

Analysis of the Correlation between the Health Expenditure and Life Expectancy



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Introduction

This paper aims to address these questions by analyzing the correlation between South Korea's current health expenditure and its life expectancy. This study focuses on South Korea, with nine selected Asian countries used as comparative references from 2000 to 2023. Using datasets from the World Bank, the World Health Organization(WHO), and the Institute for Health Metrics and Evaluation(IHME), this paper examines correlations between life expectancy, health-adjusted life expectancy, and two forms of expenditure: per capita current health expenditure and current health expenditure as a percentage of GDP.

Correlation between Health Expenditure(% of GDP) and Life Expectancy

Fig. 1. shows the correlation between current health expenditure (% of GDP) on the x-axis and life expectancy on the y-axis, using average values. There are nine differently colored trendlines, each representing a different Asian country based on its income. A data point for the Republic of Korea at 8.9% of current health expenditure(% of GDP) corresponds to a life expectancy of around 83.8 years, illustrating how higher health expenditure is associated with higher life expectancy.

Focusing specifically on the Republic of Korea, the correlation between current health expenditure as a percentage of GDP and life expectancy is strong and consistent. The Republic of Korea shows the highest R-squared value (= 0.93) among the high-income countries, such as Japan and Singapore. Overall, for this subsection, most countries follow a positive correlation: higher current health expenditure tends to be associated with higher life expectancy, except in India and the Philippines.

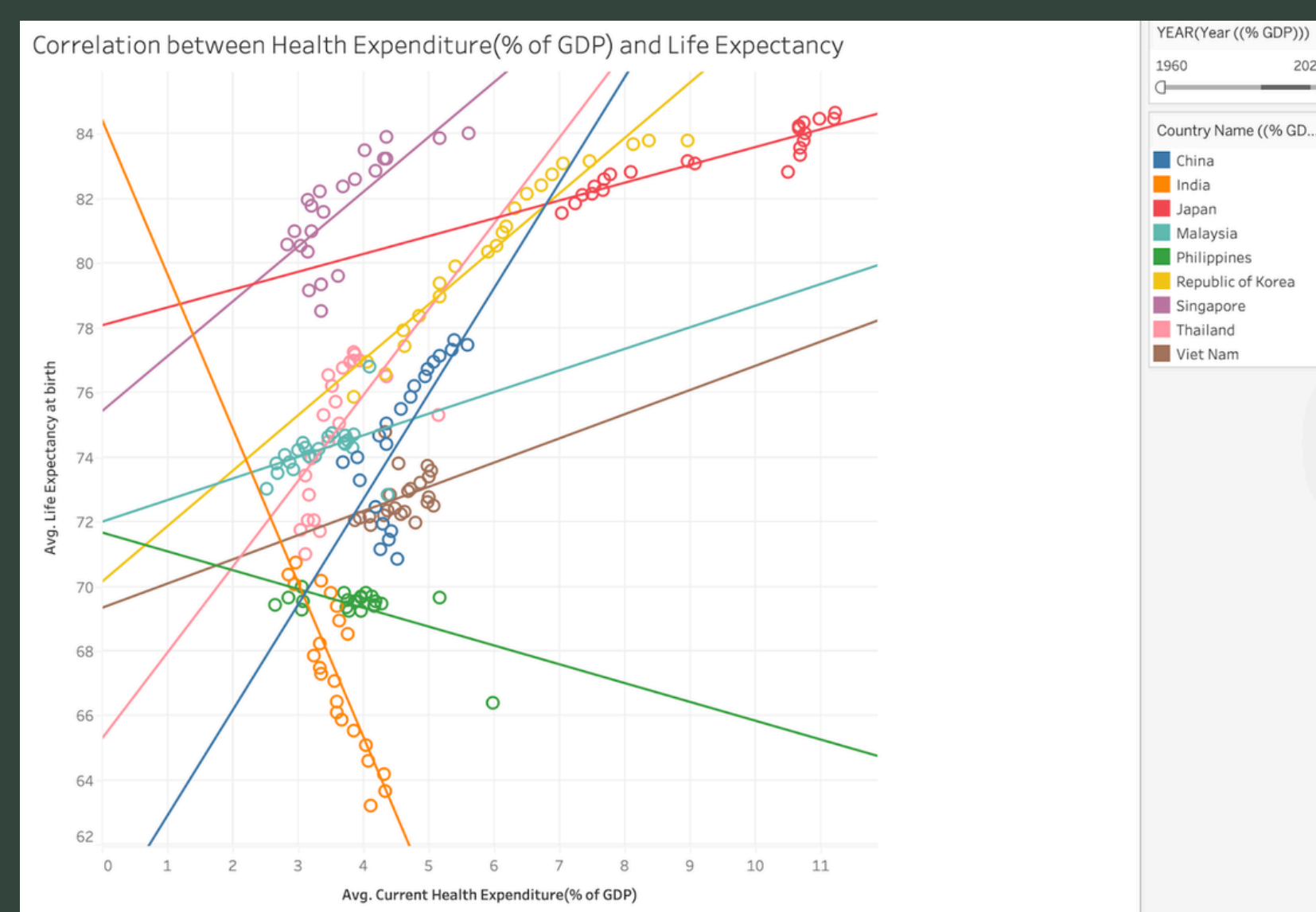


Figure 1: Scatter plot of Current Health Expenditure(% of GDP) and Life Expectancy for each year between 2000-2021

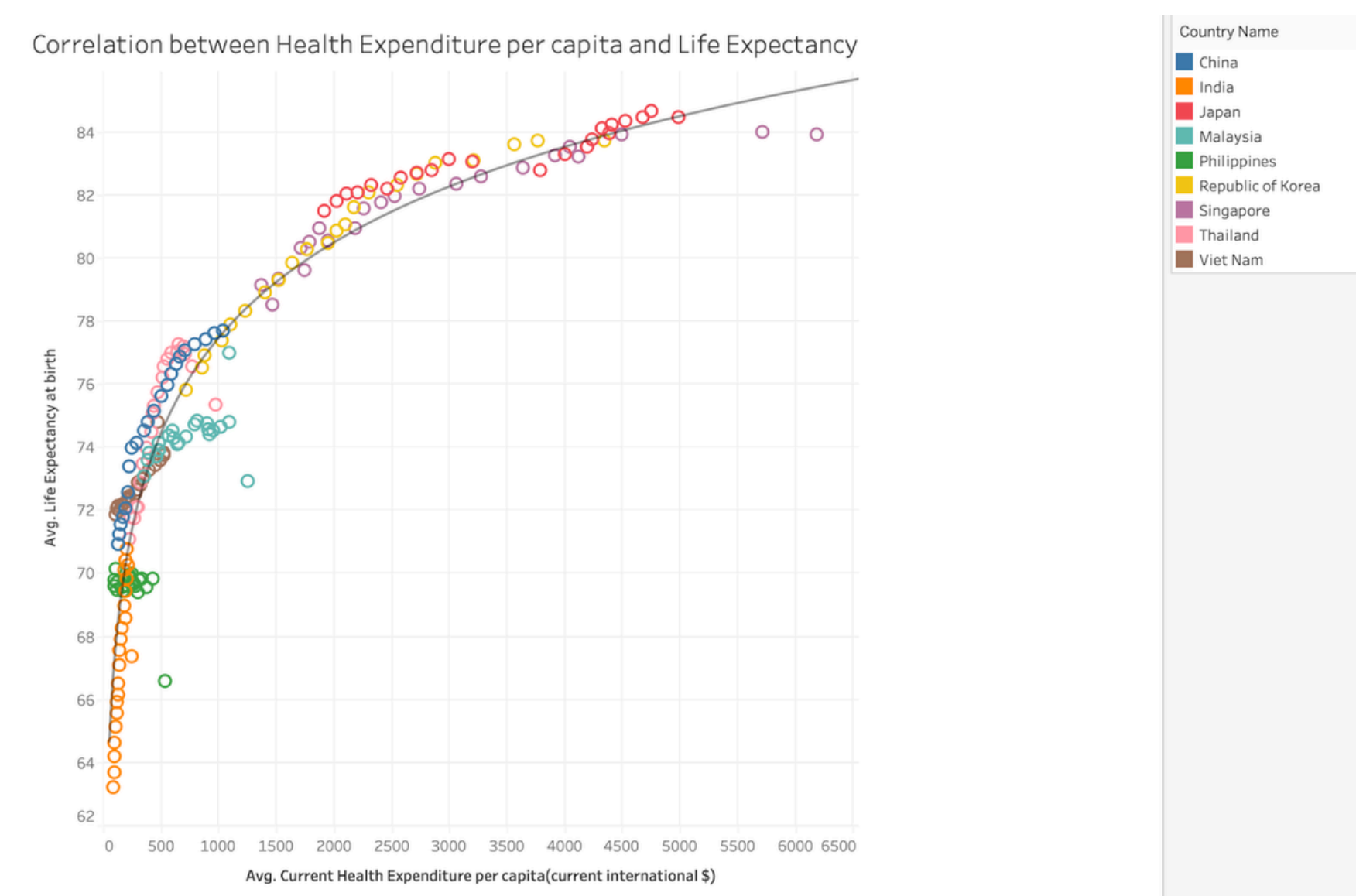


Figure 2: Scatter plot of Current Health Expenditure(per capita) and Life Expectancy for each year between 2000 and 2023

Correlation between Health Expenditure per capita and Life Expectancy

The graph in Fig. 2. represents the correlation between average current health expenditure(per capita) on the x-axis and average life expectancy on the y-axis. Each dot represents one country in one specific year. There are nine different colored points on the graph, each representing a different Asian country, and the figure includes a logarithmic trendline fitted to most of the data points.

Overall, the graph illustrates a positive association between current health expenditure(per capita) and life expectancy. The set of all countries and respective year display a clear logarithmic trend; as spending increases, life expectancy tends to rise. Focusing specifically on the Republic of Korea, the logarithmic relationship between life expectancy and current health expenditure(per capita) is notably strong. The Republic of Korea has an R-squared value of 0.98 and a P-value lower than 0.0001, which has the highest correlation among the countries.

Correlation between Health Expenditure(% of GDP) and Health adjusted

Fig. 3. illustrates the correlation between average current health expenditure as a percentage of GDP on the x-axis and average Health-Adjusted Life Expectancy on the y-axis across nine Asian countries. Each point represents a year-country pair between 2000 and 2023, and the colored trend lines represent the correlation for each country.

Focusing specifically on the Republic of Korea, the correlation between current health expenditure as a percentage of GDP and HALE is strong and consistent. The Republic of Korea shows the highest R-squared value (= 0.90) among the high-income countries, such as Japan and Singapore. In general, the majority of countries in this figure show a moderate to strong positive correlation between health expenditure(% of GDP) and HALE.

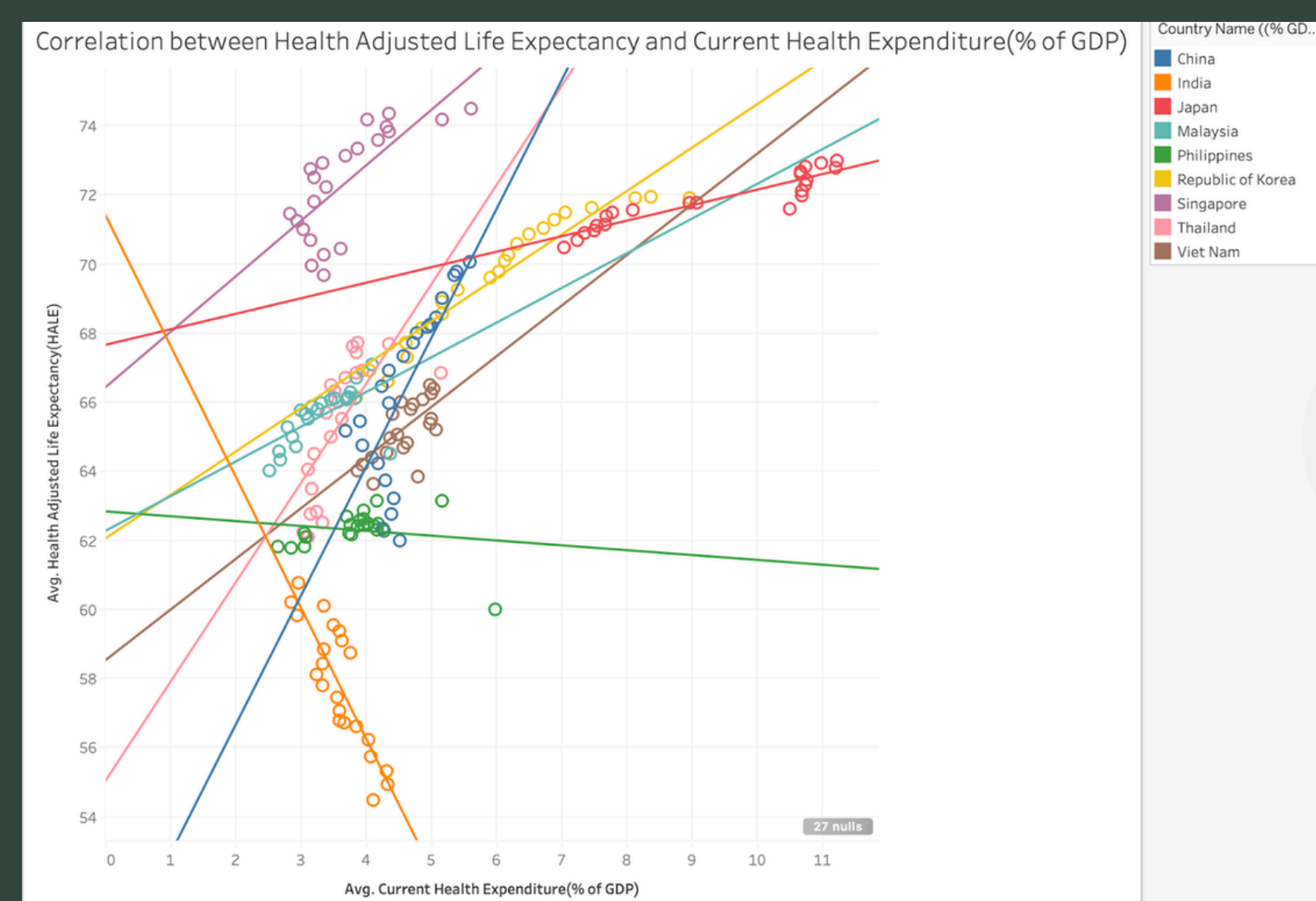


Fig. 3: Scatter plot of Current Health Expenditure(% of GDP) and Health Adjusted Life Expectancy(HALE) for each year between 2000-2023

Discussion and Limitation

One notable finding is the variation in correlation strength across countries. For context, the countries were classified by World Bank's GNI per capita categories: India, Vietnam, and the Philippines are the lower-middle-income group; China, Malaysia, and Thailand are upper-middle-income; and Japan, the Republic of Korea, and Singapore are high-income. However, these classifications were used for context, the study's main variables – health expenditure as a percentage of GDP and health expenditure per capita – do not directly correspond to GNI. Therefore, income category comparisons should be interpreted cautiously, as they do not perfectly align with the economic indicators used in the analysis. Lastly, the paper faces limitations due to a lack of data. The dataset included only the years 2000 to 2023, which restricts the ability to understand the long-term effects of the COVID-19 pandemic.

Conclusion and Future Work

The results indicated that higher current health expenditure is generally associated with higher life expectancy and HALE. Overall, the relationship appears stronger and more consistent in a logarithmic trend line among all the 9 countries when the current health expenditure is measured on a per capita basis rather than as a percentage of GDP. In the case of the Republic of Korea, the findings show a clear positive correlation in both current health expenditure measured in percentage of GDP and per capita. For future work, this research could be extended by investigating potential confounding variables that may influence both health expenditure and life expectancy. Factors such as education levels, smoking rates, access to healthcare services, population aging, and other social determinants of health could be incorporated into analyses.