A Panel Data Study of the Impact of Socio-Economic, Demographics and Environmental Factors on Life Expectancy Across Sub-Saharan African Countries

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Abstract: Life expectancy at birth can arguably be the most important indicator of a country's quality of life and social development. Over recent years, life expectancy has grown throughout the world. In terms of the percent increase in life expectancy over the last 20 years, African countries have shown the most progress in comparison to OECD countries (Roffia & Bucciol, 2022, 21). However, there is still a huge difference in the countries: people in many Sub-Saharan regions have a life expectancy of fewer than 60 years, while in Japan it exceeds 80 (Roser et al.). Due to the scope of improvement in the average life expectancy, our research project focuses on the 40 Sub-Saharan African (SSA) countries with the lowest GDP per capita. Moreover, our analysis is specifically focused on the period from 2001-2019 due to the unavailability of data for some socio-economic indicators of the countries under our study prior to 2000 and also to avoid attributing the effect of COVID-19 on life expectancy at birth.

Literature Review: The literature on the significance of life expectancy has 2 approaches; First, its effect on economic productivity, and second, the factors determining life expectancy. Past research leverages methodology such as quantile regression (Linden and Ray), vector auto-regression (Bergh and Nilsson 1191), and panel data techniques. A similar study addresses the effect of improved facilities like water supply, and sanitation on life expectancy, and consequently, it's an indirect impact on the country's economic output (Timothy). On the other hand, another paper examines the socio-economic determinants of life expectancy for 91 developing countries using multiple regression and probit regression (Kabir).

Research Question: In our research, we hypothesize that economic factors such as health expenditure, GDP per capita, and other financial investments while controlling for other health indicators like Sanitation Accessibility, Prevalence of Undernourishment, and diseases with environmental variables like CO2 emissions are significantly positively correlated with the life expectancy of SSA.

Methodology: Before diving into the modeling we will analyze the correlation of independent variables using the Pearson correlation matrix to account for multicollinearity. Moreover, special care will also be taken to ensure that classical linear assumptions, like linearity, weak dependence, contemporaneous exogeneity, no serial correlation, and homoscedasticity hold, to receive the best (minimum variance) and unbiased result possible (Rizzo, 2019). After analyzing the independent variable, we expect to use different empirical methods, including multiple linear regression and fixed effects, to analyze the effect of these factors on life expectancy.

Limitations: First, due to the lack of availability of time-series data on certain factors such as doctor-patient ratio, public vs private healthcare services, and efficiency we cannot control for these factors. Second, we are not analyzing the causal impact of any policies that might have been in effect during the time period. Lastly, certain factors might have data quality issues, since some countries have good reporting systems while others rely on estimation methods.

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