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# **Global Life Expectancy and the Relationship with Poverty and Literacy**

## **An Analysis of WHO Regional Data**

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### **Introduction**

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The goal of this project was to investigate the relationship between WHO Regional and Country indicators (income group/poverty, literacy/education, inequality/democracy index) with two key outcome measures: life expectancy and maternal mortality rate. Understanding the relationship between these indicators is critical for ranking a country's health globally as well as establishing the appropriate allocation of funds for WHO programming and policy.

### **Data Sources & Methodology**

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The analysis used two data sources; the first, a large dataset containing significant health measures for WHO countries and the second, a smaller dataset containing population level data by country (population, income group and WHO region). These datasets were combined in Python using Country as the unique identifier.

Several Python libraries were used to complete the analysis and create visualizations, including Pandas, Numby, Seaborn and Statsmodel. Due to the large number of variables in the dataset, the variables of interest were identified, renamed and then split into a new dataset specific for this analysis.

My primary goal was to utilize Python to determine correlations and simple linear regression equations. In order to do this, all missing values from the outcome and predictive variables were removed. Correlation coefficients and linear regressions were conducted.

Although multiple visualizations were created in Python, these were primarily utilized to enhance my understanding of the analysis. The majority of visualizations included in the presentation were completed using Tableau.

Indicators used in the analysis included: Life expectancy (age in years expected at birth), maternal mortality rate (deaths per 100,000 live births), population below the poverty line (percentage of the population that lives with <\$1 USD per day) and female literacy rates (% of adult female population deemed literate).

## Findings and Conclusions

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Overall, the average life expectancy, maternal mortality rate, population living below the poverty line and female literacy is worst in the Africa Region and best in the Europe Region. The distribution of indicators across countries within a region were most diffuse in the Africa Region.

Life expectancy and maternal mortality were highly correlated (correlation coefficient=-.87) suggesting both can be used to predict a country's mortality. There was a strong, negative correlation between poverty and life expectancy (correlation coefficient=-.68). For every 1% decrease in the population below the poverty line, there is a 0.3 year increase in life expectancy ( $p<.001$ ,  $R^2=0.47$ ).

Female adult literacy rates were not correlated with the percentage of females in the labor force. However, female adult literacy rates were strongly negatively correlated with maternal mortality rate (correlation coefficient=-.77). For every 1% increase in adult literacy, there is a .16 decrease in maternal mortality ( $p<.001$ ,  $R^2=0.59$ ). Finally, there was no correlation between a country's democracy score and literacy.

Overall, the findings suggest that poverty and literacy are key indicators that predict a country's life expectancy and maternal mortality rate. Addressing these key indicators would likely contribute to a decrease in a country's mortality.

## References

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Link to dataset (WHO social, economic, health, and political indicators)  
<http://www.exploredata.net/Downloads/WHO-Data-Set>