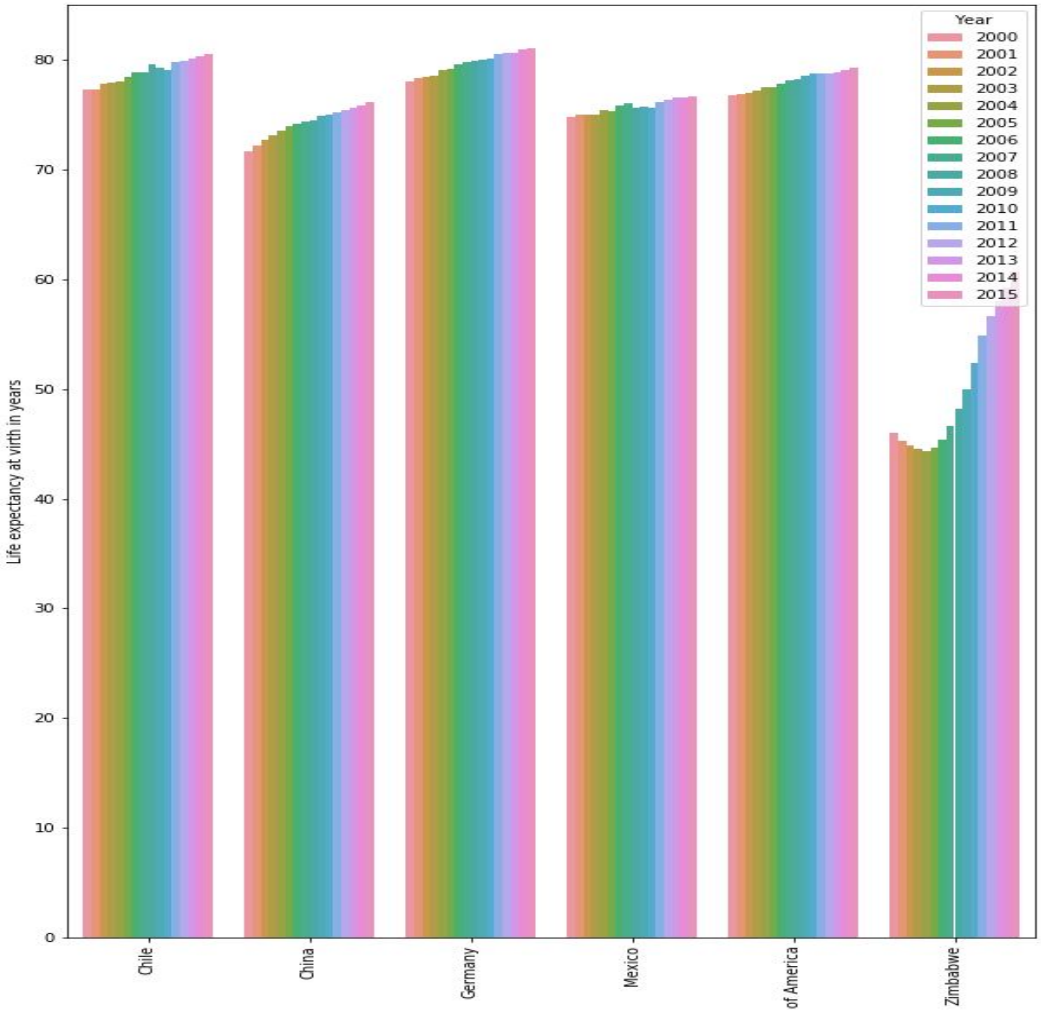
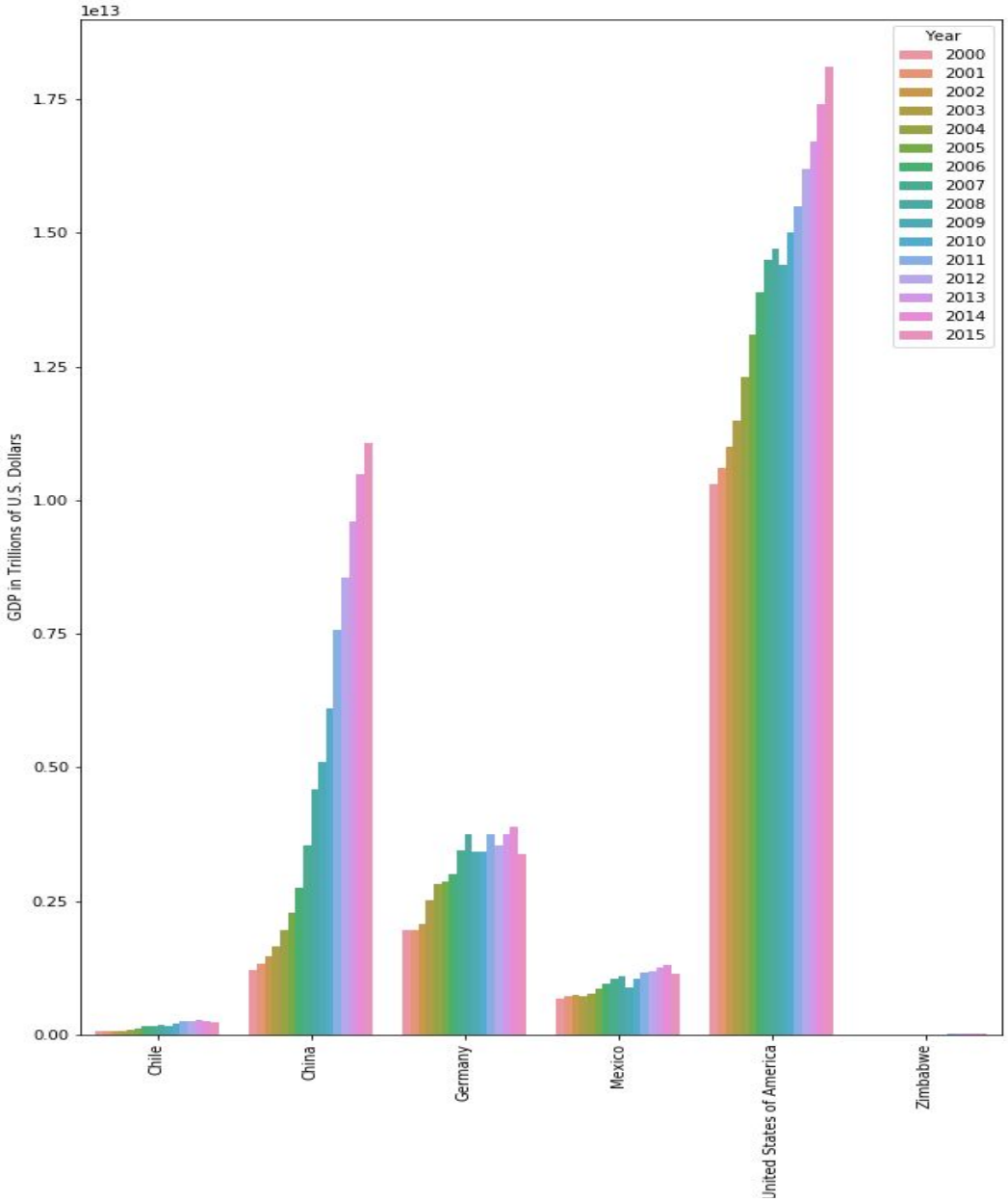
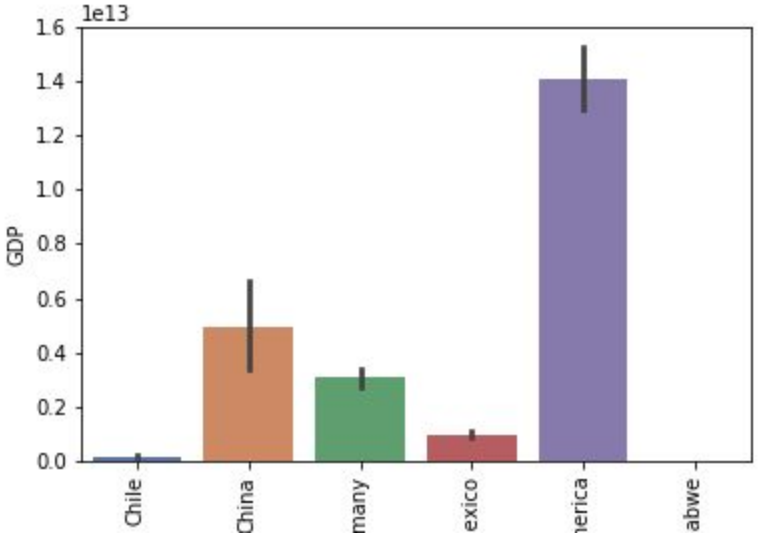
GDP vs. Life Expectancy: A complex relationship

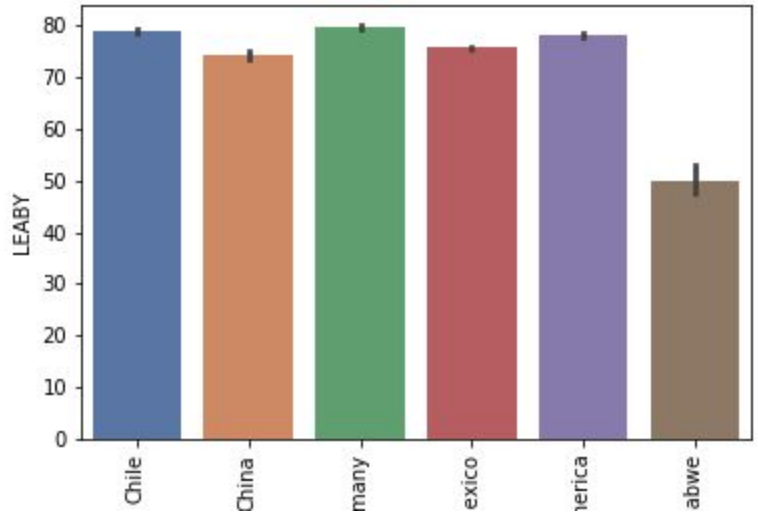
The relationship of GDP (Gross Domestic Product) and Life Expectancy should be fairly straightforward. One might imagine that when a country has more wealth, that it would show a corresponding increase in general quality of life, including life expectancy. The following two bar charts showing Life Expectancy over time and GDP over time, respectively, demonstrate in a very general way what we would expect it to. As GDP rises, so does life expectancy. But on closer examination, the relationship is not a direct one. Notice Zimbabwe, which has a large rise in life expectancy but a very small rise in GDP. Or Chile, which has a very high life expectancy given its low GDP.


Year
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Life expectancy at virth in years
0
10
20
30
40
50
60
70
80
Chile
China
Germany
Mexico
of America
Zimbabwe

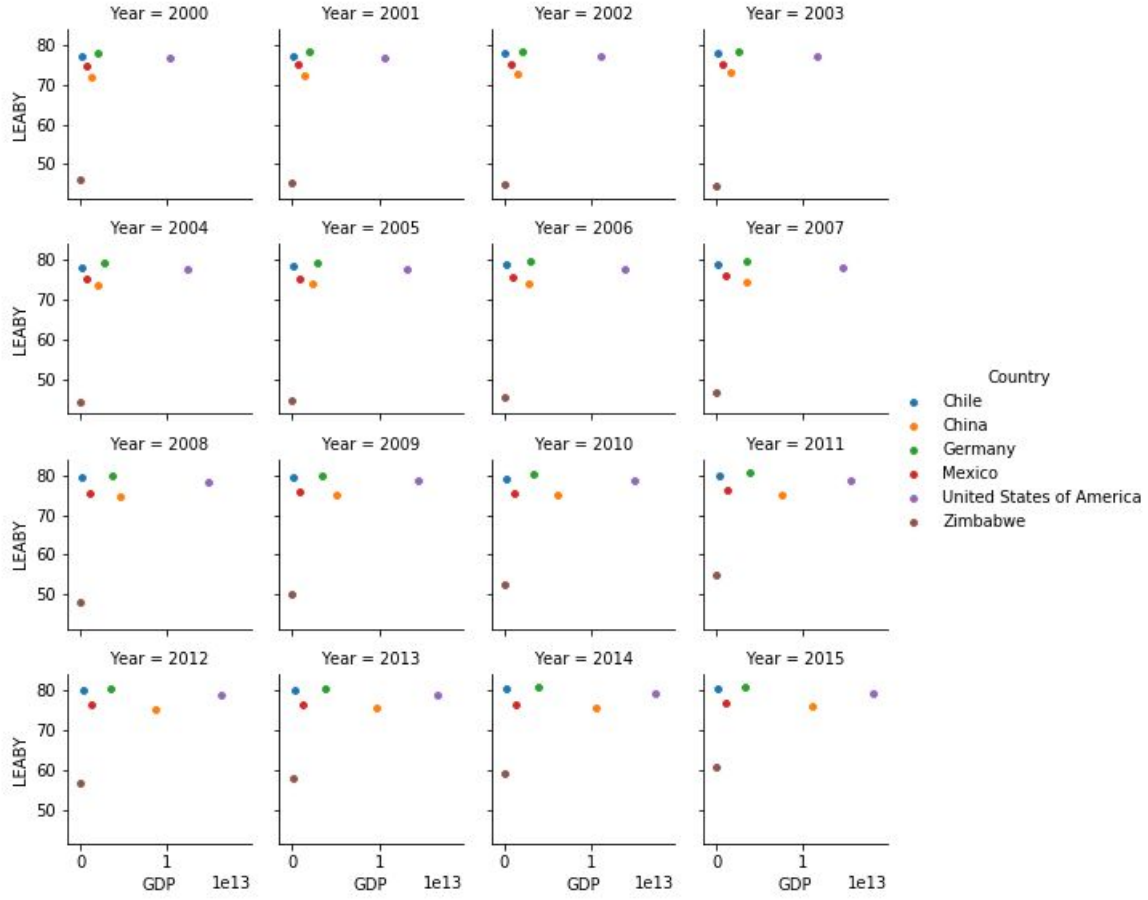


As we see in the following two bar graphs, using the same data provided from the World Health Organization and the World Bank, we begin to see the complexities of the relationship. Chile's very high life expectancy and low GDP are more obvious here, as are the similar circumstances of Zimbabwe and Mexico. Chile and Mexico have diets that differ greatly from the average diet in The United States, focusing on whole grains, vegetables, and beans. They also are both countries with universal healthcare. These local differences might account for the higher life expectancy with the relatively low GDPs.

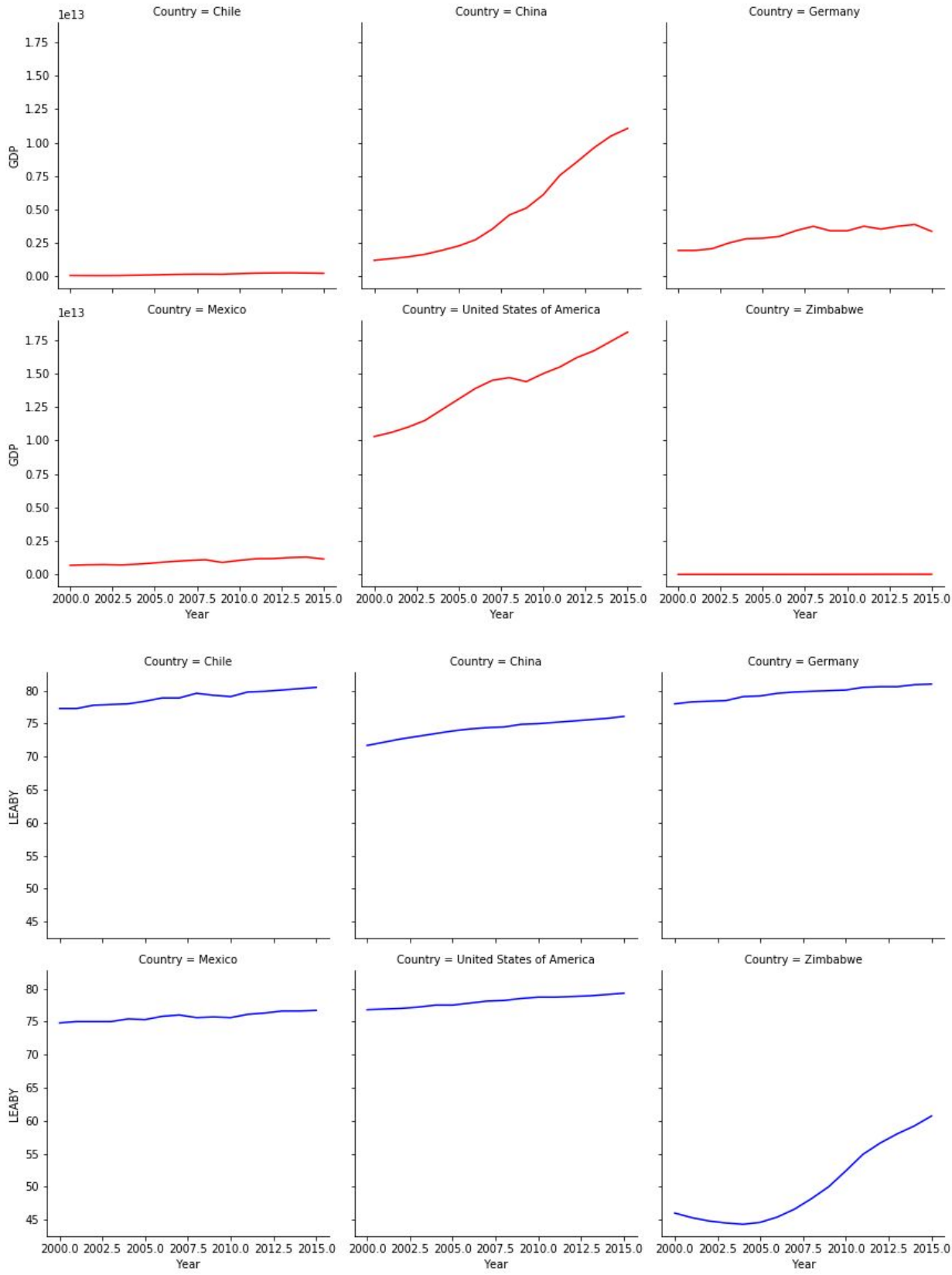

1e13
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
GDP
Chile
China
many
exico
erica
abwe


80
70
60
50
40
30
20
10
0
LEABY
Chile
China
many
exico
erica
abwe

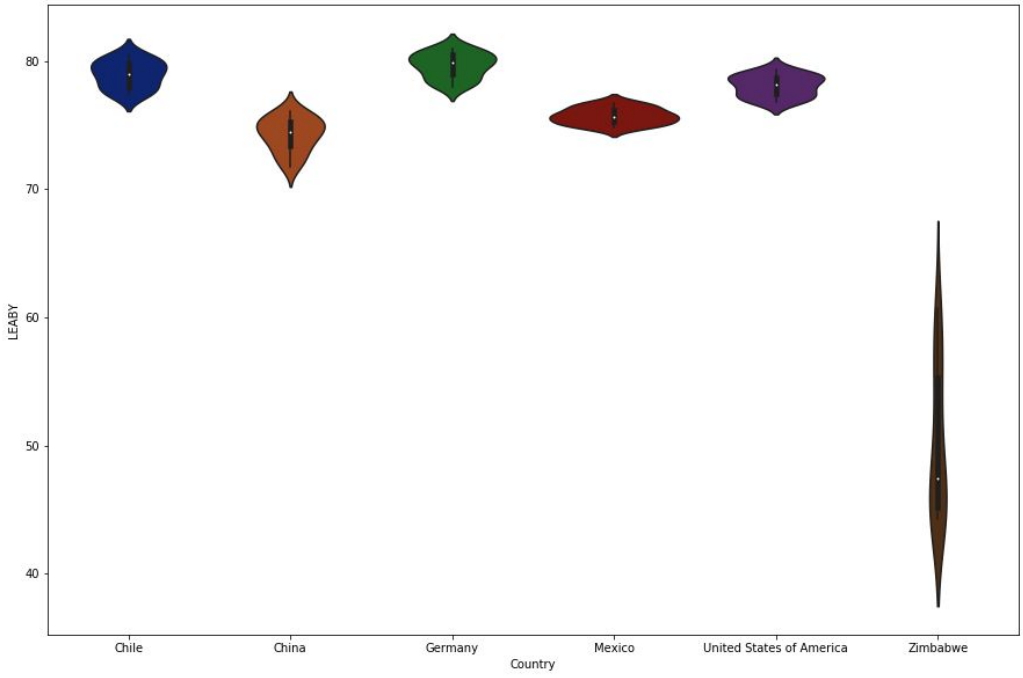
In this scatter plot, we can see China's rise in GDP very clearly, as it moves across the graph each year while staying at around the same level in life expectancy. Zimbabwe, likewise, moves clearly upwards to show its rising life expectancy while staying at around the same GDP. Clearly, the relationship is not as direct as one might assume at a first glance at the data.



These line graphs are perhaps the most easy to read when seeing the variation, in some of the countries studied, between their GDPs and life expectancies over time. Note China's relatively steady quality of life, indicating that the population had what they needed to live in relative health. Now examine its dramatic rise in GDP over the same period. Indicating that China's heavy investment infrastructure and their banks' lending power worked to keep China growing through the financial crisis, but only above an already relatively high level of general health and financial well being. We can also see Germany's fluctuating economy and a lack of corresponding fluctuations in their life expectancy. And Zimbabwe's great rise in life expectancy with a lack of increasing economy is also clear here. But we lack more specific data to explore the issue further.


Country = Chile
Country = China
Country = Germany
Country = Mexico
Country = United States of America
Country = Zimbabwe
1e13
GDP
LEABY
Year
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
45
50
55
60
65
70
75
80
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0

This violin plot gives us some more information. We can see the distribution of Zimbabwe's life expectancy with only a few years studied rising above 60 years of age, and in most years studied the country's life expectancy staying in the 40s or early 50s. It lets us know there has been more fluctuation in Zimbabwe but again our data lack the depth to understand why. With only life expectancy and not information on why people are dying, we are unable to say what the rise in Zimbabwe's life expectancy over time is due to if not GDP. We could also gather more data on the amount of money being spent on healthcare, local diets, disease outbreaks, and the great many other things that contribute to a country's life expectancy. These data show us there is a distinct correlation between GDP and life expectancy, but that we would need more data, likely much more, to fully understand that relationship.



Congressional research service- https://fas.org/sgp/crs/row/RL33534.pdf
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https://www.weforum.org/agenda/2016/06/how-has-china-s-economy-changed-in-the-last-10-years/
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