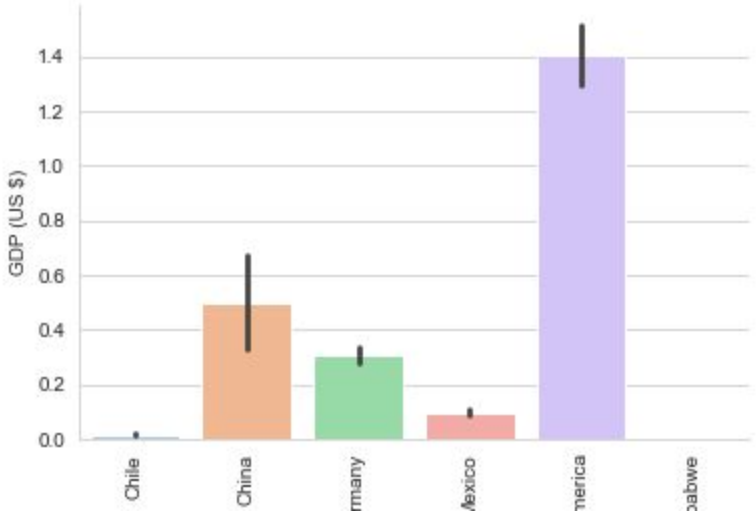
GDP and Life Expectancy - Is There a Correlation?

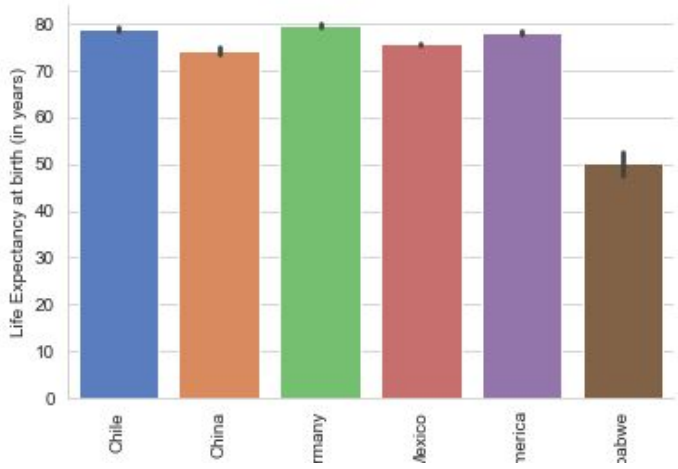
Data on Gross Domestic Product (GDP) and Life Expectancy were analyzed for 6 countries over 15 years. Here is what we found.

Gross Domestic Product (GDP) measures economic activity of a country and is calculated by imports, exports, consumer spending, and other variables. Life expectancy measures how long, on average, an organism is expected to live by taking into several factors like health, demographics, and region. We examined GDP and life expectancy data from 6 countries (Chile, China, Germany, Mexico, United States of America, and Zimbabwe) from the years 2000 up to and including 2015.

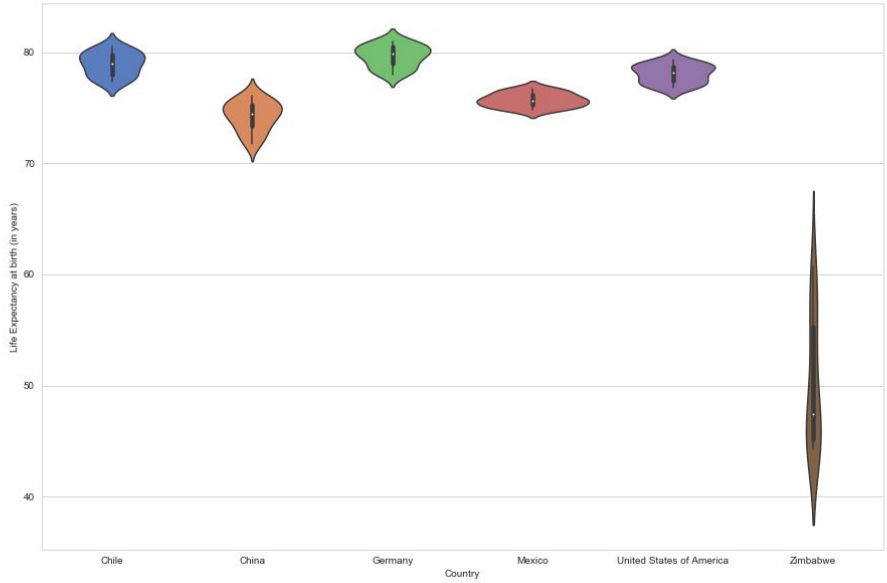
We initially examined the data on average GDP (measured in current US dollars, trillions) for the 6 countries and displayed the data on a bar graph. The United States of America has the highest average GDP, while Zimbabwe has the lowest average GDP.



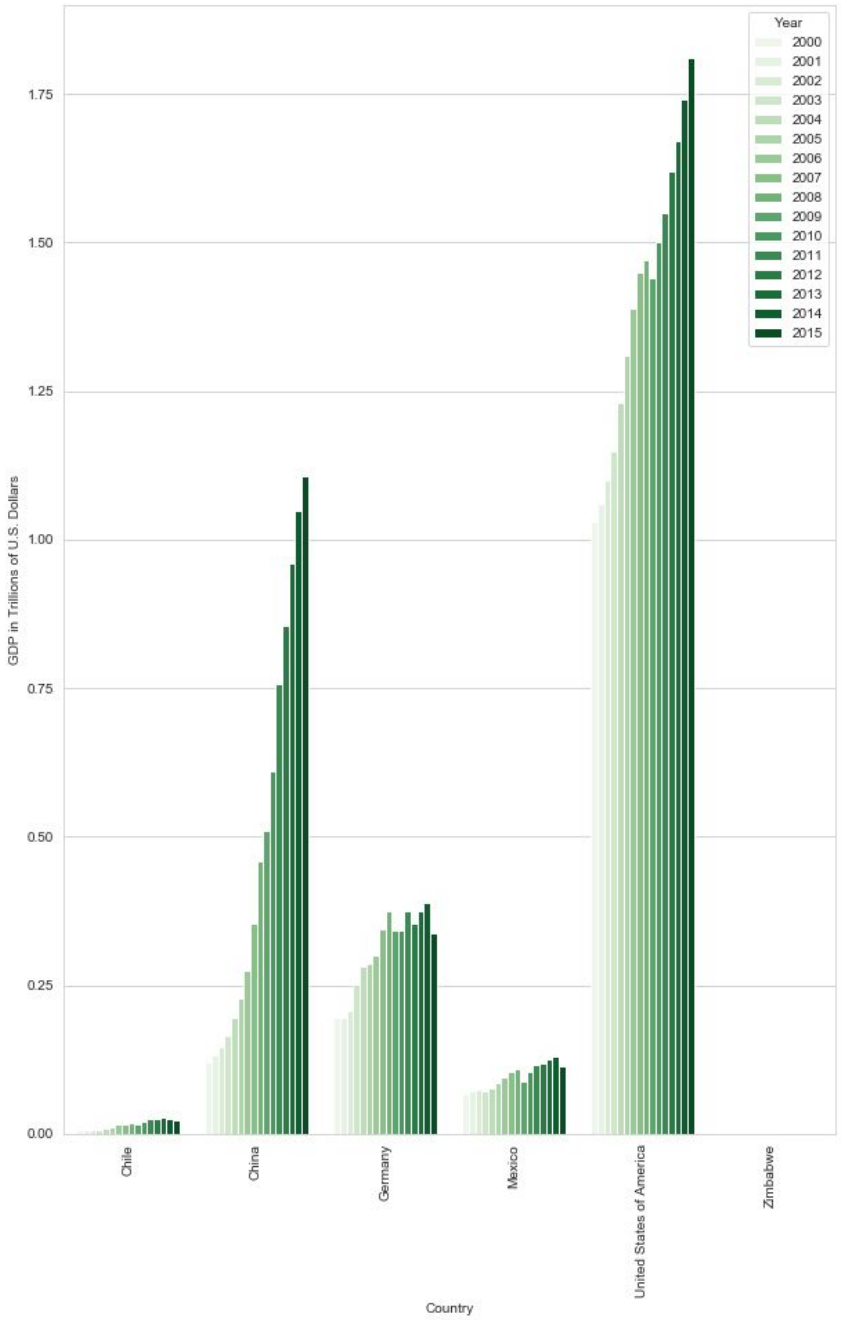
We also examined the data on average life expectancy (at birth, measured in years) for the 6 countries. The graph shows that Germany has the highest average life expectancy, while Zimbabwe has the lowest average life expectancy.

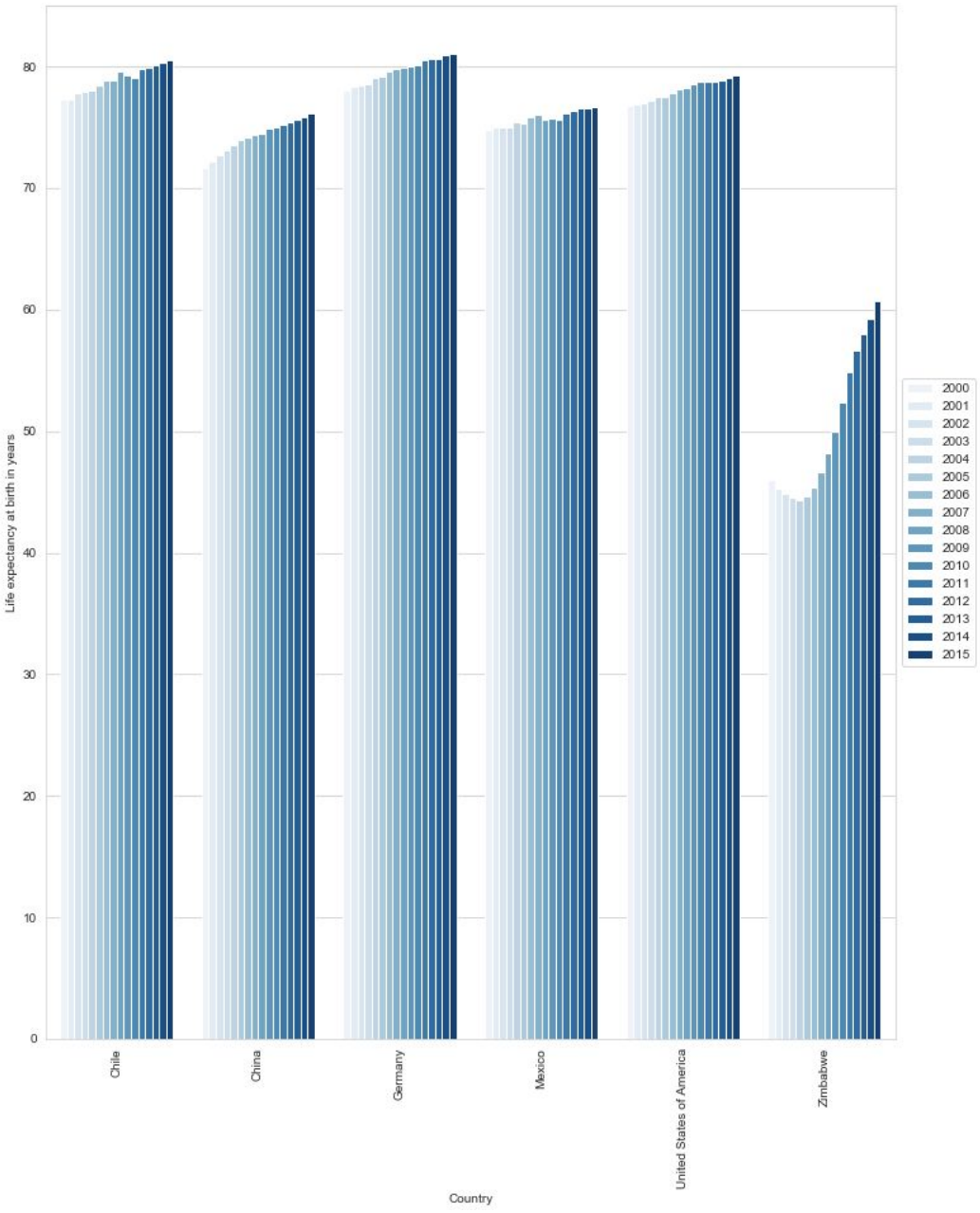


These data do not necessarily tell us everything. There may be several outliers driving the averages. We plotted the data using a violin plot to get a clearer idea of data distribution. They show us the medians, ranges, and variabilities for life expectancy of the 6 countries represented in the dataset. As we examine this plot, we quickly see that Germany's median life expectancy is the highest of the six countries, though Chile, China, Mexico, and the United States also have high life expectancy medians. The shape of each violin represents frequencies. Five of the countries have smaller shapes with concentrations around the median. This tells us that the frequencies of distribution are close and have not changed much over the 15 years. Zimbabwe displays the greatest change in life expectancy over time as its' elongated shape represents varying frequencies. Zimbabwe's life expectancy changed the most perhaps indicating economic growth, improved health conditions, and other factors may contribute to this increase.



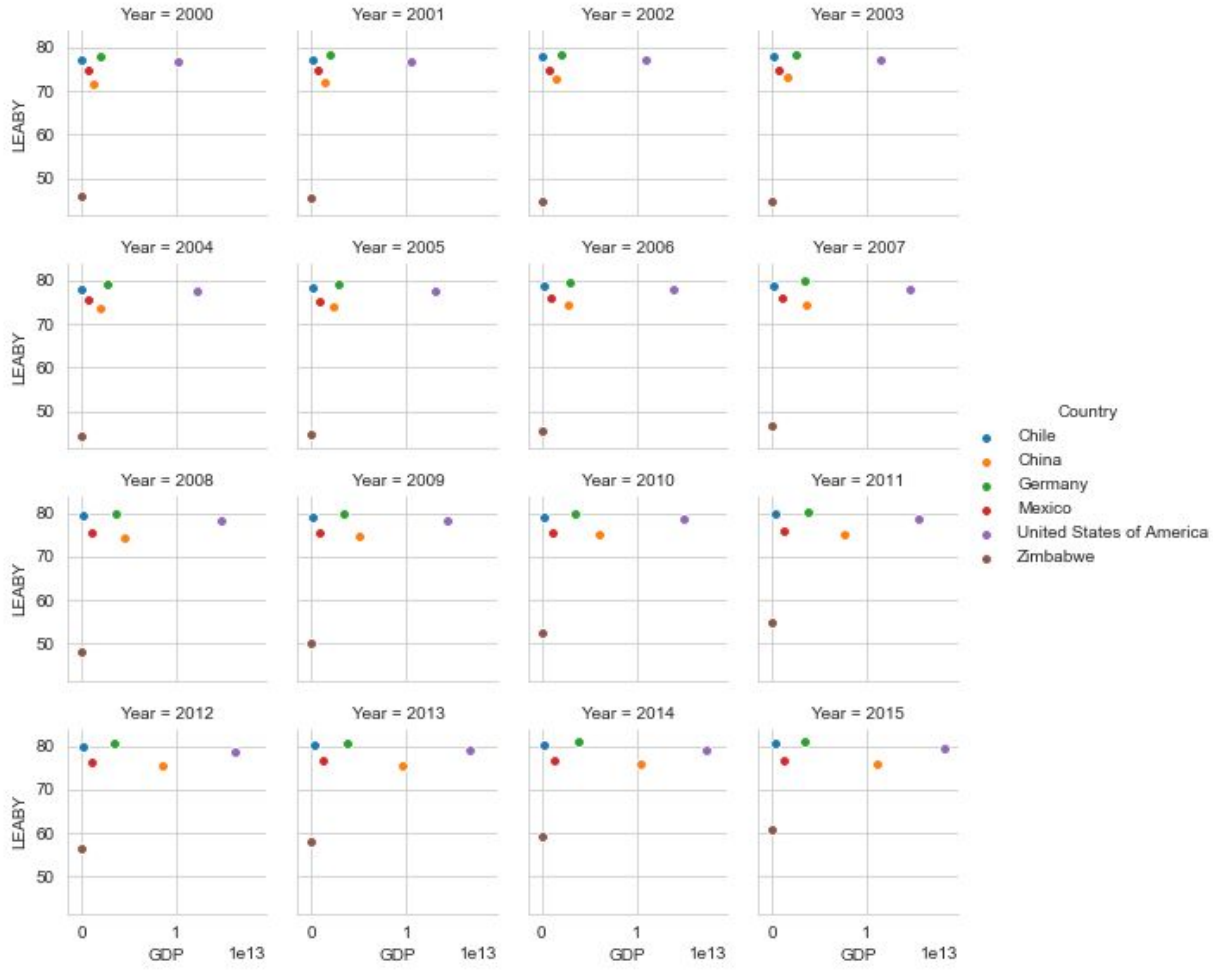
To illustrate the change in GDP and life expectancy for each country over time, the data were plotted on a bar plot with each bar representing a year in the dataset. These plots clearly illustrate that all six countries experienced growth in GDP from 2000 to 2015, with China and the United States experiencing the most growth over this time period. Life expectancy also had a modest increase during this time period for Chile, China, Germany, Mexico, and the United States. Though Zimbabwe currently has the lowest life expectancy of all six countries, it experienced the most change from 2000 to 2015.





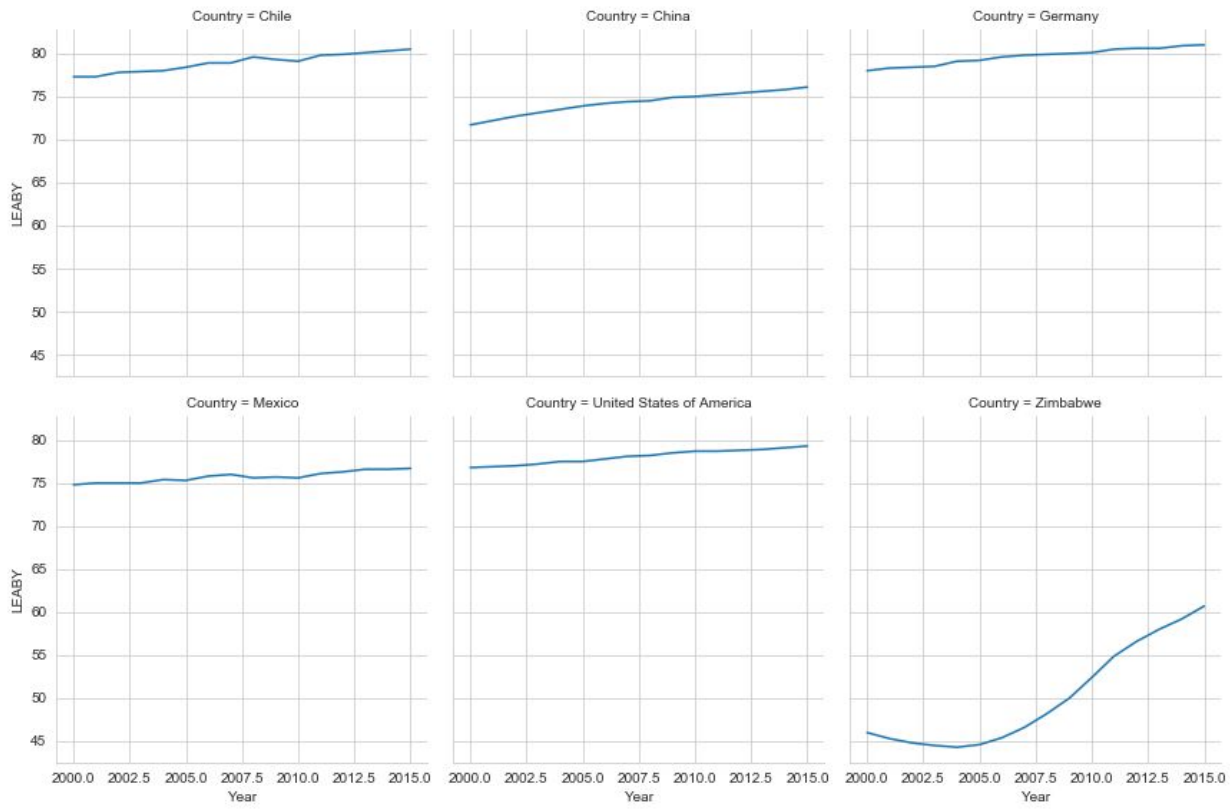
Is there a correlation between GDP and life expectancy? We created scatter plots to examine this further. The United States moves the most (along the x-axis, representing GDP) of all

countries. Zimbabwe moves along y-axis (life expectancy) the most of all countries represented.



The United States dominant GDP and China's rapid growth in GDP are not that surprising, though many might find Zimbabwe's dramatic increase in life expectancy quite surprising. This could be due to improved economic conditions, improved access to health, and other factors. Admittedly, these plots are not very easy to read and interpret.

Let us illustrate these data with a line graph for each country's GDP and life expectancy. The first line graph shows life expectancy (blue line) of each country over time. Zimbabwe's life expectancy line changes the most over time with the biggest changes occuring from 2005 to 2015. The country with the least change in life expectancy is Mexico. The second set of graphs show GDP (green line) for each country over time. China and the United States GDP changes the most over time, while Zimbabwe's GDP changes the least.


Country = Chile
Country = China
Country = Germany
Country = Mexico
Country = United States of America
Country = Zimbabwe
LEABY
Year
45
50
55
60
65
70
75
80
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0


Country = Chile
Country = China
Country = Germany
Country = Mexico
Country = United States of America
Country = Zimbabwe
1e13
GDP
Year
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0

It appears there is a modest correlation between GDP and life expectancy, whereas GDP increases, life expectancy modestly increases over time. Though, this connection isn't so clear with Zimbabwe. Zimbabwe saw small growth in GDP, yet had the greatest change in life expectancy for the period of the dataset. This could be due to decreased HIV infections and continued improvements of the country's health and economics systems. Also, the data are only from a 15 year period. In doing my exploration on my own, I found that Zimbabwe's life expectancy ebbed and flowed over and the life expectancy in the mid 1980s was almost as high as it is 2017. In conclusion, I don't think we can make a strong correlation for GDP and life expectancy given the data are for only six countries and only over a 15 year period.