

# **FACTORS AFFECTING LIFE EXPECTANCY IN VIETNAM, LAOS, CAMBODIA**

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## **ABSTRACT**

**Introduction:** According to the General Statistics Office and World Bank, the average life expectancy of Vietnam, Laos, Cambodia is increasing gradually. The aim of the research is to determine the relationship between three factors affecting life expectancy (demographics, socioeconomics and health care determinants) among many other factors **Methods:** Data were taken from the General Statistics Office and the World Bank. The data are taken continuously from 1985 to 2019. This is an appropriate timeline because it is the period after the independence of Laos, Vietnam, and Cambodia and before the outbreak of the COVID-19 pandemic. Thus, this study has excluded the factor of death due to war and the COVID-19. A multiple regression analysis was conducted with STATA to research factors. **Results:** Three factors chosen were as follows: demographics, socioeconomics, and health care resources determinants. Average life expectancy increased about 1.6 times. The above data also showed that population age 65 and older increased about 59 times, GDP growth changed from negative growth to positive growth and Industry increased approximately 1000 times. **Conclusion:** The result shows that life expectancy has a positive relationship with demographics, and health care resources. It also shows that socioeconomics affects life expectancy so weakly.

**Keywords:** Life expectancy, Demographic Aging, Socioeconomic Factors, Community Health Care

## Introduction

Life expectancy is one of the problems of life. It is a measure of the quality of life. A happy and healthy life will lead to high longevity. However, at present and to the best of writer's knowledge, there are not many studies on this issue in the world especially in developing countries. According to data from the General Statistics Office and World Bank, the average life expectancy of Vietnam, Laos, Cambodia is increasing gradually. Hence, the author proceeded to get data from the General Statistics Office and the World Bank to study the factors leading to this increase. Due to the research conditions, in this researcher, the author conducted a research in three countries Vietnam, Laos, Cambodia.

Life expectancy is the concept about the number of years that is expected to live based on the statistical average (Mandal, 2016). According to data from the General Statistics Office and the World Bank, the average life expectancy of people tends to increase. Research studies in developed countries have indicated four factors as financial income, high literacy rate, standard health facilities, and daily circumstances affecting life expectancy (Alamgir Khan, 2016). Following Beckman, in America, one of the most developed countries, nine factors affecting longevity are gender, genetics, prenatal, and childhood status, as well as education, marital status, ethnicity/migration status, lifestyle and health technology (Beckman, 2016). In detail, according to WHO, many factors such as socioeconomic conditions, including income, education, employment, and economic welfare; the quality of the health system and the state of the population; health behaviors such as drinking or eating harmful things, poor nutrition and inactivity; social factors; Genetic factors; and environmental factors, including pollution, lack of clean drinking water, climate are all factors affecting human life expectancy. Cheng-Wen (2017) introduced new factors such as infant mortality rate, internet consumption, education, and electric power. Moon Fai Chan et al (2015) conducted a study in Singapore, Malaysia, and Thailand; three South East Asian nations, concluding that demographics, socioeconomics and health care resources have impact on life expectancy.

To sum up, there are three general factors that have impact on life expectancy: demographics, socioeconomics and health care determinants. The rest of the factors are included in these factors.

Demographics is the study of a population based on factors such as age, race, and sex. Demographic data is relevant to socioeconomic information expressed statistically, including employment, education, income, marriage rate, birth rate and death rate, etc. Education is a key factor in improving people's health and life expectancy (Alamgir, 2016). Currently, in the world, Spain, Japan, Switzerland and Hong Kong are among the highest in life expectancy. The common feature of these four countries is the strong development of education (Amir, 2016). Hendi (2021) also pointed out that positive educational innovation has displayed a good sign on life expectancy.

Socioeconomic determinants include urbanization, industrial development, environmental pollution, GDP, etc.. Urbanization is an essential factor in determining life expectancy. Urban residents of developing countries often enjoy advanced health care and modern means of living, better education

and enhanced socioeconomic factors. This has a positive impact on human health as stated (Hendi, 2016). Industrial development will lead to environmental pollution, which adversely affects human life. The increase in GDP per capita is the proof of income growth and improvement in quality of life. Raj Chetty (2016) has also conducted a research study proving that income has an effect on life expectancy. Research by Venkataramani (2021) indicates that social and economic forces are likely to be the main drivers of America's decline in life expectancy.

Kabir (2008) argued that total health care spending has a significant impact on life expectancy because it directly reduces mortality and disease rates. According to statistics from the Worldbank, WHO shows that advances in health have led to an increase in longevity, a reduction in the risk of diseases and an increased ability to cure diseases. It can be seen that one of the advances in medicine is the vaccination of infants. Vaccinating for children reduces the risk of infectious diseases and has good resistance from childhood. Therefore, health care is an important factor in increasing life expectancy.

In sum, in this study, I used this three-factor model and the data from the General Statistics Office and the World Bank. This study aimed to find out the relationship between these factors and consider the increase in life expectancy of people. In addition, from the review of research results, it has been shown that there are differences between these factors in two groups of developing and developed countries.

## **Methods**

This original research is a quantitative study. Indirect sampling was used. The data were extracted from the annual statistical report of the General Statistics Office. This data is formal, reliable, readily available, easily accessible, and produced by a government entity. Data was taken from the General Statistics Office and the World Bank of three countries Vietnam, Laos and Cambodia from 1985 to 2019. This is an appropriate timeline because it is the period after the independence of Laos, Vietnam, and Cambodia and before the outbreak of the COVID-19 pandemic. Thus, this study has excluded the factor of death due to war and the COVID-19. It is used to find out the factors affecting life expectancy in three countries Vietnam, Laos, and Cambodia during this period. Research subjects are the citizens living in Vietnam, Laos, Cambodia, excluding those who have the nationality of these three countries but live in other countries. To ensure representativeness, a random sampling technique was utilized. A sample of the national population is taken up by the General Statistics Office of each country and averaged. The author recorded this survey data and made statistics with STATA software. Thus, the sample size is large enough to be reliable to extrapolate the characteristics of the population. This study is in accordance with the scientific ethical standards according to internal documents issued in these three countries.

The mathematical formula was established based on previous studies mentioned in the introduction of the present study. In summary, demographics, economics, and health care determinants have an effect on life expectancy. Moreover, the author added coefficients  $\alpha$  and error  $\varepsilon$  to increase the reliability of the model.

To research the effects of different independent variables on life expectancy, earlier studies usually followed the method of quantitative research with assistance from the software. Hence, in this research, STATA version 14.0 was employed.

Health issues are increasingly concerned and there are more and more studies related to this issue. Only when people are healthy can they build and live a better life. Human life expectancy assesses the quality of life. Although there are many studies on longevity, there are very few studies on longevity in Vietnam, Laos, Cambodia. Realizing the urgency of this problem, the author used a data set that was accurately derived from statistics to study factors affecting life expectancy. This study also helps to compare factors between developing countries and developed countries; in addition, it is a premise to study the changes of factors through COVID 19 pandemic.

The formula which represents the dependent variable is built like the following:

$$\text{Model; } LE = \alpha + \beta_1 * DG + \beta_2 * SE + \beta_3 * HL + \epsilon$$

$\alpha, \beta_1, \beta_2, \beta_3$  are coefficients

$\epsilon$  is error

The important variables are DG, SE, HL with corresponding coefficients to express their influence on LE as  $\beta_1, \beta_2, \beta_3$ .

The meaning and role of different variables are as follows:

**Table 1. List of dependent and independent variables of the regression models**

Variable	Meaning	Determined by	Role
LE	Life expectancy	Life expectancy	Dependent variable
DG	Demographic determinants	=MEAN (DG1, DG2)	Independent variable
DG1	Demographic determinants	Population ages 65 and older, female	Independent variable
DG2		School enrollment, primary (% gross)	Independent variable
SE	Socioeconomic determinants	=MEAN (SE1,SE2,SE3,SE4)	Independent variable
SE1	Socioeconomic determinants	GDP growth (annual %)	Independent variable
SE2		Urban population growth (annual %)	Independent variable
SE3		Industry (including construction), value added (constant LCU)	Independent variable
SE4		CO2 emissions (metric tons per capita)	Independent variable
HM	Health care determinants	=MEAN (HM1, HM2)	Independent variable
HM1	Health care determinants	Immunization, DPT (% of children ages 12-23 months)	Independent variable
HM2		Mortality rate, infant (per 1,000 live births)	Independent variable

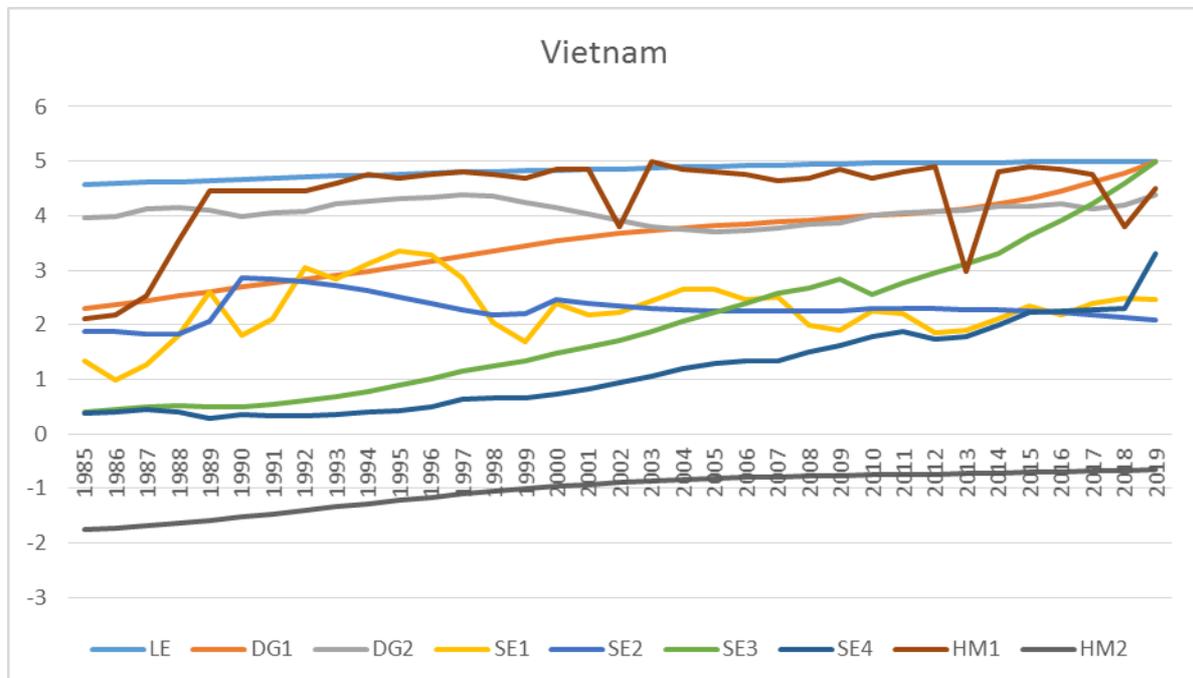
## Result

After collecting data through the World Bank and the General Statistics Office, the author entered them into Microsoft Excel. Next, the author recalculated the answers based on the Likert scale with a scale of 1-5 corresponding to the levels from weak to strong. Through Excel, the data is calculated the maximum and the minimum value, using scaling, with the maximum value of 5, the smallest value is 1, the results are decimal numbers from 1 to 5. The descriptive statistics in Table 2 indicate dependent variable LE and three different independent variables (DG, SE, HM) with their mean, minimum, and maximum values.

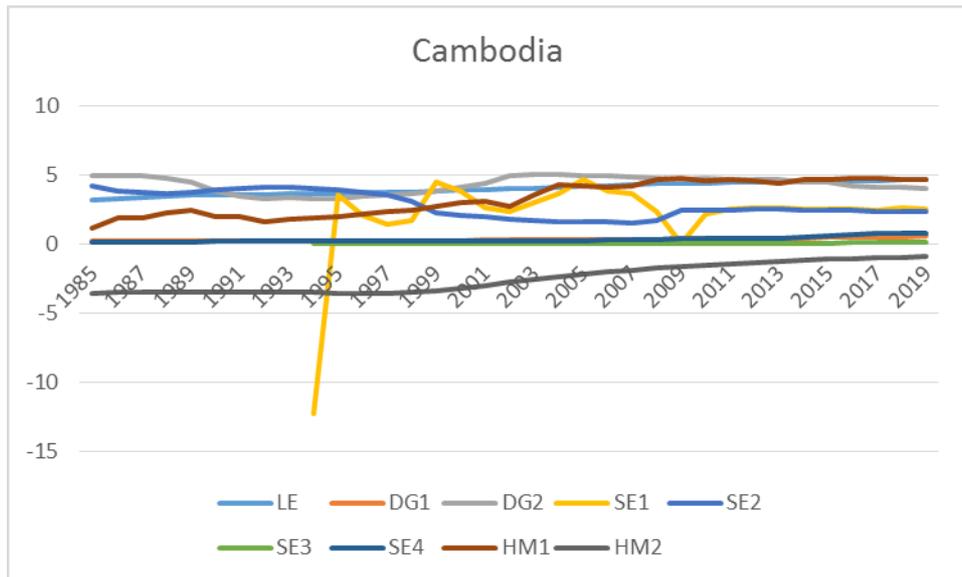
**Table 2. Variables summary**

Variable	Obs	Mean	Std. Dev	Min	Max
LE	105	64.25856	7.941212	47.864	75.37
DG1	105	1168544	1447309	74703	4423377
DG2	105	109.6907	10.71641	85.02592	131.937
SE1	96	6.333176	4.862933	-34.80864	14.19064
SE2	105	3.932691	1.195572	2.109575	6.945852
SE3	81	2.37e+14	3.47e+14	1.26e+12	1.35e+15
SE4	105	.6617799	.8659623	.0518955	4.568923
HM1	105	67.25714	25.98003	4	99
HM2	105	53.25333	29.54952	15.9	120.9

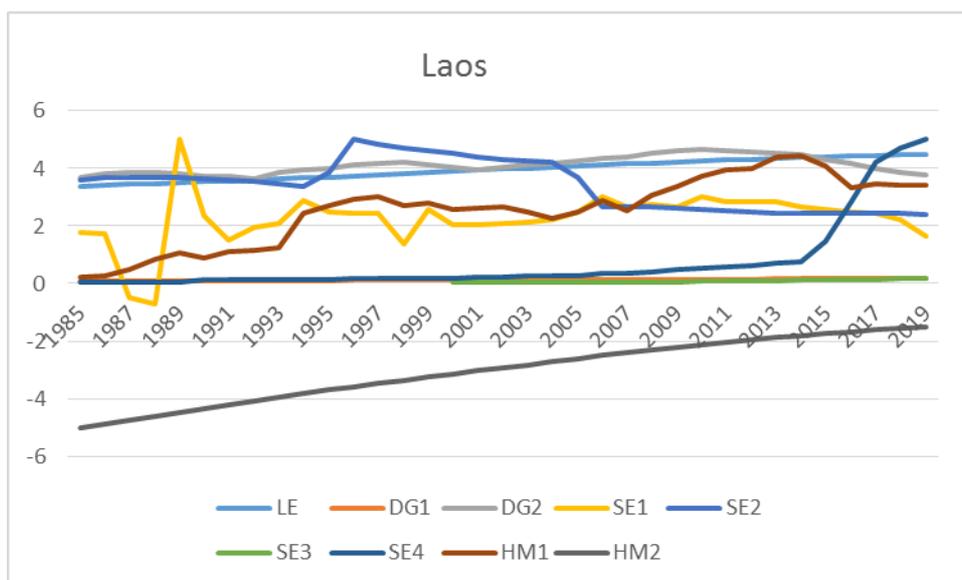
Looking at Table 2, it is clear that the maximum value of LE is 75.37 and the minimum is 47.864. So the difference between them is quite large. This shows that the socio-economic situation and people's lifestyle have changed markedly.



**Figure 1: Tendency in Vietnam**



**Figure 2: Tendency in Cambodia**



**Figure 3: Tendency in Laos**

According to figure 1,2,3, it is possible to see the changing trend of factors. Factors such as LE, DG1, SE1, SE3 tend to increase in all three countries. Furthermore, through the results, it is shown that the remaining factors do not change significantly. Their changing tendency is not obvious.

In the regression model, if the independent variables are closely related, or have a linear relationship, it indicates that the independent variables are strongly and strongly correlated with each other, and the phenomenon of multicollinearity will occur illustrating that independent variables in the model depend

on each other and can be expressed as a function. Therefore, the author performs the VIF coefficient test. The result VIF=2.01 indicates that the model does not suffer from multicollinearity.

Moreover, in the regression model the phenomenon of autocorrelation and variance can also occur. Therefore, to consider these cases, the author used White and Wooldridge tests and both obtained P value < 0.05 which indicates that there is autocorrelation between variables and the variance varies in a fixed direction.

**Table 3. General regression model regression**

	<b>Coef.</b>	<b>Std. Err.</b>	<b>z</b>	<b>P value</b>
DG	.2428934	.0369247	6.58	<0.001
SE	.0083835	.0152808	0.55	0.583
HM	.2081466	.0202195	10.29	<0.001
_cons	3.485768	.0978025	35.64	<0.001

There are four regression models commonly used in STATA: Pool, fixed effects model (FE), random effects model (RE) and general regression model (FGLS). The author has performed all four regression models to compare the level of reliability and choose the appropriate model. Initially, the author used a linear regression model Pool. However, after running it, the results had autocorrelation and variable variance (P-value < 0.05 of White test and Wooldridge test). Therefore, the more suitable models are FE (fixed effects model) and RE (random effects model). After using "Test of variance" a Prob result of 0.0098 proved the variance in a fixed direction. Thus, the more suitable model is FE (fixed effects model) because it helps to overcome the occurrence of fixed variance in the model. But after using the FE (fixed effects model), we still get the results showed the variable variance and the autocorrelation phenomenon. Thus, although the FE model has overcome the disadvantages of the Pool model, it still exists the phenomenon of variable variance and autocorrelation. According to the linear regression theory, the FGLS (general regression model) can overcome this phenomenon and give the most accurate results. Therefore, the FGLS (general regression model) was selected.

According to the above table, the variables DG and HM have a P-value of less than 0.05 except SE with a P-value of 0.583. Therefore, the reliability of LE's dependence on SE is not high. In addition, based on Coef. column (coefficient) and the values of DG, HM, \_cons rounded to the third decimal, then the model representing the dependence of LE is:

$$LE = 0.243 \cdot DG + 0.208 \cdot HM + 3.486 + \epsilon$$

### Discussion

From the research results mentioned above, it can be said that no socioeconomic determinants is related to the life expectancy. Nevertheless, Vietnam, Laos, and Cambodia should improve people's quality of life and their income and Socio-economic development associated with environmental protection. The reason that this variable does not affect human life expectancy is that the economies of these three countries are in the developing stage. Besides, health care and demographics have positive changes and good effects on life expectancy.

Thus, with the correct use of data from Data World Bank, the General Statistics Office and the analysis through STATA software, the author has come to the conclusion that the factors socioeconomic determinants, health care determinants, and demographic determinants have influences on life expectancy. This is consistent with previous studies by major authors mentioned in Introduction such as (Alamgir Khan, 2016), (Mandal, 2016), (Moon Fai Chan, 2015).

In the study of Lubitz (2003), he clarified that health care has a positive effect on the increase of life expectancy in the elderly. The results of this study show similarities and confirm that healthcare is an essential factor. Research by Eggleston et al (2012) found the share of increases in life expectancy realized after age 65 was close to 80 percent by the dawn of the 21st century. Thus, it can be seen that the elderly are tending to increase, and that also leads to an increase in life expectancy.

In addition, compared with the study done in the UK by Welsh (2021), the results all show the similarity in the influence life expectancy. Life expectancy is closely related to demographics, socioeconomics, and healthcare resources. However, this study also showed a difference in the degree of correlation. Because the three studied countries have their own specific characteristics in terms of culture, politics, especially the economy, thus health has the strongest impact, while economic development such as polluting the environment, increasing discontent social equality, urbanization, GDP... have negligible influence. According to statistics on Worldometers in 2017 (the world had not yet been impacted by COVID), it has been shown that GDP: \$19,485,394,000,000 (USA), \$12,237,700,479,375 (China), \$4,872,415,104,315 (Japan)... and \$223,779,865,815 (Vietnam), \$22,158,209,503 (Cambodia) \$16,853,087,485 (Laos). Thus, there is a significant difference in GDP between the two groups of countries.

Following Teichler (2005) and Baum et al (2013), the countries of North America and Europe are considered to provide the best education for people. Differences in the quality of education lead to people's perception of life and health care. This is also a vital factor in life expectancy.

### **Conclusion**

From the research results mentioned above, it can be said that no socioeconomic determinants is related to human life expectancy. Nevertheless, governments could improve quality of life leading to positivity in increasing life expectancy. Demographic determinants, health care determinants, on the other hand, impacts positive on life expectancy. These two factors play almost equal roles in influencing aspects of life expectancy.

Thus, this study has conducted research on the factors affecting health typical in three countries Vietnam, Laos, Cambodia. Each factor has a different degree of influence and is specific between groups of developed and developing countries.

The scope of this study is not wide and only shows the influence of factors on human life expectancy from developing countries and in the time before the COVID-19 epidemic. However, it is a premise for policy makers to find solutions to improve life expectancy. In the future, I will expand this study during COVID to see how the factors influence mortality.

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## Conflicts of Interest

The author declares no conflicts of interest.

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