

life_expectancy_gdp

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Portfolio Project using Python with Jupyter Lab

1 Life expectancy and GDP Project

The purpose of this project is to investigate the relationship between life expectancy and Gross Domestic Product (GDP) in six countries strategically selected to represent diversity in the world. Five key questions will be answered to see that relationship.

1.1 Scoping Project

- 1) Has life expectancy increased over time in the six nations?
- 2) Has GDP increased over time in the six nations?
- 3) Is there a correlation between GDP and life expectancy of a country?
- 4) What is the average life expectancy in these nations?
- 5) What is the distribution of that life expectancy?

1.2 Loading Data

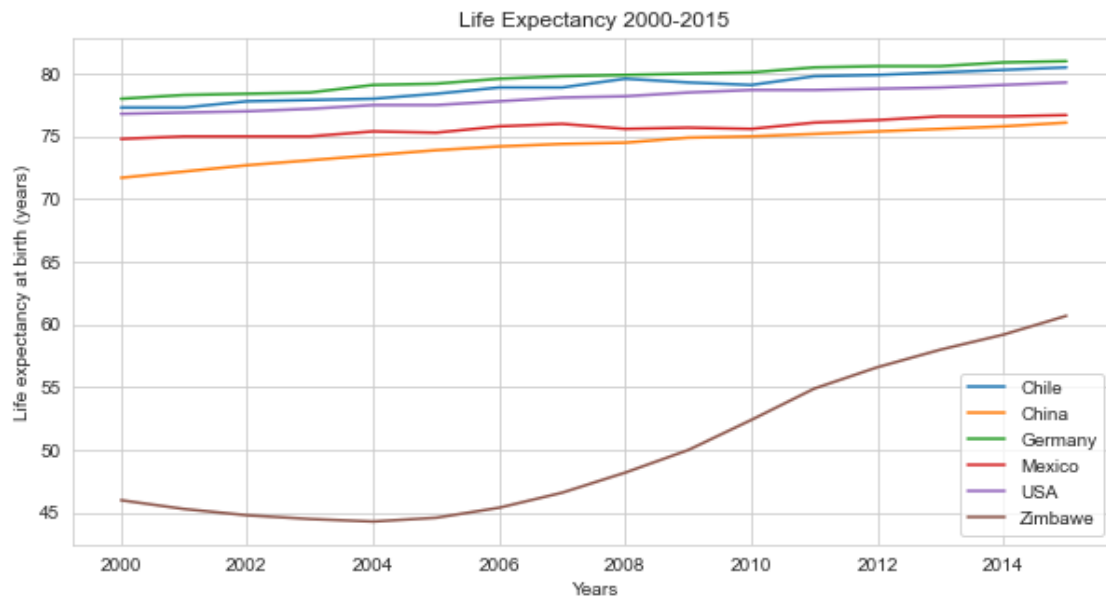
```
[1]: import pandas as pd
      from matplotlib import pyplot as plt
      from numpy import mean
      import seaborn as sns
```

```
[2]: all_countries = pd.read_csv('all_data.csv')
      #print(all_countries.head(), all_countries.info())
      #Seems like the third column name are very descriptive but not usefull to use
      ↪ in programming.
      all_countries.rename(columns={'Life expectancy at birth (years)': 'LEABY'},
      ↪ inplace=True)
      #print(all_countries.head(), all_countries.info())
```

1.3 1) Has life expectancy increased over time in the six nations? 2) Has GDP increased over time in the six nations?

```
[6]: name_countries = ['Chile', 'China', 'Germany', 'Mexico', 'USA', 'Zimbabwe']

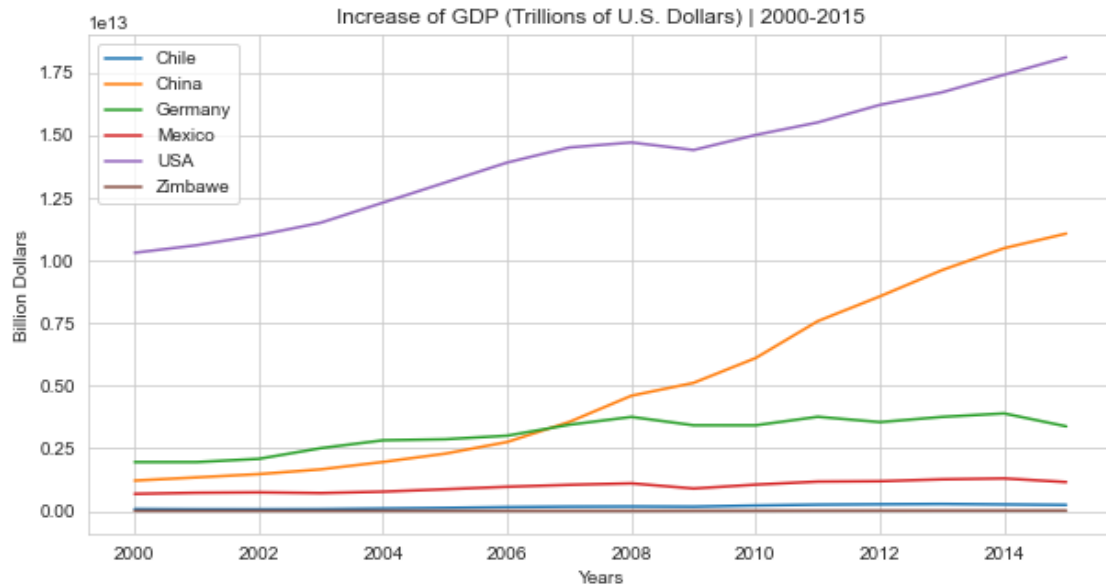
ax1 = sns.set_style('whitegrid')
ax1 = plt.subplots(figsize=(10, 5))
sns.lineplot(data=all_countries, x="Year", y="LEABY", hue='Country')
plt.title('Life Expectancy 2000-2015')
plt.xlabel('Years')
plt.ylabel('Life expectancy at birth (years)')
plt.legend(name_countries, loc=4)
plt.savefig('Life_Expectancy1.png')
plt.show()
```



The graph shows that life expectancy increases in all countries, but Zimbabwe's increase is more significant than others.

```
[7]: ax2 = sns.set_style('whitegrid')
ax1 = plt.subplots(figsize=(10, 5))
sns.lineplot(data=all_countries, x="Year", y="GDP", hue='Country')
plt.title('Increase of GDP (Trillions of U.S. Dollars) | 2000-2015')
plt.xlabel('Years')
plt.ylabel('Billion Dollars')
plt.legend(name_countries, loc=2)

plt.savefig('GDP_only.png')
plt.show()
```



Based on the second graph, we can see that the USA and China have higher GDPs than other countries. The US GDP decreased slightly in 2009 due to the recession but immediately began to increase again in 2010. As compared to all other countries, China's GDP has increased significantly without downfalls, and Germany's has fluctuated slowly over time.

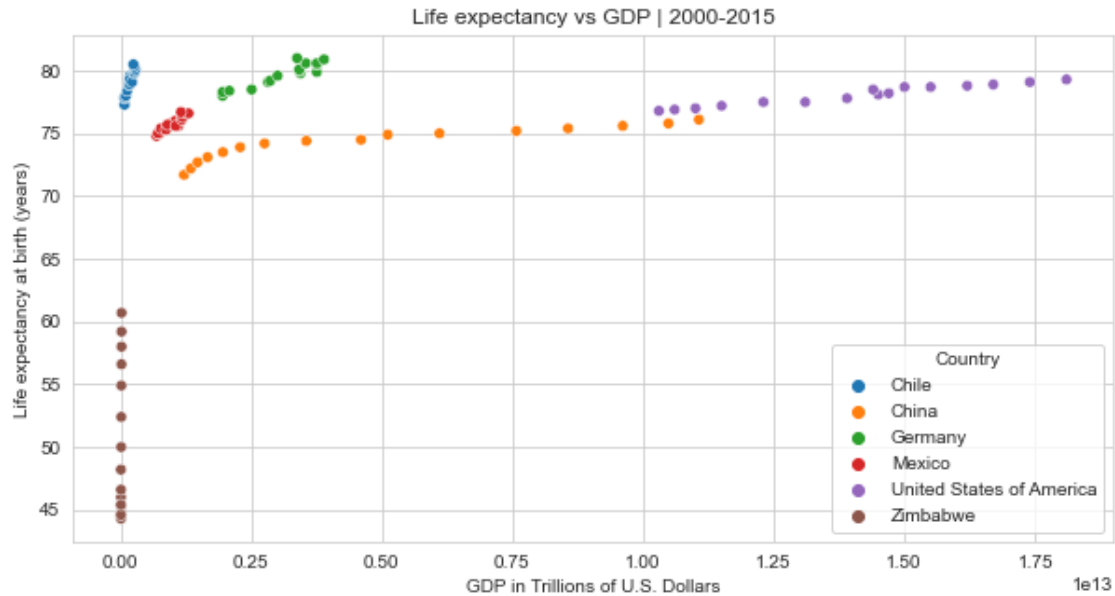
1.4 3) Is there a correlation between GDP and life expectancy of a country?

```
[5]: plt.clf()

ax1 = plt.subplots(figsize=(10, 5))
ax1 = sns.set_style('whitegrid')
sns.scatterplot(data=all_countries, x="GDP", y="LEABY", hue='Country')
plt.title('Life expectancy vs GDP | 2000-2015')
plt.xlabel('GDP in Trillions of U.S. Dollars')
plt.ylabel('Life expectancy at birth (years)')

plt.savefig('LEABY_vs_GDPscatterplot.png')
plt.show()
```

<Figure size 432x288 with 0 Axes>



Here we have a scatterplot graph to represent the correlation between Life expectancy and GDP. Notice that Zimbabwe only increases its Life expectancy without increasing its GDP. Chile and Mexico have a small amount of increase compared to others in both instances. Germany increases its life expectancy but seems to be static in its GDP over the last few years. USA and China have the same tendency to increase rapidly their GDP and slowly their life expectancy. Again, we can see the recession in the USA in 2009, this time when the GDP of the country was around \$1.48 trillion.

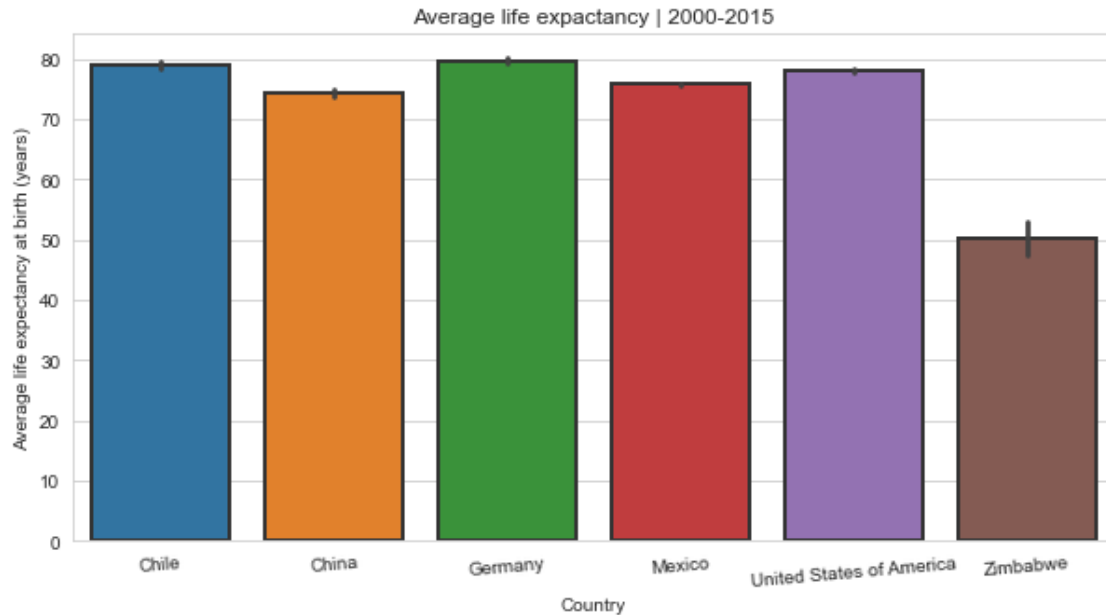
1.5 4) What is the average life expectancy in these nations?

```
[11]: plt.clf()

ax1 = plt.subplots(figsize=(10, 5))
ax1 = sns.set_style('whitegrid')
sns.barplot(data=all_countries, x="Country", y="LEABY", estimator=mean,
            linewidth=2, edgecolor=".2")
plt.xticks(rotation=5)
plt.title('Average life expectancy | 2000-2015')
plt.xlabel('Country')
plt.ylabel('Average life expectancy at birth (years)')

plt.savefig('AverageLifeExpectancy.png')
plt.show()
```

<Figure size 432x288 with 0 Axes>



In this graph we can see clearly that the average life expectancy of Chile, China, Germany, Mexico and USA are between the age of 73 and 80. Only Zimbabwe is far behind from them with an average life expectancy of 50 years old. Notice that the error bar of Zimbabwe is big compared to the other countries; this is because of the high variation of life expectancy over the years.

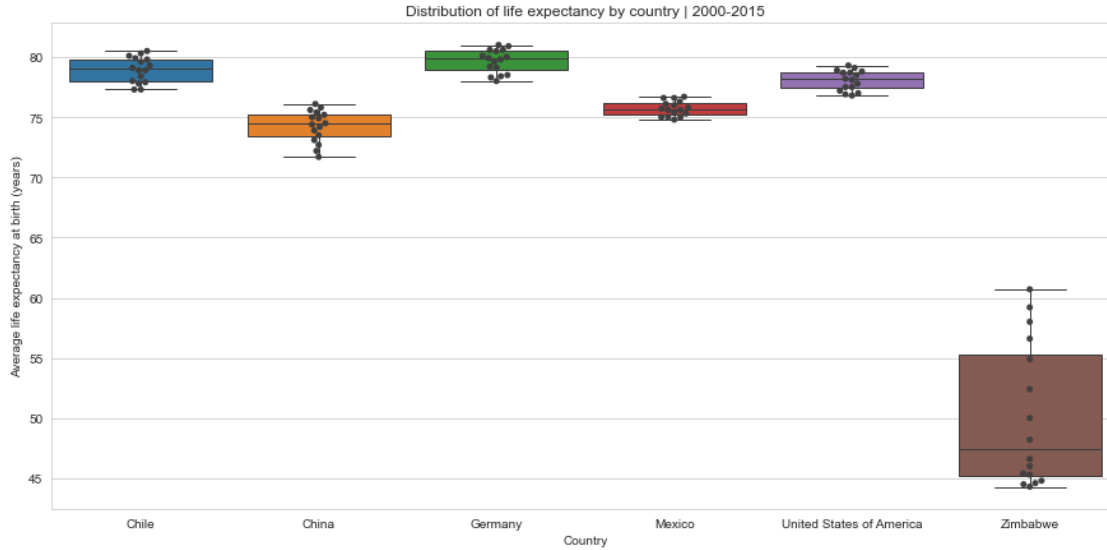
1.6 5) What is the distribution of that life expectancy?

```
[12]: plt.clf()

ax1 = plt.subplots(figsize=(15, 7))
ax1 = sns.set_style('darkgrid')
sns.boxplot(data=all_countries, x="Country", y="LEABY", linewidth=1)
sns.swarmplot(data=all_countries, x="Country", y="LEABY", color="0.25")
plt.title('Distribution of life expectancy by country | 2000-2015')
plt.xlabel('Country')
plt.ylabel('Average life expectancy at birth (years)')

plt.savefig('AverageLifeExpectancy.png')
plt.show()
```

<Figure size 432x288 with 0 Axes>



Although Chile and Germany have lower GDPs than the United States and China, they have higher life expectancies. Due to its narrow distribution, Mexico's life expectancy has remained almost the same over the years, while Zimbabwe's has a significant distribution that explains the length of the error bar in the previous graph.

2 Conclusions

All countries are gradually increasing their life expectancy, but Zimbabwe seems to have the most significant increase. While the United States has the highest GDP growth, China has the fastest growth. Despite not having an increase in GDP, Zimbabwe appears to be experiencing an increase in life expectancy, suggesting that other factors are contributing to the increase, possibly globalization and vaccination access. Alternatively, Zimbabwe's boxplot has a wider interquartile range, suggesting its data may be somewhat unreliable or its life expectancy is very susceptible to high variations (seasons of famine or war).