FACTORS AFFECTING LIFE EXPECTANCY IN BANGLADESH: EVIDENCE FROM 2000−2020 DATA

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ABSTRACT

Life expectancy is the key metric for assessing population health for any country. Life expectancy has increased rapidly since the age of enlightenment and there are various factors those affect the average life expectancy of people. This study aims to assess the factors affecting life expectancy of people in Bangladesh using panel data from 2000 to 2020. Multiple linear regression analysis was employed to assess the factor those affect life expectancy. Result showed that population is positively and significantly related with life expectancy. In case of per capita income, negative and significant association was found. Inflation and unemployment rate were found negatively associated with life expectancy of people in Bangladesh. Positive association of number of physicians with life expectancy was found for female and for all, but negative relation was observed for male. Result suggests that to increase the life expectancy with increasing number of physician, we need to control unemployment and inflation rate.

Keywords: Life expectancy, Panel data, Developing countries, Bangladesh.

INTRODUCTION

Life expectancy is the fundamental indicator and one of the essential terminologies for analyzing the population's economic, environmental, and biological health (Gulis, 2000). It is one of the critical indicators of quality of life, encompassing many different factors (Panzabekova and Digel, 2020). Analysis of these factors is thus necessary to bring to light those with the most decisive impact and devise state policies to improve the quality of life in the country. Many of the world's wealthiest countries' populations have higher life expectancies, whereas some countries have a comparatively low life expectancy level. In 2020, the population of high-income nations was 80.31 years, medium-income 72.17 years, lower middle income 69.28 years, and lower income 64.05 years old, with a global average life expectancy of 72.75 years (Life Expectancy – Our World in Data, n.d.).

Although life expectancy is the concept of the number of years expected to live based on the statistical average (Mandal, 2016), the average life expectancy depends on several factors, as identified by several studies. Financial income, literacy rate, standard health facilities, and daily circumstances generally affect the life expectancy of a country (Alamgir Khan, 2016). Low levels of infant mortality, a safe living environment, sufficient provisions, and preventive treatments would also lead to a high life expectancy (Reidpath and Allotey, 2003). Şentürk and Amjad (2021) stated that environmental degradation, purchasing power, and level of education contribute significantly to life expectancy. Studies also find an undefined positive relationship between life expectancy with short-run democracy (Lin *et al.*, 2003). Besides these variables, income per capita, nutritional intake, literacy rate, number of doctors per thousand population, and economic globalization were found to have a significant effect on life expectancy (Halicioglu, 2010). Higher income implies better access to housing, education, health care, and other items, all of which lead to better health, lower mortality rates, and longer life expectancy. As a result, it is assumed that aggregate income has historically been a pretty good predictor of life expectancy (Bacci, 2017).

In Bangladesh, in 2020, the average life expectancy was 73 years which is 8 years more than the average life expectancy in 2000 (World Bank, n.d). Although Bangladesh is doing better in increasing the average life expectancy and the need for study of life expectancy is crucial for the sustainable development of a country, there are very few articles addressing the factors affecting the life expectancy of Bangladeshi people. In a study, Alam *et al.* (2021a) investigated the role of financial development in the rapid rise of life expectancy. Their study has only addressed the role of financial development as an indicator of life expectancy. Mahumud *et al.* (2013) have only studied the impact of life expectancy on economic growth and health-care expenditures in Bangladesh. Gender differences in disability-free life expectancy were studied by Tareque *et al.* (2014). However, to the best of our knowledge, almost no studies have been conducted in the past 5 years regarding the determinants of life expectancy. As a result, considering the importance of life expectancy on the economic growth of a country, this study attempts to determine the factors that affect life expectancy in Bangladesh.

Table 1: Description of variables used in the multiple linear regression model

Variables	Descriptions/Measurement
Life expectancy	Life expectancy at birth, total (years)
Population	Population, total in Million
GDP per capita	GDP per capita (current US$)
Inflation rate	Inflation rate at consumer prices (annual %)
Unemployment rate	Unemployment rate (%)
Health expenditure	Per capita expenditure in USD
Physician	Physician per thousand people

Table 2: Descriptive statistics of different variable of this study

Variables	Minimum	Maximum	Mean	SD
Life expectancy	65.45	72.87	69.58	2.313
Population	127.66	164.69	147.29	11.18
Per capita income	413.08	2270.35	994.39	623.16
Inflation	2.01	11.40	6.31	2.20
Unemployment	3	5	4.21	0.51
Health Expenditure	183	867	371.37	217.636
Physician	0.25	0.64	0.40	0.105

Table 3: Correlation matrix of life expectancy, population, per capita income, inflation, unemployment, health expenditure, and physician for Bangladesh (2000–2020)

Variables	Life expectancy	Population	Per capita income	Inflation	Unemployment	Health expenditure	Physician
Life expectancy	1						
Population	0.997**	1					
Per capita income	0.887**	0.914**	1				
Inflation	0.315	0.280	-0.024	1			
Unemployment	0.573**	0.591**	0.554**	0.110	1		
Health expenditure	0.790**	0.809**	0.879**	-0.056	0.322	1	
Physician	0.781**	0.789**	0.806**	-0.023	0.252	0.941**	1

**significant at the 0.01 level

METHODS

Research design and data sources

This research was carried out based on the population of Bangladesh. Data from the preceding 21 years were used to produce this research, which spans from 2000 to 2021. The data sources were taken from the annual reports or website statistics of the World Bank, Bangladesh bureau of statistics, the World Health Organization (WHO), and the Macro Trends. We used the findings of the previous studies to select the most common variables that have shown an impact on life expectancy (Chan and Devi, 2015; Hassan *et al.,* 2017; Delavari *et al.,* 2016).

Analytical techniques

The main objective of the research is to determine the factors that affect the life expectancy of Bangladeshis. A multiple linear regression is used to analyze this conceptual model. To assess the association between two or more independent variables and one dependent variable, multiple linear regression is utilized.

The approach allows analysts to calculate the model's variation and the proportional contribution of each independent variable to the total variance. This study used population, GDP per capita, inflation rate, unemployment rate, and physicians as independent variables to explain variation in life expectancy. Table 1 describes the variables and their definitions in this model. The formula for a multiple linear regression is:

$$Y = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + ..\beta X + \varepsilon$$

Where,
Y = The predicted value of the dependent variable, which is life expectancy in this study,
βo = The y-intercept (value of y when all other parameters are set to 0)
$\beta_n X_n$ = The regression coefficient (β_n) of the first independent variable (Xn)
ε = Model error

RESULTS AND DISCUSSION

Summary statistics

Table 2 shows the summary statistics of variables used in this study. The mean value indicates the average for each variable. The result showed that the average life expectancy of Bangladesh people during 2000–2021 was 69.58, which is 3.288 years less than the life expectancy of Bangladesh people in 2020. The average population during this time was 147.29 million, with a standard deviation of 11.183. A significant difference was observed in per capita income with a minimum value of 413.08 USD and a maximum of 2270.35 USD from 2000 to 2020 as shown in Table 2. The average per capita income during this time was calculated at 994.39 USD, less than half of 2020 (2270.348 USD).

The average inflation rate was calculated at 6.31%, with the highest inflation rate at 11.40% (Table 2). The maximum and minimum unemployment rates were 3 and 5%, respectively, with a standard deviation of 0.51. Average per capita health expenditure was calculated at 371.37 USD, and the number of physicians per 1000 was found to be 0.40 from 2000 to 2020. Table 3 shows the correlation matrix between different variables used in this study.

Table 4: Results of the determinant of life expectancy at birth for Bangladesh (2000-2020)

Variables	Coefficient (all)	Coefficient (male)	Coefficient (female)
(Constant)	30.8285***	39.694***	29.120***
Population	1.176***	1.187***	1.170***
Per capita income	−0.179***	−0.187***	−0.175***
Inflation	−0.016	−0.010	−0.022
Unemployment	−0.021	−0.018	−0.023*
Physician	0.002	−0.006	0.010

***significant at the 0.01 level, *significant at the 0.1 level

Factors affecting life expectancy

Life expectancy at birth is considered one of the leading indicators for examining health status in developed and developing countries. In this study, we have taken 21 years of data from different sources to predict the factors affecting the life expectancy of Bangladeshi people. Life expectancy contributes to different variables, but this study has considered macroeconomic data to explain the variation. The result presented in Table 4 shows the comparison of different factors affecting the life expectancy of male, female, and average life expectancy of Bangladeshi people. Population with life expectancy was found positively and significantly related for both three categories of people (male, female, and all). The estimated coefficient for the population was highest for males, with a value of 1.187 as shown in Table 4. The coefficient of the population for all of Bangladesh was 1.176, implying that an increase in one million people increases the life expectancy by 1.176 years. Per capita income was also significantly related to people's life expectancy for all three categories in this study. However, it was negatively correlated with estimated coefficient values of 0.179, 0.187, and 0.175 for all populations, male and female. The estimated coefficient value for per capita income for all population −0.179 implies that 1 unit increase in per capita income decrease life expectancy by 0.179 years (Table 4).

The coefficient value for inflation was found to be −0.016, −0.010, and −0.022 for all people, male, and female, respectively, showing a negative association between life expectancy and inflation rate. However, the findings were found insignificant. The unemployment rate was also negatively related to all people's life expectancy, with estimated values of −0.021, −0.018, and −0.023. However, the relationship was found to be significantly related only in the case of females. The estimated value of unemployment for females at −0.023 implies that one unit change in the unemployment rate decreased the life expectancy of females by 0.023 years, which was significant at 10% level of significance. Finally, the physician per thousand population was found to be positively related to the life expectancy of people in Bangladesh for all populations and the female. Nevertheless, negative association was observed with the male category with an estimated coefficient of −0.006. However, the result was insignificant for all categories.

CONCLUSION

Life expectancy is a measure often used to gauge the overall health of a community. It is a measure that summarizes a country's mortality,

allowing us to compare it by generation and analyze trends. From the result, we have found that Bangladesh has significantly improved the life expectancy of its population. Besides, health expenditure has been observed in the last two decades. The number of physicians per thousand population has also increased, but it is still insufficient then it should have. Per capita income has notably increased, but at the same time, the unemployment rate was observed.

The estimated results revealed that the explanatory variables representing population and number of physicians had positive coefficients, which indicated that these variables have a positive relationship with life expectancy. On the other hand, per capita income, inflation, and unemployment had negative coefficients indicating a negative relationship with life expectancy. The result suggests that to increase life expectancy with an increasing number of physicians, we need to control unemployment and inflation rate.

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