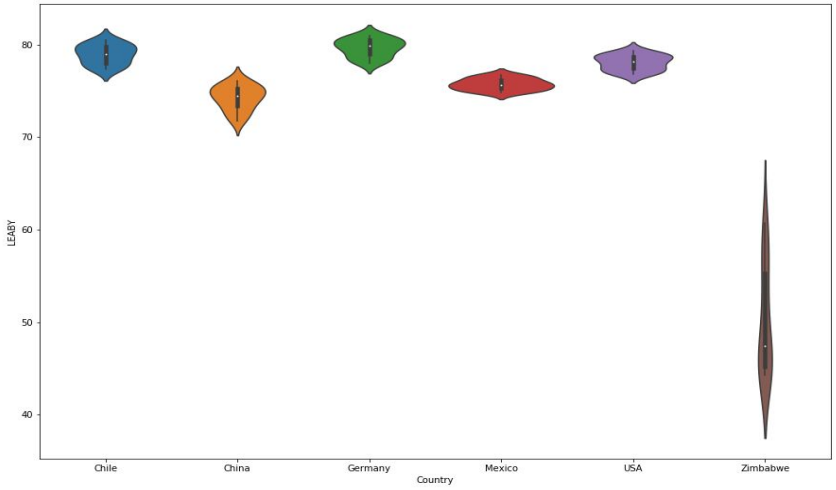
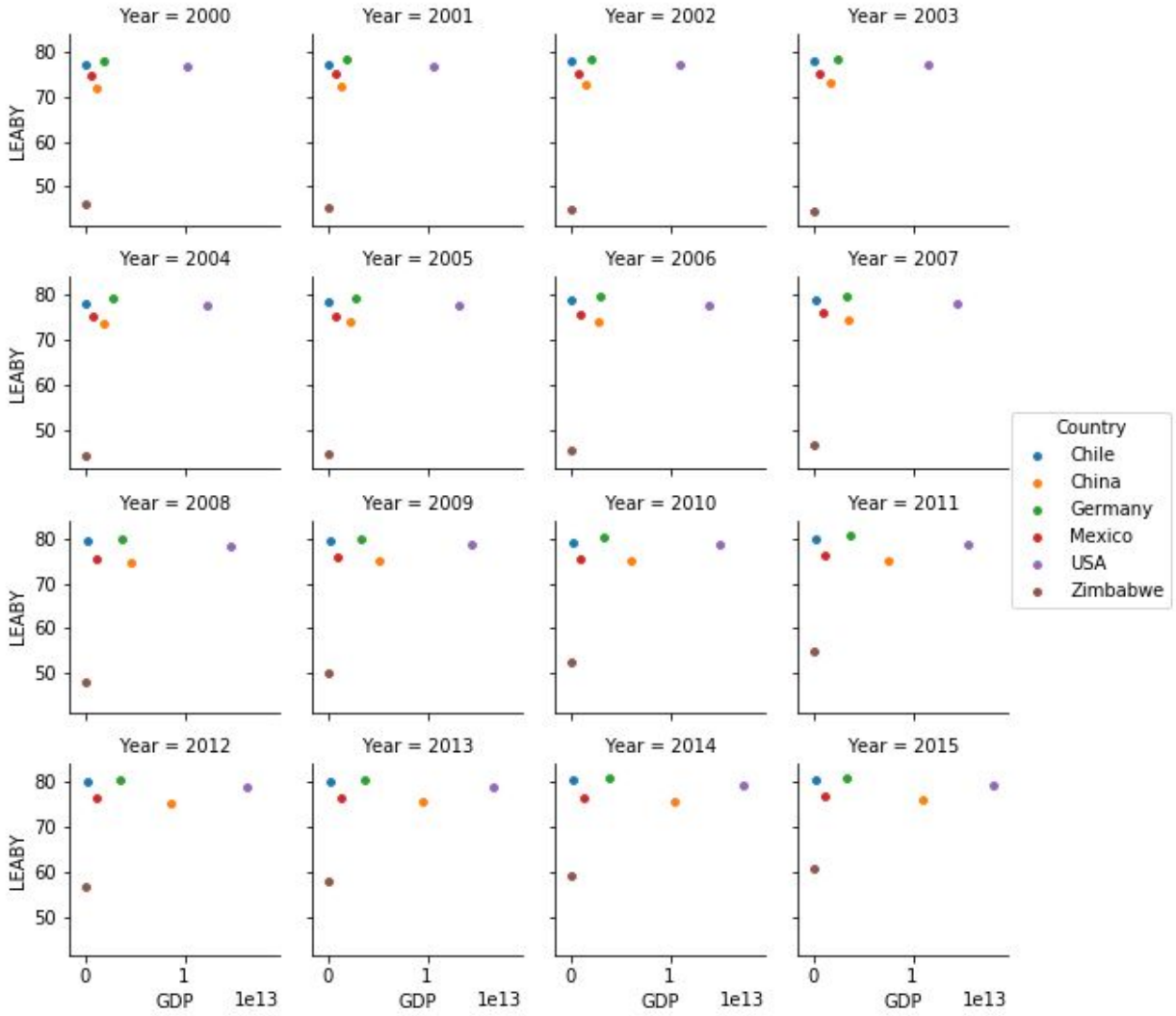
Revealing Correlations between Life Expectancy and Gross Domestic Product.

Gross domestic product(GDP) is an important variable in any country's economy. GDP represents the total value of goods produced and services provided in a country during one year. In this research, World Health Organization scientists investigated the correlations between life expectancy of the countries citizens and gross domestic product for the following countries: Chile, China, Germany, Mexico, USA, and Zimbabwe. The data were collected over 15 years from 2000 to 2015. The scientists are trying to understand how GDP was changed over the years and how these changes were reflecting life expectancy of the people in these six countries. One of the biggest question is what can be done in order to increase these variables and make people live longer on average?

First, consider the following plot representing life expectancy by country (in years) versus country. White dot on each of these plots represent the median life expectancy age. For example, Chile's expected life age is around 78, China: 75, Germany: 79, Mexico: 76, USA: 77, and for Zimbabwe around 48. Unfortunately, Zimbabwe's life expectancy median age is quite low. However, there are good news for Zimbabwe citizens: their life expectancy increasing rate is one of the fastest among 6 considered countries! The fact is evidenced by the longitudinal spreading of the Zimbabwe violin plot. Indeed, Zimbabwe life expectancy is growed a lot over 15 years and will be reaching average's world curve hopefully soon.

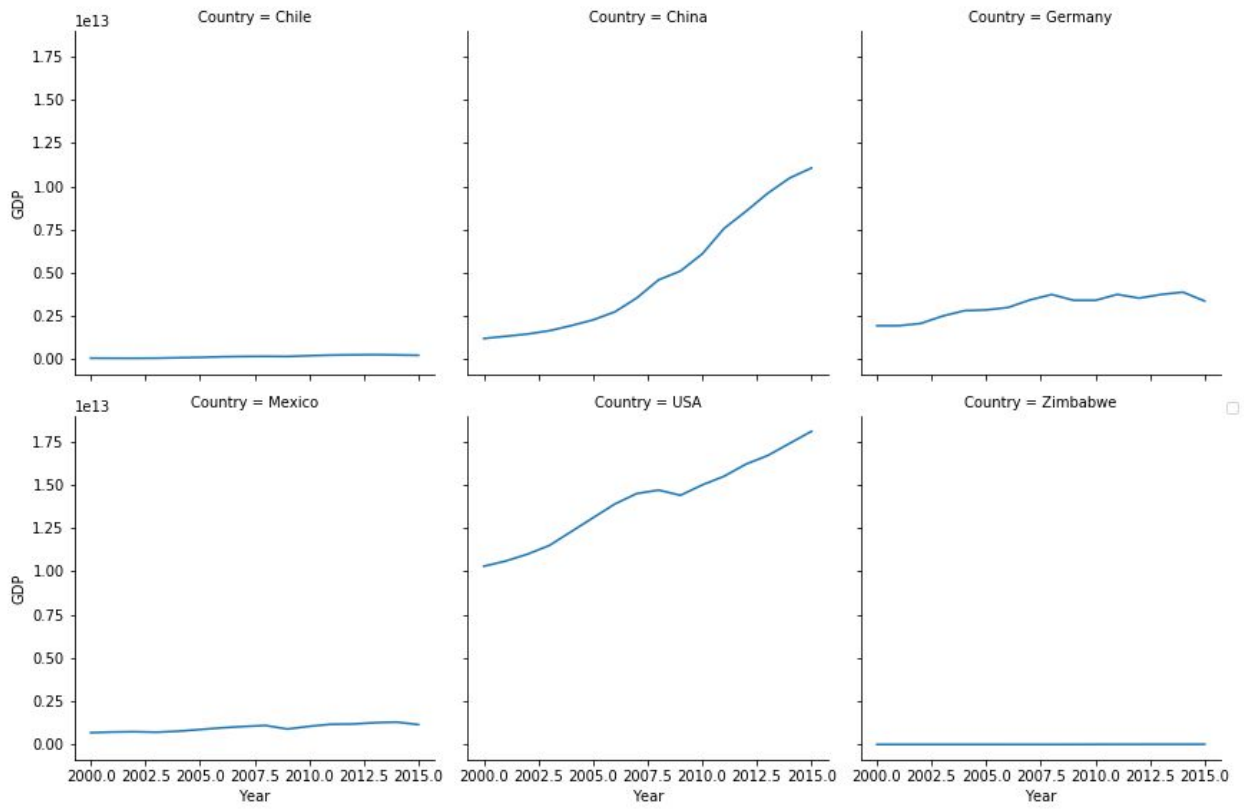


Now, let's investigate the face grid of scatter plots mapping GDP as a function of Life expectancy by country.



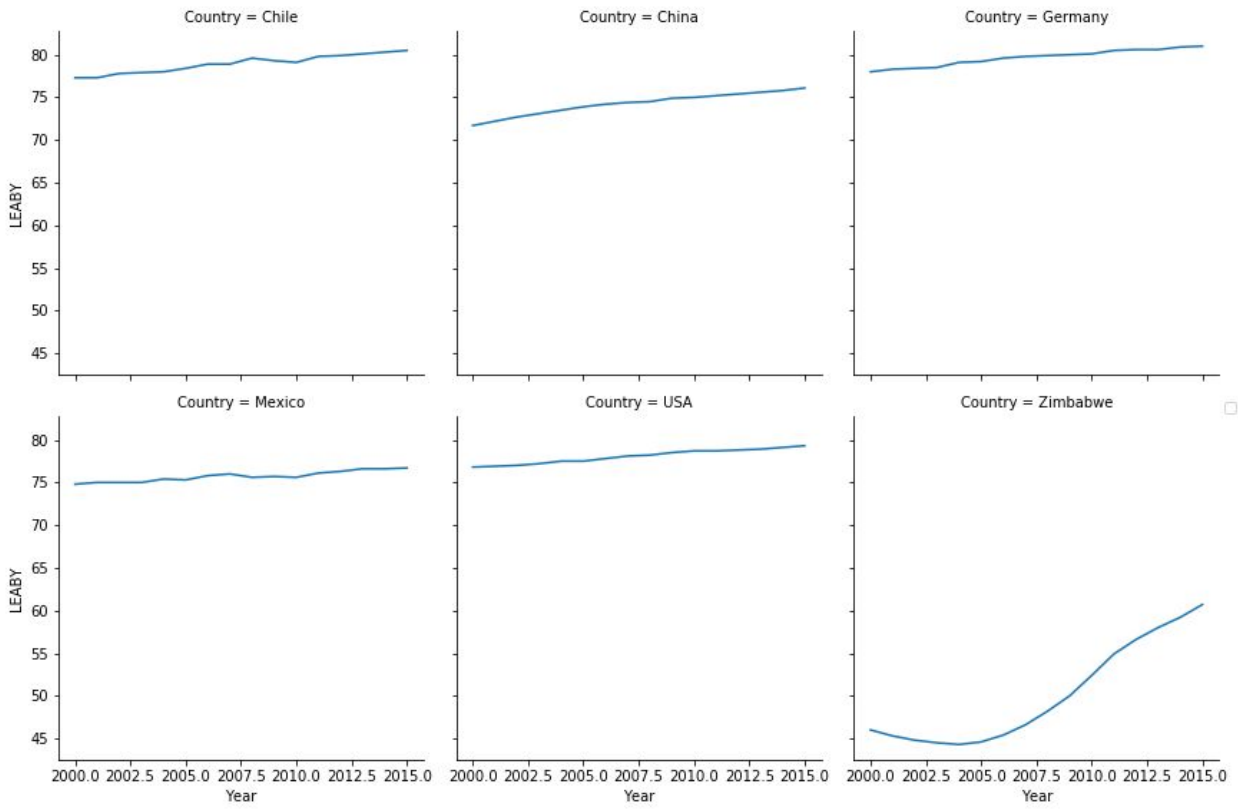
According to these plots, gross domestic product rate was changing pretty fast for the United States. However, it didn't affect that much life expectancy of US citizens. Indeed, starting from year of 2000, life expectancy was about 78 , and in 2015 it stays around the same value. So far, the data shows that GDP increasing didn't improve nor worsen life expectancy in the United States. Another example is Zimbabwe, where GDP wasn't changing over 15 years, while life expectancy was increased dramatically. Indeed, in 2000, Zimbabwe citizens lived on average up to 45 years; and by 2015, most people reached age of 62.

Next, let's look at the facegrid line graphs mapping GDP by country:



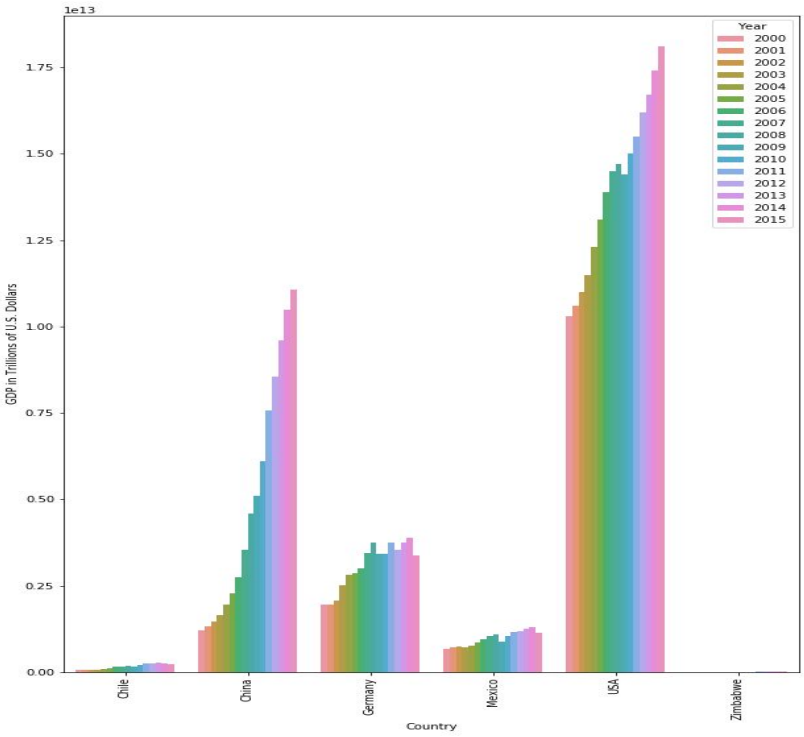
According to the information gotten from these plots, China's GDP rate was increasing faster in comparison to other presented countries. USA's GDP rate is also relatively high, but increasing almost linearly (if you ignore the bump around year of 2007). Mexico, Chile, and Zimbabwe GDP increasing is quite slow.

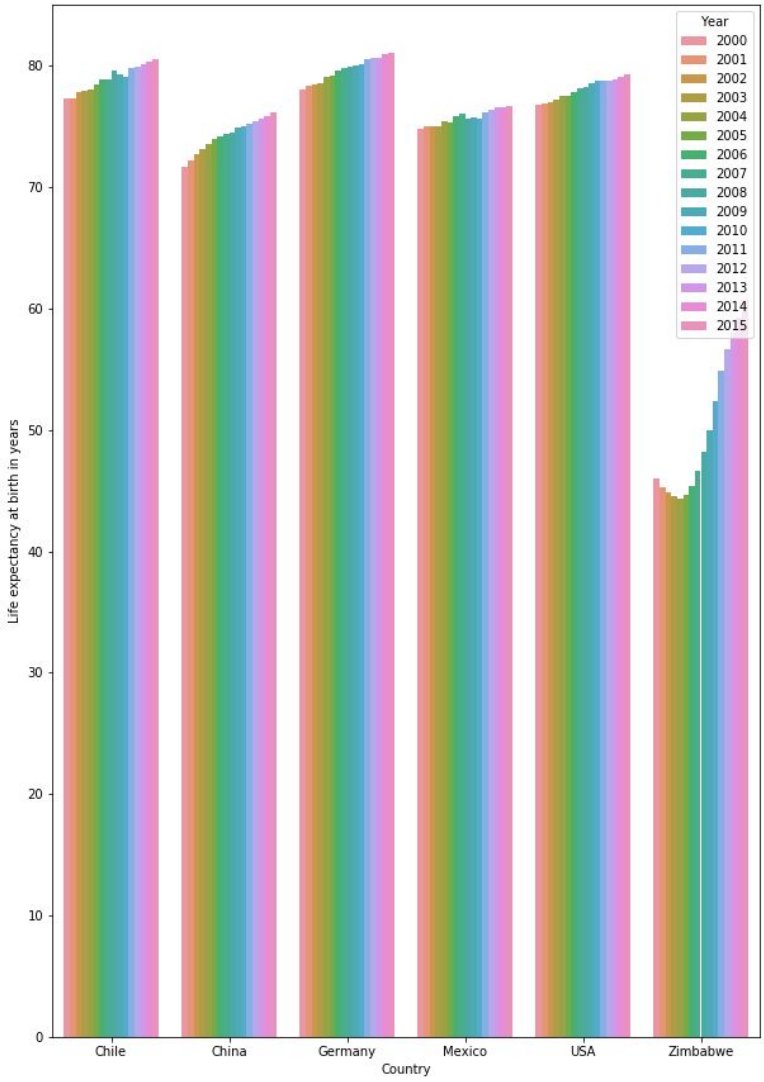
Now, let's investigate similar plots for these countries but for life expectancy:



As we noted before that USA's GDP was changing a lot over 15 years, life expectancy stays about the same. However, for Zimbabwe life expectancy was increasing very fast, but GDP stays the same over these years.

Next, let's explore the bar plots in order to see the changing curves for GDP and Life expectancy by country:


1e13
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
GDP in Trillions of U.S. Dollars
Year
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Chile
China
Germany
Mexico
USA
Zimbabwe
Country



Again, these plots gives us the same message over and over: GDP and Life expectancy have unclear correlation. For some of the countries like USA, and Zimbabwe there was no correlation; however, for other countries like Germany, Chile, China, GDP was slightly increasing over 15 years as well as life expectancy. Despite on that, they don't seem to be having unclear correlation.

Possible factors why increasing rate for GDP wasn't affected life expectancy for these countries is that we need to include more variables into research. Clearly, GDP

can't alone to improve life expectancy, but it's also clear that it should affect citizens lives overall. Probably worsen GDP combined with bad access to the medicine and wars would definitely have strong correlations with life expectancy of the citizens. Taking closer look into Zimbabwe's history between 1980-2000 years, the civil war inside the country and fighting for independence badly affected the whole country's economy, GDP, and lifestyle. Many civilians got killed over these years. As the result, Zimbabwe's life expectancy rate was falling down from 1940 (according to google public data for life expectancies by country) up to 2005. Year of 2005 is the lowest life expectancy point since 1900! (according to google data). Next, once the war stopped, the country slowly is raising it's GDP and life expectancy, as well as the economy, access to the medicine and education, and other goods. That's' why for future studies is important to have an access into bigger data sets (let's say from 1900 up to now for Zimbabwe, so the data sets were interpreted more clearly).

Another example is the United States. There were no war on the US territory over these 15 years and beyond, so that explains why life expectancy was relatively higher, for instance, in comparison to Germany, which had unstable economic situation after the Second World War.

To improve reliability of the studies, ones need to access more data for their research, take into account cultural and historical background of the researching countries, and take into account access to the medicine as well as average living conditions.

References:

https://www.bbc.com/news/world-africa-14113618