LIFE EXPECTANCY

I- Introduction

Life expectancy is an important indicator that evaluates the nation's well-being and the effectiveness of its healthcare and socioeconomic conditions. Life expectancy refers to the number of years that a person can expect to live and is calculated based on the average age that members of a particular population group will be when they die. This report analyzes the Life Expectancy dataset from the years 2000 to 2015 of 179 countries to get insights about differences in life expectancy across the world, how it has evolved over time, as well as the factors that affect human longevity, and emphasizes disparities in life expectancy between regions.

II- Life expectancy over time and the differences in life expectancy across the world.

During the period from 2000 to 2015, global life expectancy distribution was left-skewed with a mean of life expectancy of around 68 years, indicating that it concentrated toward the higher end of life expectancy. There was a minority of countries that experienced lower life expectancies, contributing to the skew. Notably, there were two modes, 72.6 and 73.1, indicating the most prevalent life expectancy during this period. This distribution emphasizes the progress as well as the existence of disparities in global life expectancy and suggests the need for further investigation into underlying factors.
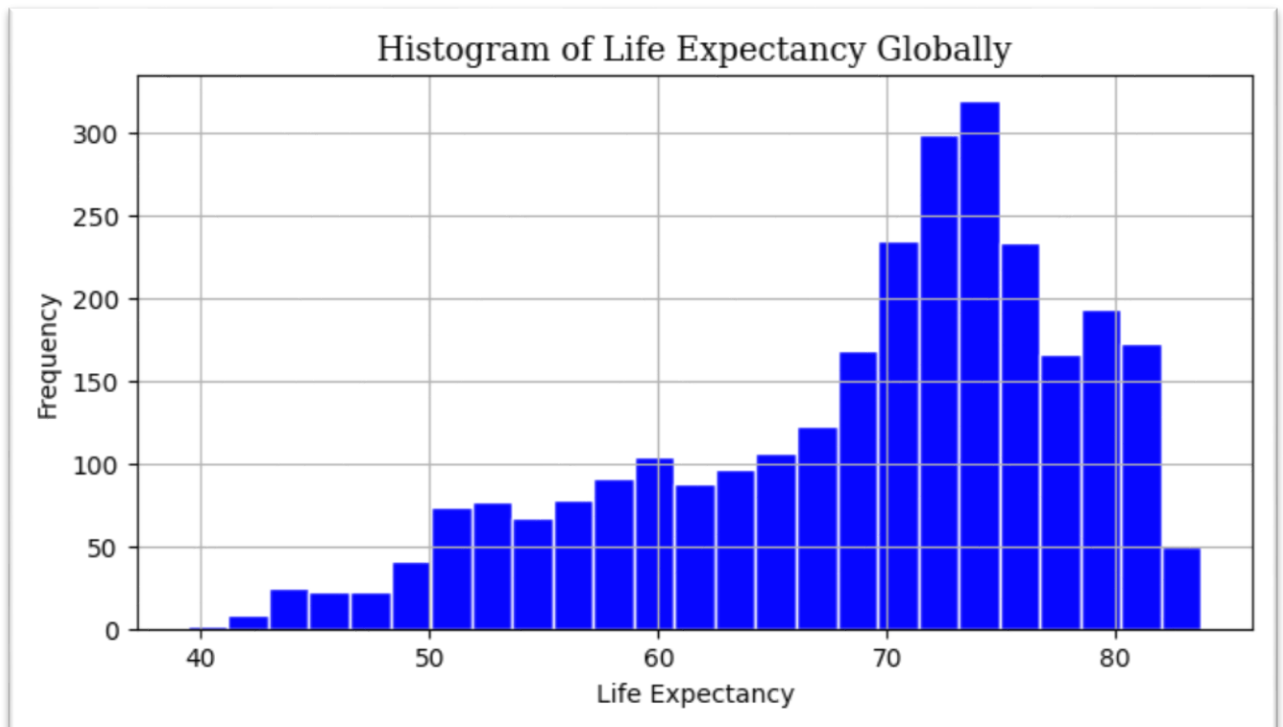

Figure 1.1: Histogram of Life expectancy globally

As Figure 1.2 illustrates, between 2000 and 2015, global life expectancy witnessed a substantial improvement in which most regions like Asia, Central America and the Caribbean, the European Union, and the Middle East have risen to around 3 to 5 years of life expectancy. While Africa experienced the most significant change, increasing from 54 years in 2000 to 62.5 years in 2015. These positive trends emphasize the progress in the world life expectancy but there were considerable disparities in life expectancy from region to region. Specifically, in the year 2015, the European Union reached the highest average life expectancy among regions at 79 years, followed by North America at 77 years, while Asia and Oceania only achieved 71 to 72 years and Africa had the lowest average life expectancy at approximately 63 years.
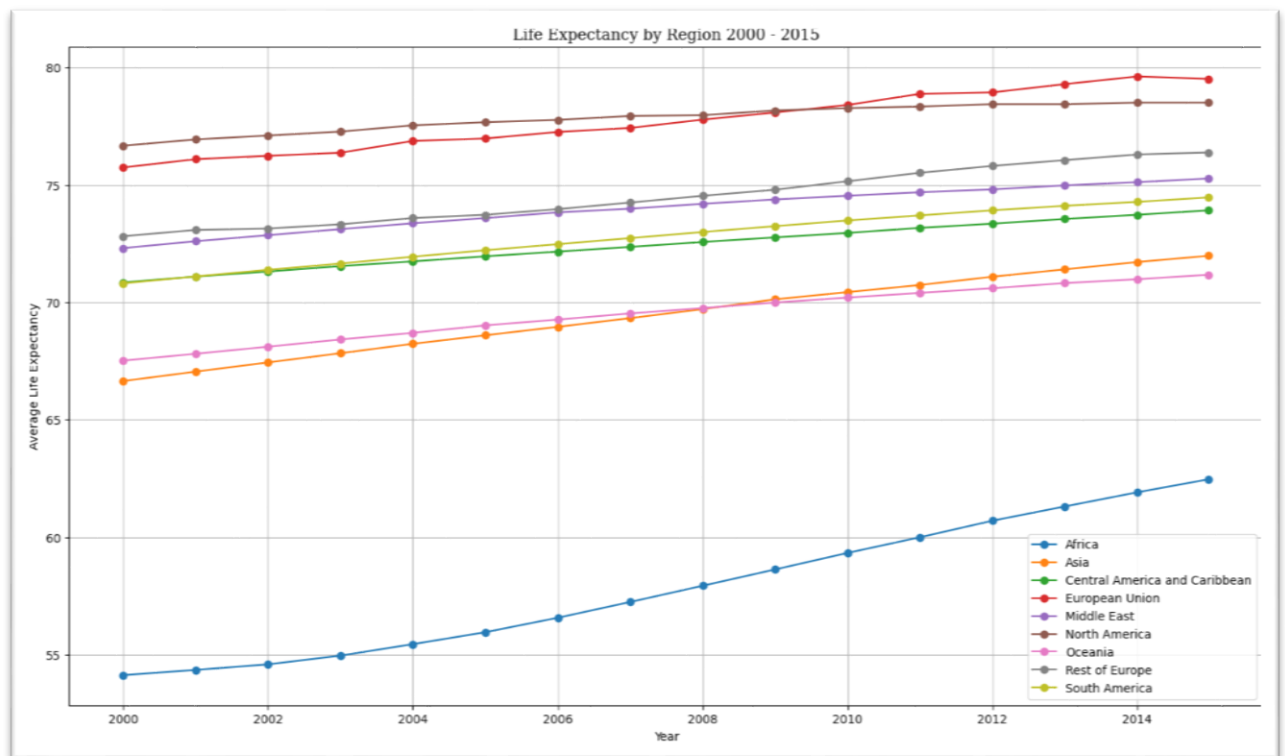
Figure 1.2: Life expectancy over time by region

From figure 1.3, we can see that North America and the European Union consistently demonstrated the highest life expectancy among the regions examined. In the European Union, 25% of its countries surpassed 80 years in life expectancy, while 25% fell within the range of 70 to 75 years. The maximum life expectancy in the European Union reached around 83 years. In North America, a quarter of its countries exceeded 75 years in life expectancy. Meanwhile, in South America, Central America, and the Caribbean, 50% of countries achieved a life expectancy surpassing 71 years. However, these regions also exhibited notable outliers with life expectancies falling below their minimum values. While Africa has had the lowest life expectancy compared to other regions throughout this period.

There 25% of its countries had a life expectancy below 49 years, 50% from 51 to 59 years, and 25% above 62 years.
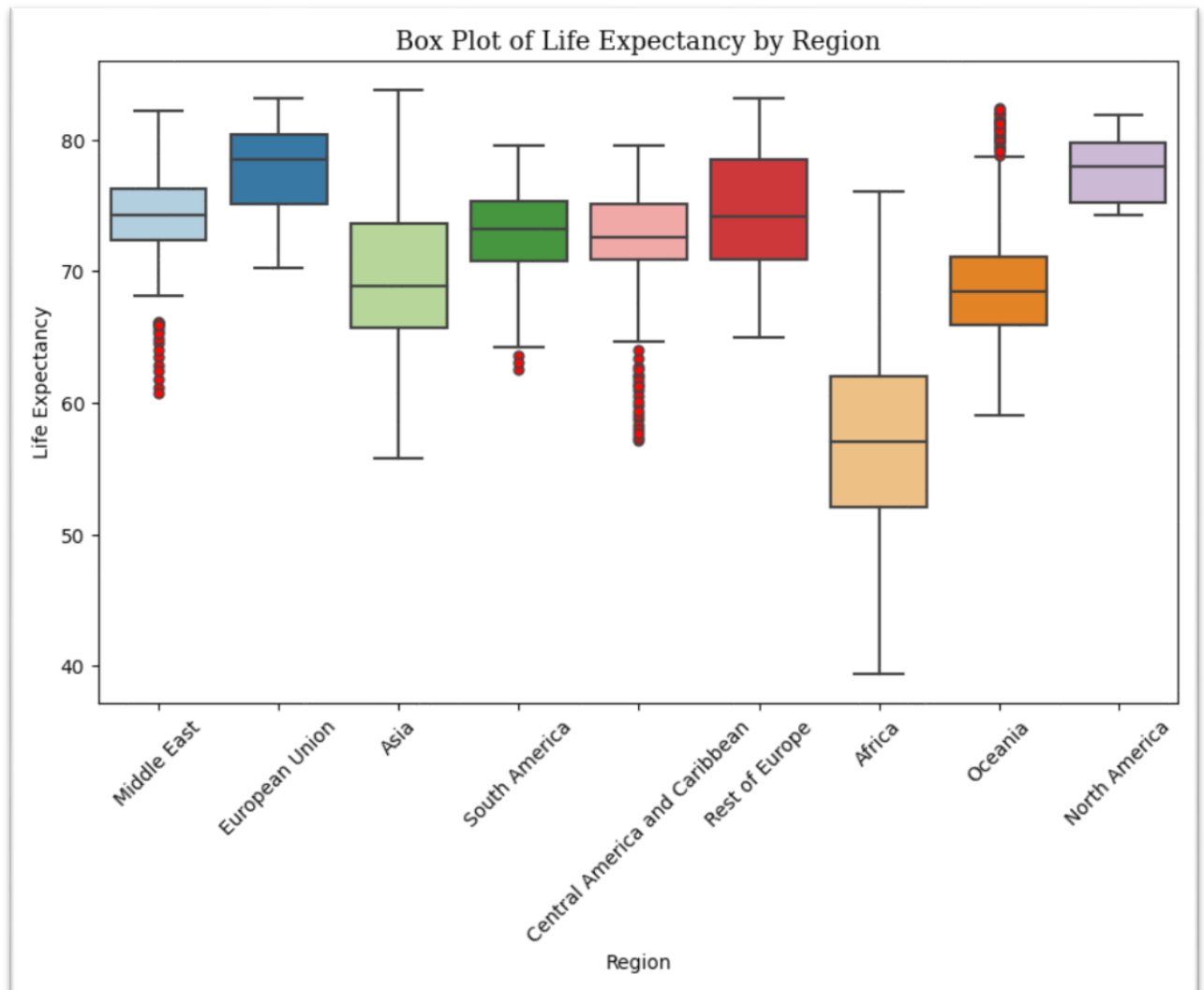

Figure 1.3: Box plot of life expectancy by region

## III- The relationship between life expectancy and other factors

The correlation heatmap below shows that there were five features including Schooling, Polio, Diphtheria, BMI, and GDP per capita that had strong positive correlations with life expectancy. Besides that, Measles and Hepatitis B also had positive correlations, although they were not as strong as the above-mentioned factors. In addition to positive correlations thinness, incidents of HIV, Infant deaths, under five deaths, and adult mortality showed negative correlations with life expectancy. This implies that higher rates of infant and under-five deaths, along with higher adult mortality rates, are strongly associated with lower life expectancies.
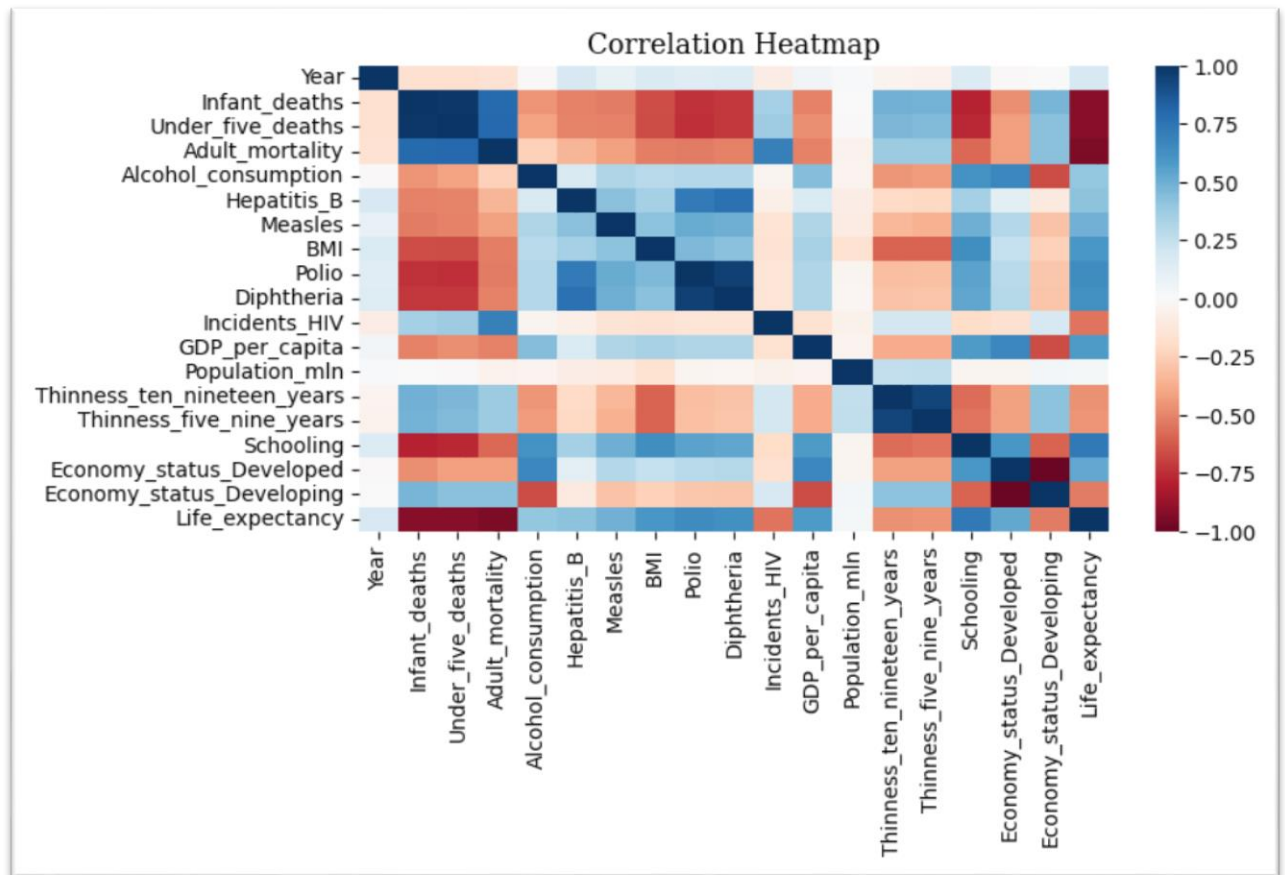
Figure 2.1: Correlation Heatmap

The scatter plot for Schooling vs. Life expectancy showed a strong positive correlation, which aligned with the high correlation coefficient. As the number of years of schooling increased, life expectancy tended to increase as well. Polio vs. Life expectancy also exhibited a positive correlation with a correlation coefficient of 0.64. As the immunization coverage for Polio increased, life expectancy tended to be higher. Similar to the Polio scatter plot, higher immunization coverage for Diphtheria was associated with higher life expectancy. This emphasizes the significance of vaccination against preventable diseases. Moreover, generally,

countries with higher GDP tended to have a higher life expectancy.
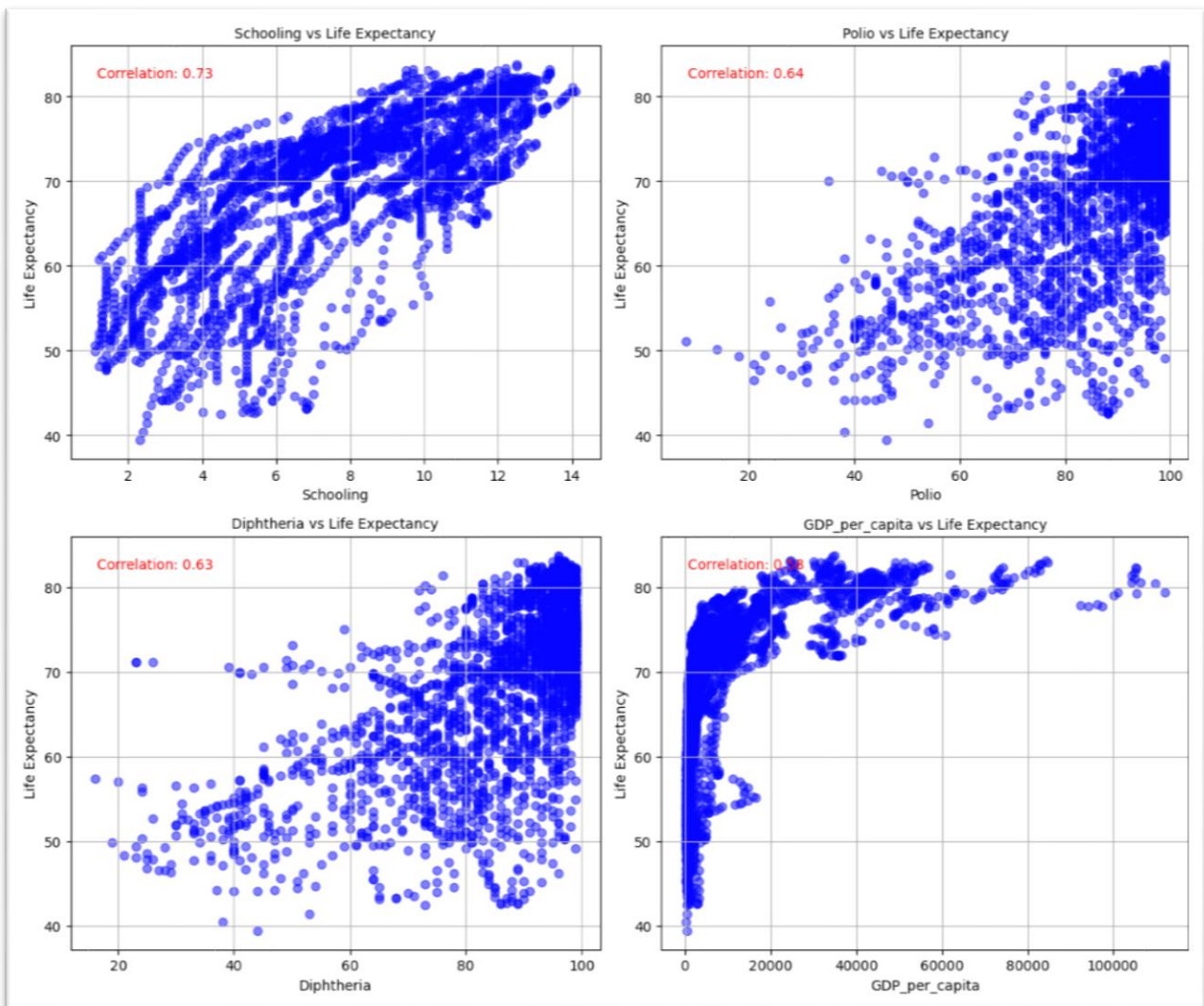
Figure 2.2: Scatter of Life Expectancy versus other factors

During the period 2000 to 2015, most of the regions like South America, Oceania, the Middle East, Central America, the Caribbean, and Asia had the same level of average years of schooling while North America and the European Union had the highest average years of schooling, specifically, Africa had the lowest average years of schooling among the regions. Similar to Schooling, the immunization coverage of Polio and Diphtheria was different from region to region. Notably, Europe and North America always had the highest rate of Polio and Diphtheria immunization while Africa had the lowest values for these features. Besides that, different regions also had significant differences in GDP per capita. North America reached the highest GDP per capita at almost 35000 among the regions, followed by Europe with a GDP per capita from 20000 to 27000, and Africa also had the lowest value of GDP per capita at only 2500. These results underscore the relationship between life expectancy versus schooling, the coverage

of immunization as well and GDP per capita and it can explain why there existed life expectancy inequality across the world during this period of time.
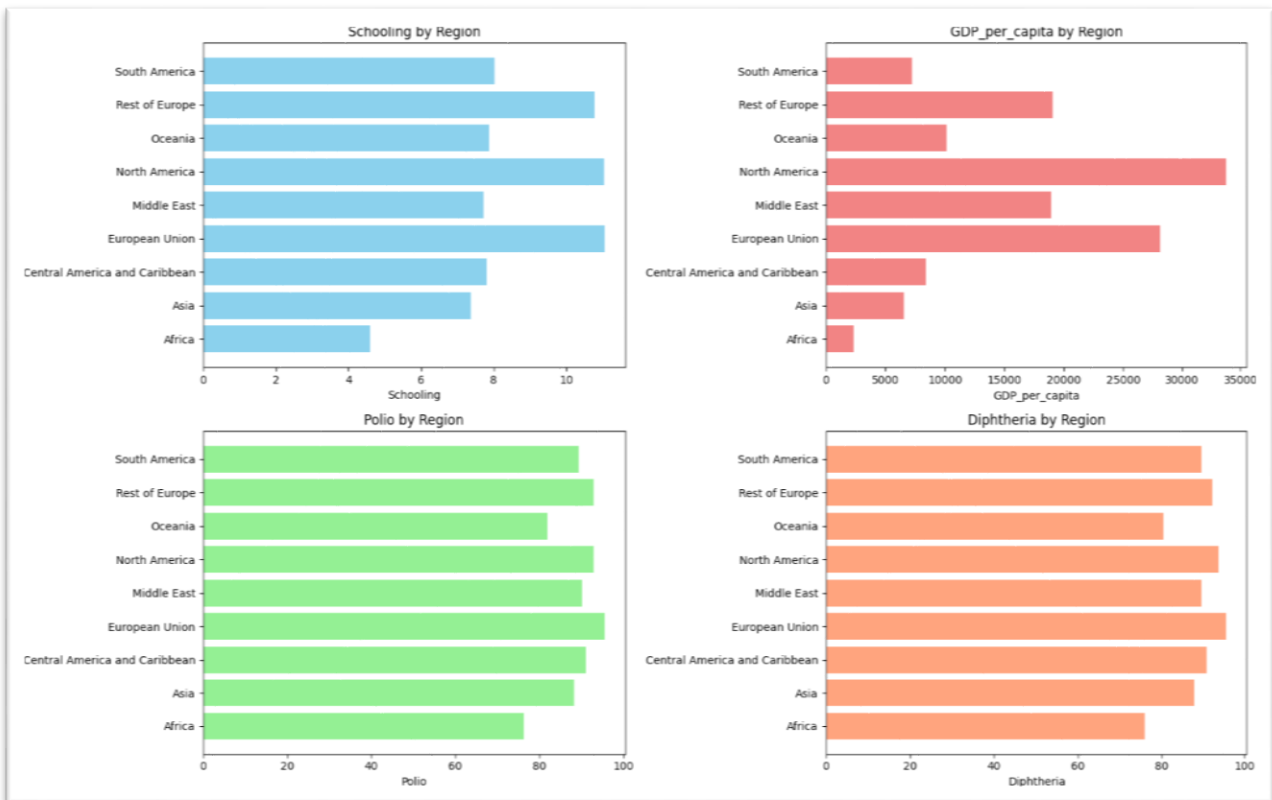
Figure 2.3: Factors by region

Figure 2.4 illustrates that developed countries had higher life expectancy with 50% of their population reaching above 79 years of age while developing countries had a lower life expectancy. There were 50% of developing countries had a life expectancy of 58 to 75 years of age, and 25% of it below 58 years of age. This result also emphasizes that developed countries

tended to have higher life expectancy than developing countries.
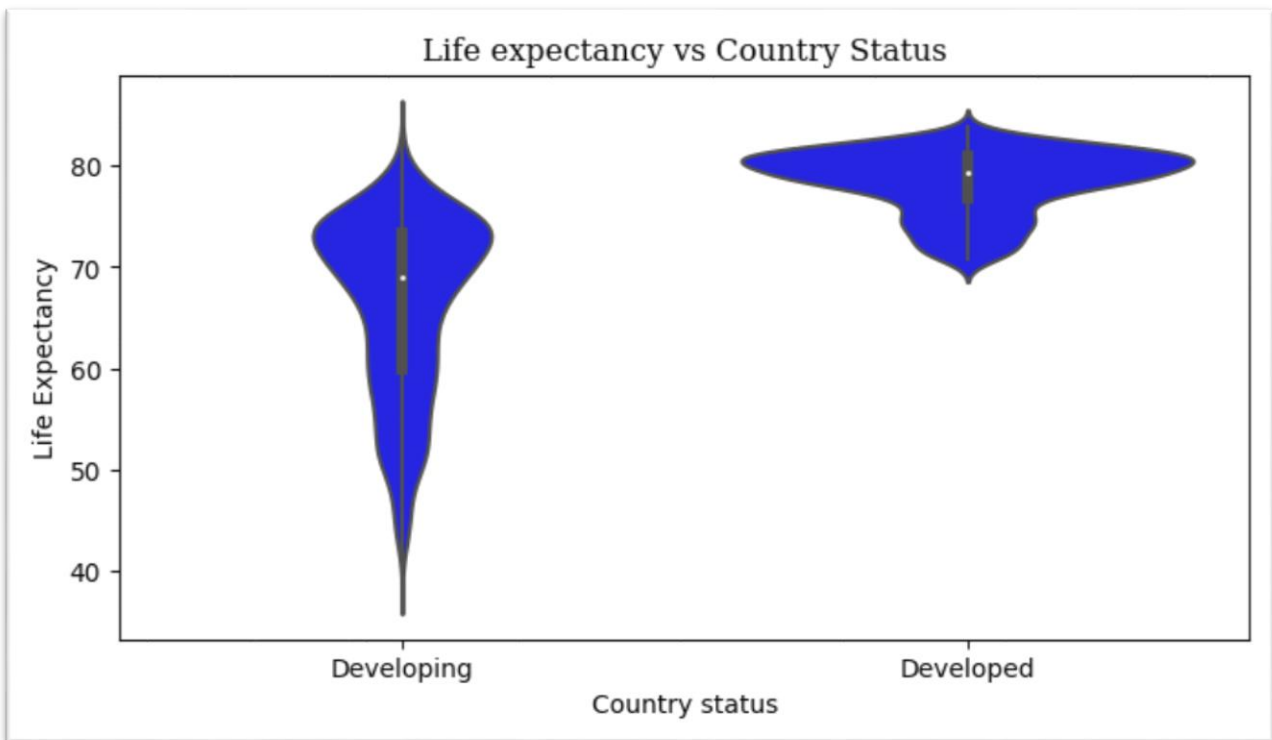
Figure 2.4: Life expectancy vs. country status

In addition to a positive correlation, the scatter plot for adult mortality and life expectancy showed a strong negative correlation with a correlation coefficient of -0.95. This means that higher adult mortality was associated with lower life expectancy. Besides that, under-five deaths also had a strong negative correlation with a correlation coefficient of -0.92. High under-five mortality was associated with lower life expectancy. Additionally, HIV incidents and thinness among individuals aged 10-19 years exhibited a moderate negative correlation with life expectancy. A higher incidence of HIV was associated with lower life expectancy. Higher levels

of thinness in this age group were also associated with lower life expectancy.
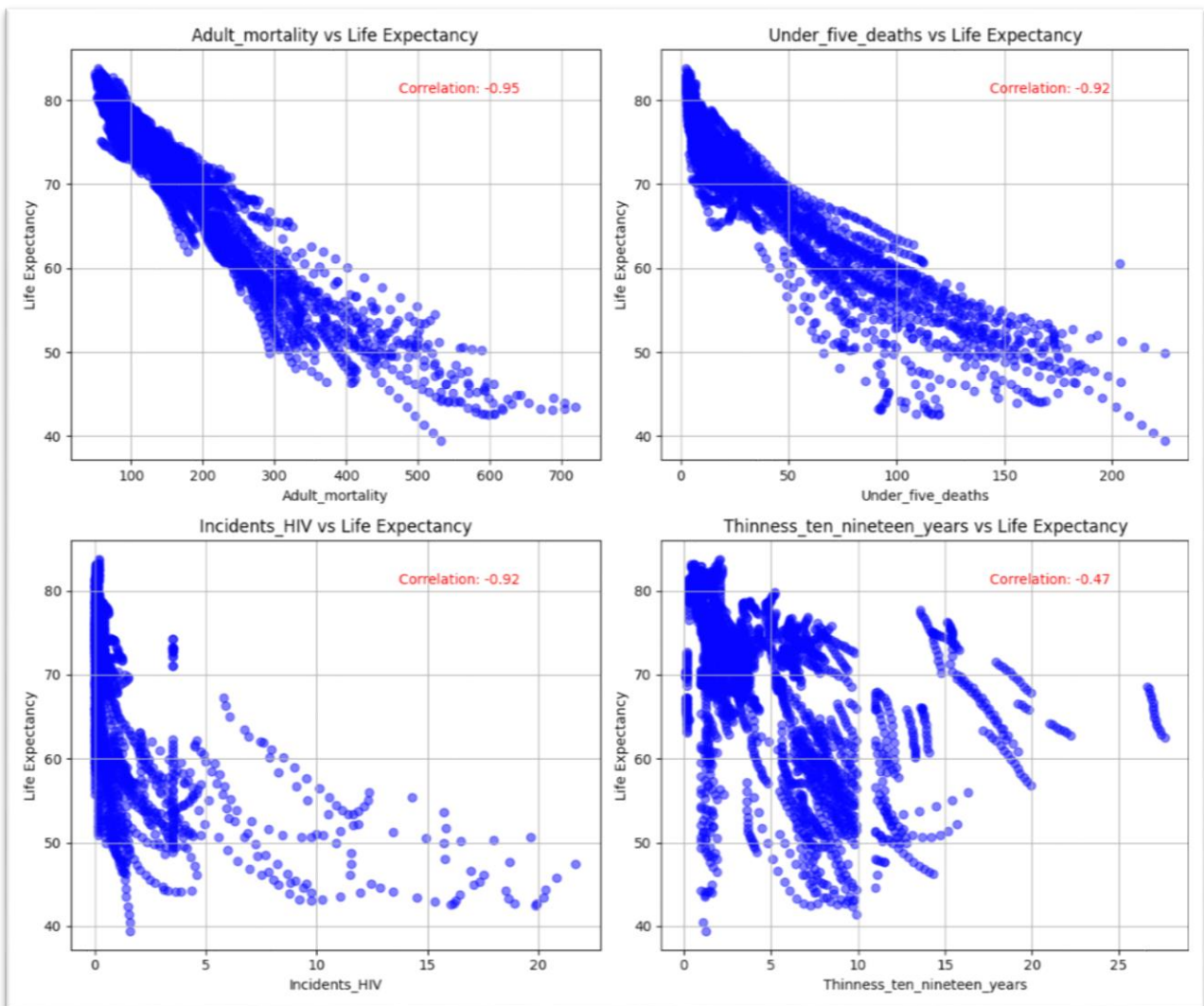

Figure 2.5: Scatter plot of Life expectancy versus others negative factors

From Figure 2.6, there were considerable differences in terms of adult mortality, under-five deaths, Incidents of HIV, and thinness by region. Notably, North America and the European Union reached the lowest level of these features while Africa always reached the highest values in terms of these features. These results plus insight from Figure 2.5 can emphasize disparities in life expectancy between regions and explain why Africa had the lowest life expectancy while

North America and European Union always reached highest life expectancy during this period.
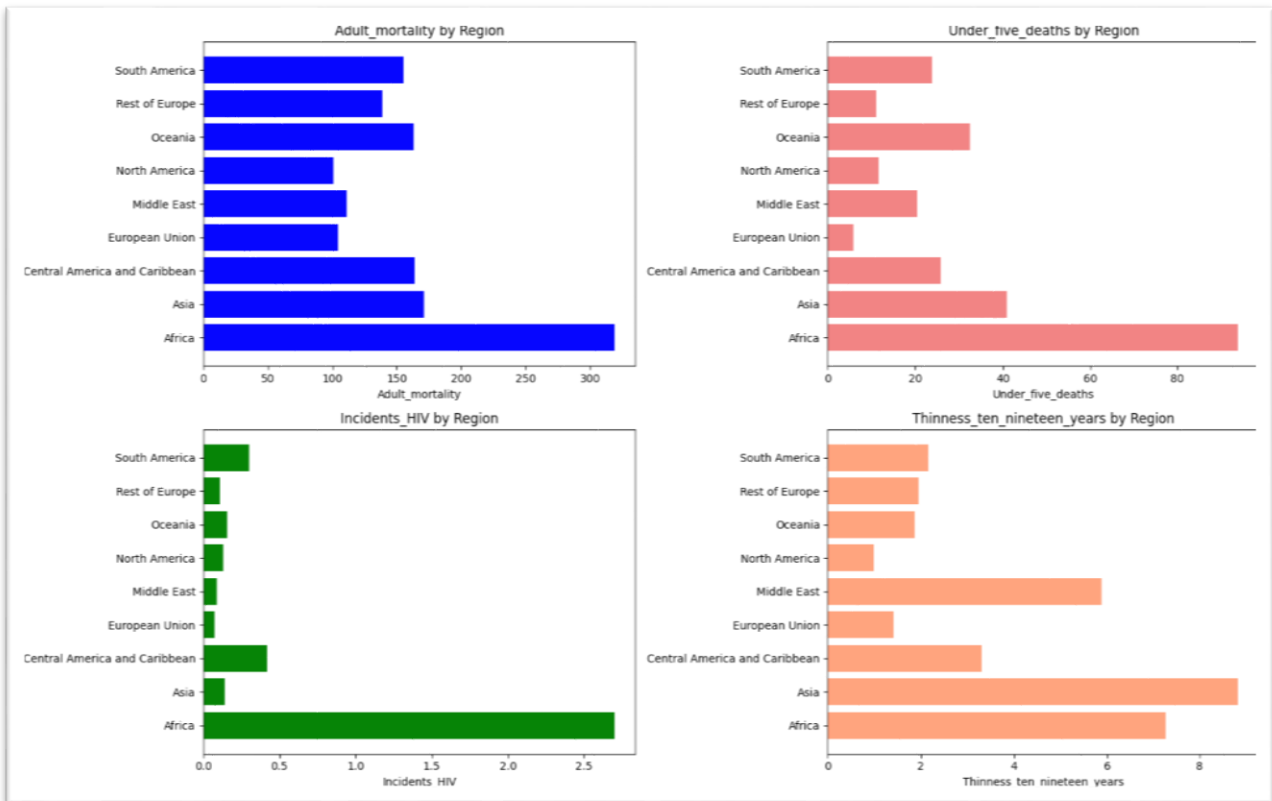
Figure 2.6: Factors by region

IV-   Conclusion

In conclusion, this report has provided a comprehensive analysis of life expectancy trends, disparities, and influential factors in life expectancy across 179 countries from 2000 to 2015. Over the 15-year period, the global average life expectancy has improved considerably, with most regions witnessing a rise ranging from 3 to 5 years. Africa experienced the most significant development, increasing life expectancy from 54 to 62.5 years, but it was still the country that had the lowest life expectancy compared to other regions. When analyzing factors that affect life expectancy, the results indicated that schooling, the coverage of immunization for Polio or Diphtheria, and GDP per capita described strong positive correlations to life expectancy across the world. The improvement in these areas was associated with higher life expectancies. Conversely, negative correlations were observed between life expectancy and indicators of adverse health conditions and mortality. Notably, adult mortality and under-five deaths exhibited strong negative correlations, emphasizing the detrimental impact of high mortality rates on life expectancy. Additionally, HIV incidence and thinness described moderate negative correlations with life expectancy which underlines the importance of addressing these issues to enhance overall life expectancy. However, it is significant to note that correlation does not imply causation. In this report, I am just looking at several aspects, it is very necessary for further investigation to enhance overall life expectancy across countries.

References:

Data source: https://www.kaggle.com/datasets/lashagoch/life-expectancy-who-updated