan	Asia	0.459	0.639
Zambia	Africa	0.479	0.369

Conclusion and Future Work

Through the graphical representation identified within each of our insights, we were able to identify three specific points that convey the relationship between happiness levels, climate awareness, and cyclones. The points are as follows regarding the overall conclusions, trends and limitation in our report.

As visible, the correlation factor is 0.5072062. When it comes to social sciences, a correlation factor greater than 0.35 is considered a strong correlation, and a factor of 0.5 is considered very strong. However, this may defer between contrasting areas of study. From this we can conclude that correlation does not directly imply causation, thus we suspect that the wealth of a country, which we analyzed in the first insight, may be a third factor that influences both climate awareness and happiness levels. This can be interpreted as the reason why the correlation between happiness and climate awareness is strong. Ultimately, the conclusion we can

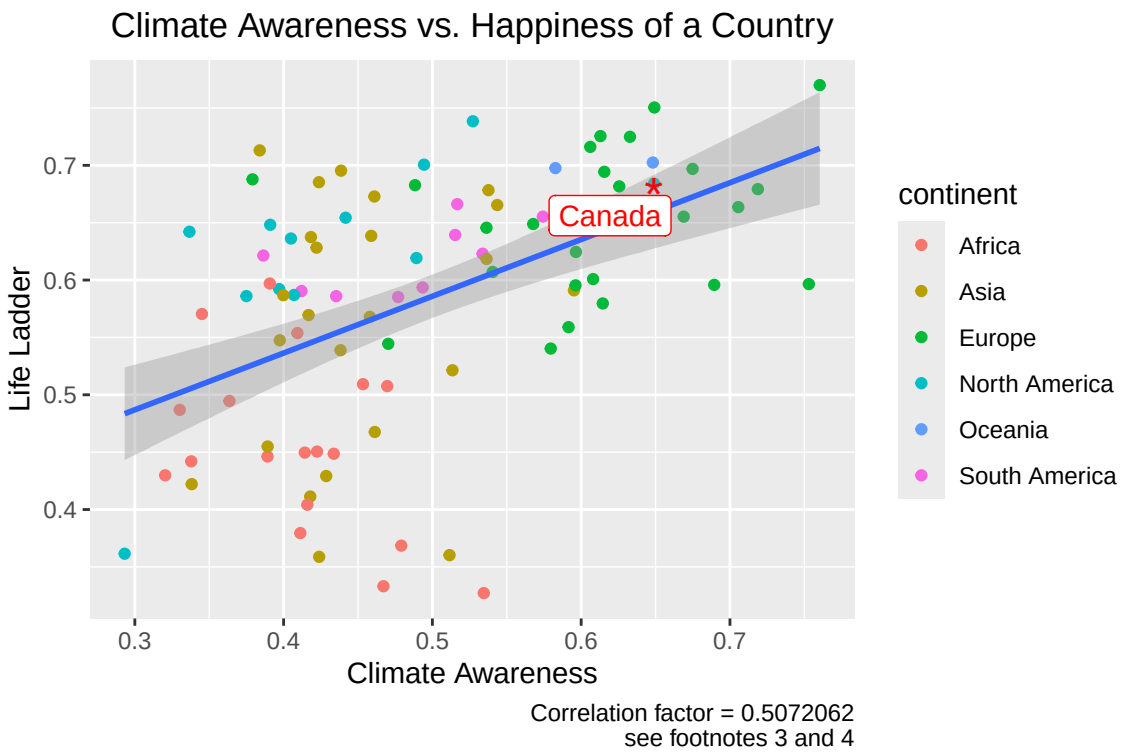

Figure 3: The correlation between how aware of climate change the people of a country are and how happy those people are

draw from this is that if a country exhibits a high climate awareness score, there is evidence that indicates the education and literacy rate of the the country is relatively high due to having a higher average wealth per population. This connects to happiness because countries that have social services and an education system are wealthier, therefore they may be inherently happier, having greater knowledge of climate awareness.

Evidently, a trend that we may notice among continents is that Asia and Africa tend to be lower on the life ladder, and have a lower score of climate awareness. While continents such as North America and Europe tend to be higher in both aspects, this supports our previous correlation as said continents tend to have higher GDP levels. Through our second insight, it can be inferred that the frequency of cyclones affecting a continent does not have any major correlation to happiness levels and climate awareness. If cyclones affected happiness and climate awareness, North America would be the lowest on both of these metrics because it receives the most amount of cyclones, which does not agree with our first and third insights.

Because of the methods we used to organize countries into continents for the cyclone data, we were unable to establish strict boundaries based on the longitude and latitude as continents are not simple shapes, rather they inhibit complex borders. We were also unable to properly analyze the correlation between cyclones and climate awareness as well as happiness levels due to our inability to create a function that would allow us to summarize the frequency of cyclones. All data sets lacked data pertaining to specific years, corresponding to the data points. This heightened the difficulty to pinpoint any correlations over time.

References

1.U.S. Department of Commerce 2.NOAA Cyclone/Hurricane Data 3.2022 Climate Change Opinion Survey 4. World Happiness Report Score (from 2023 report) 5.The relevance to the insights is from «Physical Map of the World Continents - Nations Online Project», url: <https://www.nationsonline.org/oneworld/continents_

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