

THE EFFECTS OF HEALTH AS A FORM OF HUMAN CAPITAL  
ON ECONOMIC GROWTH IN ASEAN COUNTRIES



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HATHAIKARN SOMIYA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ECONOMICS  
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ACADEMIC ADMINISTRATION AND DEVELOPMENT MAEJO UNIVERSITY  
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ชื่อเรื่อง	ผลกระทบของสุขภาพในมิติของทุนมนุษย์ต่อการเจริญเติบโตทางเศรษฐกิจในกลุ่มประเทศอาเซียน
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### บทคัดย่อ

การศึกษานี้ตรวจสอบความสัมพันธ์ระหว่างสุขภาพในรูปแบบของทุนมนุษย์และการเติบโตทางเศรษฐกิจ โดยใช้ชุดข้อมูลแบบ Panel Data จากประเทศที่ได้ทำการคัดเลือกมาจากกลุ่มเอเชียตะวันออกเฉียงใต้ โดยใช้ทฤษฎีการเติบโตแบบ Solow โดยการใช้การประมาณค่าตามแบบจำลองการถดถอยกำลังสองน้อยที่สุดโดยทั่วไป (Generalized least square regression model) ซึ่งการศึกษาในครั้งนี้ได้ใช้ข้อมูลจากเก้าประเทศที่เป็นประเทศกำลังพัฒนาในเอเชียตะวันออกเฉียงใต้ ผลการวิจัยชี้ให้เห็นว่าสุขภาพในรูปแบบของทุนมนุษย์มีผลกระทบในทางลบต่อการเติบโตทางเศรษฐกิจของอาเซียน เนื่องจากรายจ่ายของรัฐบาลอาเซียนมุ่งเน้นไปที่การใช้จ่ายเพื่อช่วยเหลือผู้ป่วยโรคไม่ติดต่อมากกว่าการมุ่งเน้นไปที่การพัฒนาทรัพยากรทางด้านสุขภาพเพื่อปรับปรุงสิ่งอำนวยความสะดวกด้านสุขภาพและการเข้าถึง ดังนั้นรัฐบาลควรส่งเสริมอย่างมากในการกระจายที่เหมาะสมของบุคลากรสาธารณสุขในชนบทหรือพื้นที่ห่างไกลให้มีบุคลากรทางการแพทย์เพียงพอที่จะส่งเสริมทุนมนุษย์ด้านสุขภาพที่มีประสิทธิภาพและเตรียมพร้อมกับแนวโน้มที่เพิ่มขึ้นในด้านอายุขัยของประชากร

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### ABSTRACT

This study examines the relationship between health as a form of human capital and economic growth using a panel data from selected countries in South East Asia to base on Solow growth theory. We estimated a generalized least square regression model using data from nine developing countries in South East Asia. Findings suggest that health as a form of human capital have negative affect to economic growth on ASEAN because the ASEAN government expenditure has focused on spending to help people who are sick from NCDs and does not focus their resources to improve health facilities and access. Thus, government should promote heavily in proper distribution of health personnel in rural or remote areas have sufficient medical personnel to promote human capital in health that have efficiency and prepared with the increasing life expectancy of the population.

Keywords : Economics growth, Human capital in health, ASEAN, Obesity

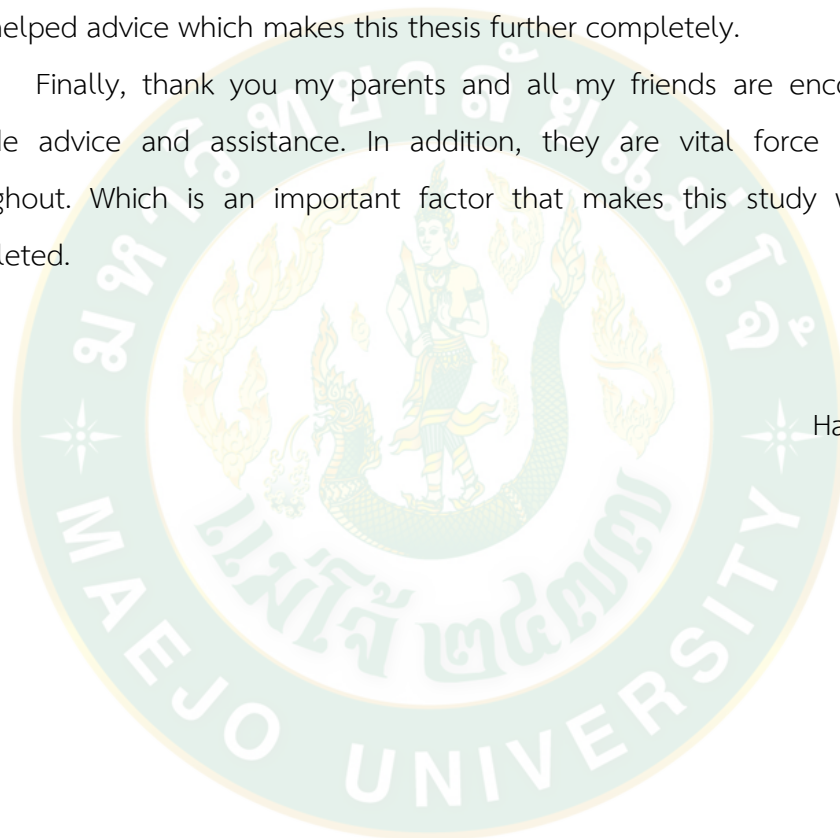
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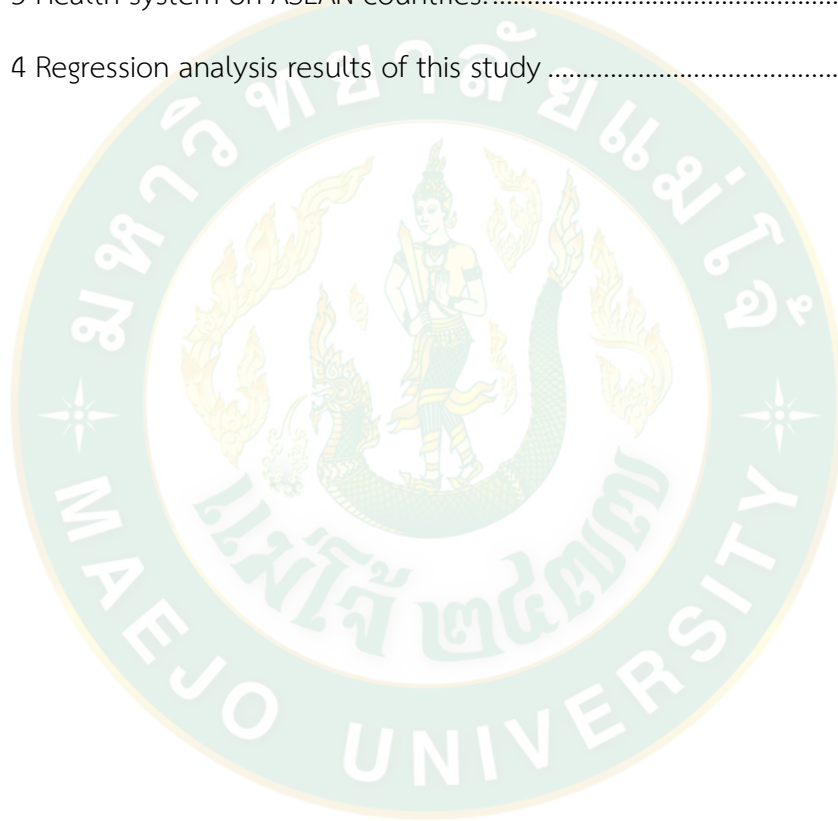
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## CHAPTER 1

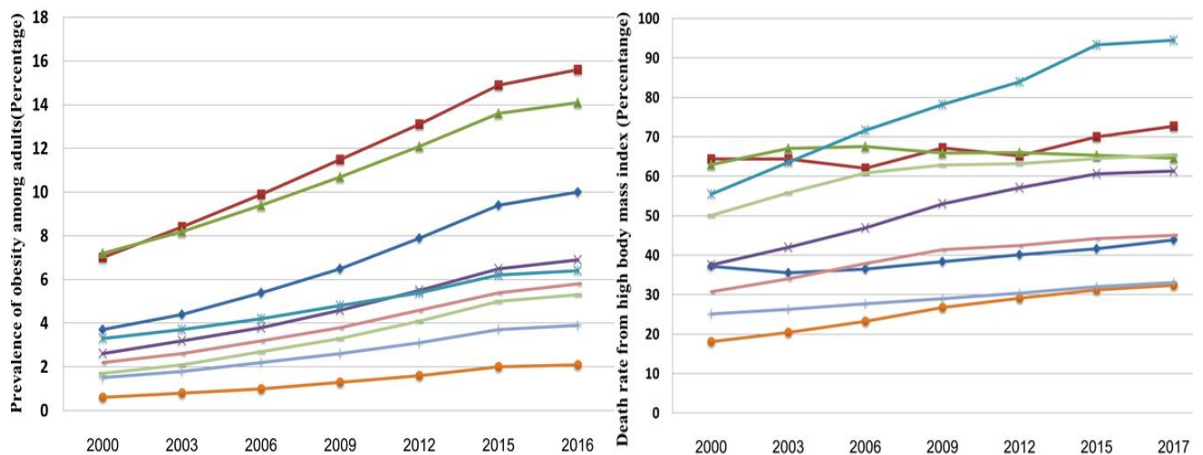
### INTRODUCTION

Investing in human capital is an important factor of economic growth and development, which economic development is an increase in productivity or growth in the manufacturing sector which that have development of human resources in terms of skills and abilities more will result in growth in the manufacturing sector (Oketch, 2006). Human capital is recognized as a representative of national development in every country of the world. Providing health services to people may improve the quality of human resources (Isola and Alani, 2012). Health is considered the basis of economic growth and development and is one of the important factors for increasing economic efficiency at both the micro and macro levels, also health is considered a direct component of human well-being and forms of human capital that increase personal ability (Bloom et al., 2004). Furthermore, health improves an individual's mental and intellectual capabilities and increased health can raise the growth rate of income through technical innovation leading to better educational outcomes due to long-term economy growth (Schultz, 1999). If human or labor have good health, energetic and strong physically and mentally will make they be more productive in their work or productivity and receive higher wages, thus it means illness and disability have an effect on hourly wage cuts directly in developing

countries, which has a greater proportion of use labor in the production than in industrial countries (Bloom et al., 2004).

Currently, non-communicable diseases (NCDs) are important cause of mortality worldwide and a serious public health threat to developing countries (Islam et al., 2014). According to several experts, the increase in obesity is an important factor that accelerates the incidence of many non-communicable diseases (NCDs) including colorectal cancer, diabetes, high blood pressure, cardiovascular disease and cerebrovascular disease and etc (The Economist Intelligence Unit Limited, 2017).

As can be seen in the left panel of Figure 1, the prevalence of obesity among adults has increased from 2000 to 2016. The countries experiencing the major obesity rates are Malaysia, Brunei and Thailand. In turn, the country that lowest rate of obesity is Vietnam by in 2016 has obesity at 2.1 percent from 2 percent in 2015. In addition, the right panel in Figure 1 shows that the death rate from high body mass index also had a sharp increase similar to that of the prevalence of obesity. The countries experiencing the highest death rates are Philippines, Malaysia and Brunei. As a result, the increases in obesity have an impact in the health of the country.



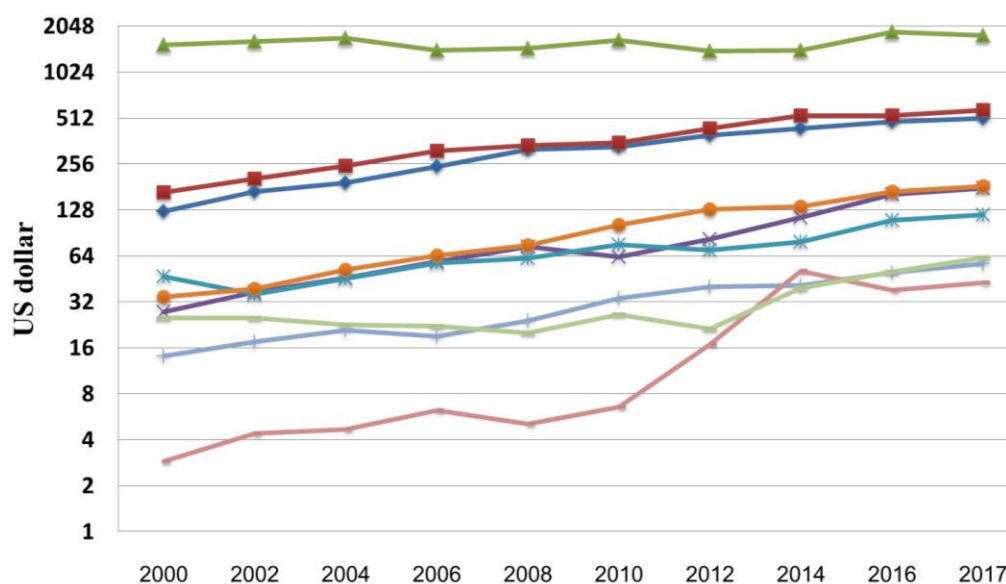
**Figure 1** Prevalence of obesity among adults, BMI  $\geq 30$ , age-standardized estimates (left panel) and Death rate from high body mass index (right panel) within ASEAN countries.

Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is Cambodia, Pink line is Myanmar and Light green line is Lao.

Source: World health organization (2020) and Our world in data (2020)

When the prevalence of obesity increases the government has to spend more in health care. Furthermore, the establishment of Universal health coverage has resulted in a rapidly growing rate of health expenditure by most of the health costs comes from public or government spending at 80 percent and from private spending at 20 percent (Teerawattananon and Luz, 2017). This is shown in Figure 2, where the domestic general government health expenditure per capita has increased within ASEAN countries. Brunei has the most domestic general government health expenditure per capita in 2017 at 1777.89 US dollar followed by Malaysia at 576.18 US dollar and Thailand at 510.72 US dollar. The country that has lowest domestic general government health expenditure per capita in 2017 is Myanmar at 42.58 US

dollar, which overall the countries in ASEAN have trend of domestic general government health expenditure that increase.



**Figure 2** The domestic general government health expenditure per capita (US dollar) at purchasing power parity (PPP) within ASEAN countries from 2000-2017.

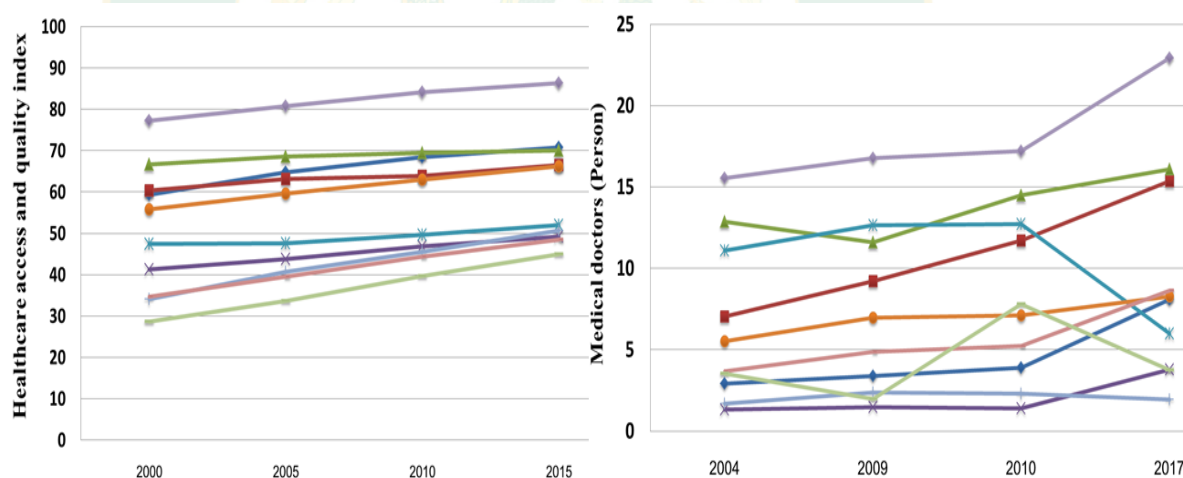
Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is Cambodia, Pink line is Myanmar and Light green line is Lao.

Source: World bank (2020)

Another consequence of the increase in NCDs is that the amount of money in the development of health capital and medical treatment falls. Thus, make of medical treatment is not cover and less quality, which can be seen from the graph of healthcare access and quality index in ASEAN country (left panel of Figure 3). All nine countries in ASEAN have rates of access and quality lower than Singapore. The lack of access to quality health may due to ASEAN countries have problems with improper distribution of health personnel by in rural or remote areas have

insufficient medical personnel, also have weak in production and employ qualified health personnel (Minh et al., 2014).

In right panel of Figure 3 will show rate of medical doctors per 10,000 populations within ASEAN countries compare with Singapore by Brunei has the most rate of medical doctors in nine countries behind Singapore at 16.09 persons per 10,000 populations in 2017 followed by Malaysia at 15.36 and Myanmar at 8.64. And the country that has lowest rate of medical doctors is Cambodia at 1.93 persons per 10,000 populations in 2017. From the above limitations, it affects the cover of healthcare services and quality in ASEAN countries.



**Figure 3** Healthcare access and quality index within ASEAN countries compare with developed country such as Singapore (left panel) and Medical doctors (per 10,000 population) within ASEAN countries compare with developed country such as Singapore (right panel).

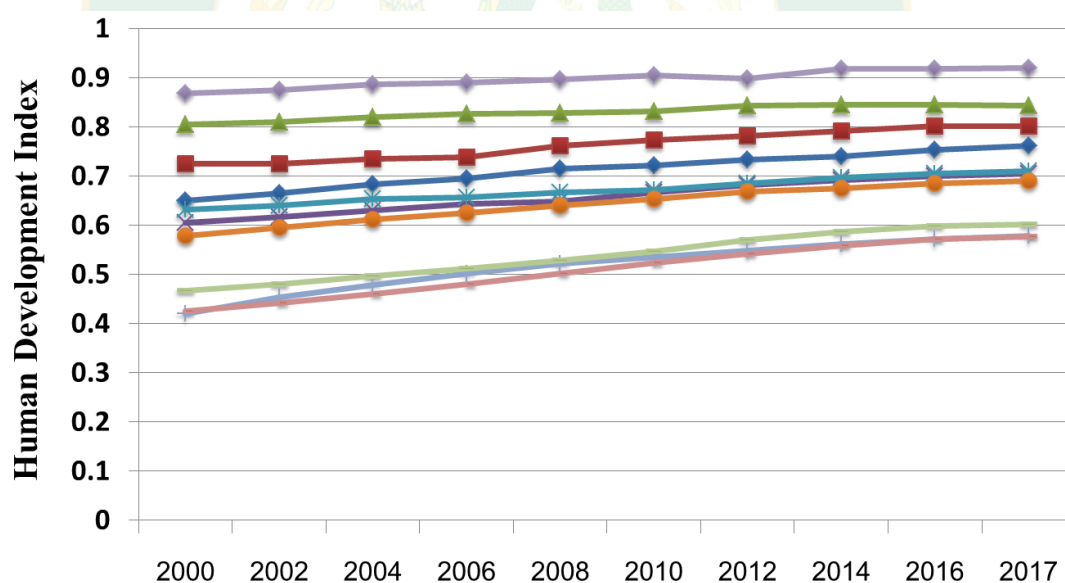
Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is



Cambodia, Pink line is Myanmar, Light green line is Lao and Purple gray line is Singapore.

Source: Global Burden of Disease Collaborative Network (GBD) (2020) and World Health Organization (2020).

Thus, when ASEAN countries have number of health personnel less will affect to human capital on health. Which will can see from Human Development Index (HDI) that ASEAN countries (Figure 4) have rate that lower than United Kingdom. Due to, government of ASEAN countries spending to help people that sick more than develop standards in medical or treatment that will improve directly on health of people (Teerawattananon and Luz, 2017).



*Figure 4 Human Development Index (HDI) within ASEAN countries compare with developed country such as United Kingdom.*

Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is



Cambodia, Pink line is Myanmar, Light green line is Lao and Purple gray line is United Kingdom.

Source: United nations development programe (2020)

From the above information, we will can see that the problem of human capital in health on ASEAN are population has obesity increase, which make government spending more to help population that has obesity or sick instead development infrastructure in human capital on health (Teerawattananon and Luz, 2017). As a result, the amount of money in the development of medical treatment decreases which make medical treatment is not cover and less quality, which can be seen from the graph of healthcare access and quality index in ASEAN country (Figure 4). By causing problems of improper distribution of health personnel by in rural or remote areas have insufficient medical personnel, also have weak in production and employ qualified health personnel (Minh et al., 2014). Thus, although government spending in health will increase, it may not contribute to economic growth on ASEAN.

There is a previous study by Gundlach (1997) show major determinants of economic development is the important role of human capital formation. And Oketch (2006) has shown that human capital in health affect economic growth. And the study of Bloom et al. (2004) explain about good health has a positive and statistically significant effect on aggregate output due to can produce more.

Along with there is a previous study of the effects of health human capital on the growth rate of per capita income in Sub-Saharan African and OECD countries and however, the study focuses on the impact of human capital in health and economic growth in compare differences cross-country of Sub-Saharan African and OECD countries (Brempong and Wilson, 2004). And study by country from Thoa et al. (2013) on the impact of economic growth on health care utilization but the study focuses on the impact of human capital in health and economic growth in rural Vietnam.

However, it does not include economic integration that is developing countries in the Southeast Asia. And there is little empirical evidence on the relationship of human capital in health and economic growth in ASEAN. This highlights the following question "How does human capital in health affect economic growth on ASEAN?".

### **1.1 OBJECTIVE OF THE STUDY**

The main objective of this study is to investigate the relationship between health as a form of human capital and economic growth in selected ASEAN countries. To do this, we also established the following objectives (1) Review indicators of health as a form of human capital, (2) Develop a theoretical model that incorporates health indicators as a form of human capital in Solow growth model to measure the impact of health on economic growth of selected countries in the ASEAN region and (3) Provide policy recommendations to develop economic growth through promote on health as a form human capital.

## 1.2 IMPORTANT OF THE STUDY

This study is important to government to set policies in support of economic growth by health human capital which is another factor that affects. Also, when asked about the major determinants of economic development is likely to point to the important role of human capital formation (Gundlach, 1997). Because human capital is another important factor for economic growth. If human capital is promoted with skills and good welfare, it will result in the use of limited resources to maximize benefits. And cause investment there are various technological developments. Which, will cause effective economic growth (Bloom et al., 2004).

## 1.3 ADVANTAGE OF THE STUDY

It is also beneficial to those who interesting to study or increase knowledge to the extent that is related to human capital in health and economic growth.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 ECONOMIC GROWTH ON ASEAN

Economic growth continues to be one of the most relevant and interesting sub areas of economics due to the problem of economic development remains a major one for humanity at large while many region or countries have stagnate by differential growth as the result to increase gap in income per capita and living standards that continues to current, which effect of few percent change in the growth rate of a nation can have huge consequences for the wellbeing and living standards of its citizens (Acemoglu, 2012). By growth in per capita income has been a persistent feature of the world economy in the past two centuries and come from accumulation of physical capital and human capital (Klenow and Rodriguez-Clare, 1997). Which must is effective resources it means effective in human capital or labor and physical capital (Solow, 2016).

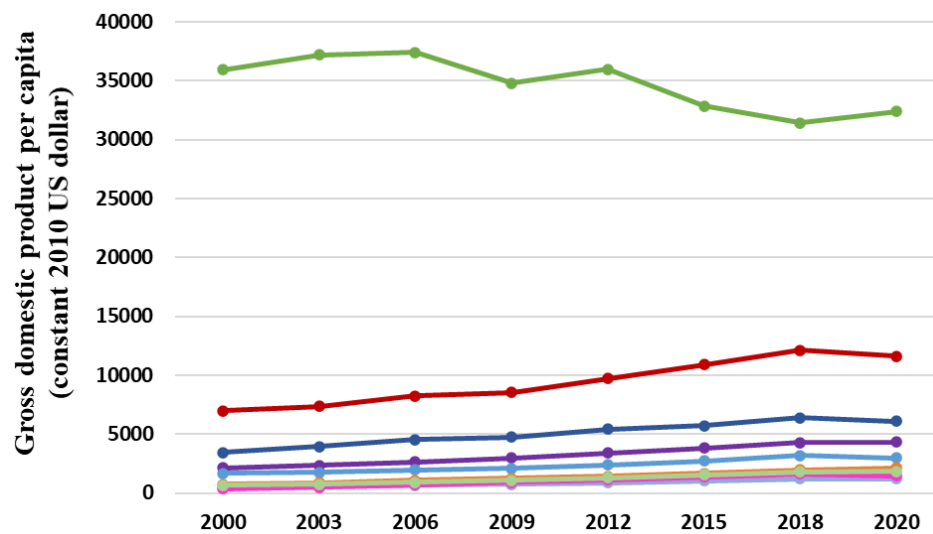
The Association of southeast asian nations (ASEAN) was established in 1967 by five countries are Indonesia, Malaysia, Thailand, Philippines and Singapore, which these five countries are countries that join the first group by have main objective was to create a “prosperous and peaceful community of South-East Asian Nations” in addition ASEAN’s main purpose is to accelerate economic growth, social progress and cultural development among the members (Beeson, 2009). By in January 1992

agreement of the ASEAN-6 by are the five founding members plus Brunei that come for integration to create AFTA, which officially came into existence in 2002, it make AFTA symbolized ASEAN's desire to unite the region via economic integration by the important step to integration of ASEAN and have the institutional framework for the member states to work together in a more rules based environment with improved decision making and compliance mechanisms through legal personality that created together (Kim, 2011). ASEAN have positive affect on Southeast Asian and East Asian relations and the region's economic success that will make trade increase through economic integration (Stubbs, 2019).

Trade in the ASEAN economies group is higher than that we expect due to income levels and other important determinants of bilateral trade, which rate of trade within ASEAN or within East Asia have increase by rapid growth of the countries in group, which trade of Southeast Asian countries will in the future naturally continue to grow more rapidly than incomes and the stock of Foreign Direct Investment (FDI) is a significant determinant of trade in ASEAN, by if the ASEAN countries make serious progress along the path that they have set for themselves under the AFTA, which will make gains from trade and investment in the area are potentially important have increasing trend and progress in ASEAN countries (Frankel and Wei, 1996). While, human capital and innovation capacity are vital for driving economic growth due to human capital and innovation capacity has a significant

positive effect on the economic growth in ASEAN in part of capability of ASEAN countries as "innovator" countries instead of "user" countries that will increase (Muhamad et al., 2018).

As we can see the ASEAN countries are economic integration that is developing and developed countries in the Southeast Asia. Which have grown considerably, doubling its share of the world's gross domestic product (GDP) which make be the sixth-largest economic group in the world (Haini, 2020). In Figure 5 will show rate of gross domestic product per capita within ASEAN countries by Brunei has the most rate of gross domestic product per capita in 2020 at 32,402.37 US dollar. Due to Brunei Darussalam is country that very rich in terms of natural resources and focus on trade liberalization such as set averages tariffs on its imports from other countries are very low etc (Tahir and Hayat, 2020). Followed by Malaysia at 11,637.35 US dollar because Malaysia its focus manufacturing sector more than agriculture sector by industry use labor intensive and high technology, which make rapid increase in manufacturing affect to economic growth (Hussin and Saidin, 2012).



*Figure 5* Gross domestic product per capita (constant 2010 US dollar) within ASEAN countries.

Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is Cambodia, Pink line is Myanmar and Light green line is Lao.

Source: World bank (2021a).

From the above mention, the dynamics of the global economy make developing countries have opening to trade and capital flows, however have different result by some countries have growth rate increase make can improve living standards and decrease poverty levels but some countries cannot get benefit make low rates of economic growth (Carrasco and Tovar-García, 2020). Because countries have different structure make get external shocks not the same, which affect to different economic growth (Kim et al., 2016).



Hence, domestic investment and export as a determinant for economic growth of ASEAN countries and physical capital accumulation and improve in economic efficiency will make economic growth increase (Malarvizhi et al., 2019). And study from Sermcheep (2019) found that there has been evidence of growth rate of services export in ASEAN will promote gross domestic product growth and have positive effect due to modern services exports by the services exports have important increase in part of new engine of growth.

Although, ASEAN have an important role in the Asia Pacific but due to ASEAN's limitations about far deeper issues revolving around state building or government within Southeast Asia from instability and stability in order to gain foreign trust, which the institution have very important because as factor that attract for foreign investment that will contribute to the development of the economy and important to increasing trend of economic growth in ASEAN (Narine, 2008).



## 2.2 HUMAN CAPITAL ON ASEAN

Human capital refers to the fact that human have investment in themselves such as invest in education, training or other activities that will make human have more knowledge for raises their future income by increasing their lifetime earnings by assets that can generate income in the future are called capital, in addition population that have highly educated workers are more likely to come from higher social class groups in society and to work in urban more than rural areas (Woodhall, 1987). Currently, human capital have important role in the formation of macroeconomic indicators, by formation of human resources will depend on policy of government that will promote for sustainable development that ensures the survival of humanity and the ability of its further sustainable for generations in the future (Sycheva et al., 2019). It mean human capital will drives the marginal productivity of labor and marginal productivity drives earnings through education and health and have important overlaps in practice and linear continuum although the two are different but have relationship between each other both in context and internally (Marginson, 2019).

Hence, the important factors that will affecting the efficiency of human capital formation is the quality of life and social protection of the population by most population have limited access to the use of critical infrastructure such as access to medical for population that sick do not have enough and educational institutions that make population lack in knowledge and development will make

efficiency of potential of human capital have increasing trend (Shelkovnikov et al., 2016). By development on ASEAN still have ways to go in order to fully develop due to gap of development on human capital and capacity of ASEAN Member States (AMSs), which human capital serves as a strong driving force by investment in human capital for increase the productivity of workers that make their earnings increase (Tullao and Cabuay, 2015). Which, things that make this economic integration successful include four main characteristics are a single market and production base, a highly competitive economic zone, an area with equitable economic development and an area that is fully integrated with the global economy as a result ASEAN high development and reduce poverty (Wibowo, 2019).

**Table 1** Human capital on ASEAN

Country	Human Development Index	Population in 2020	Labor force 2020
Thailand	0.755	69,799,978	38,483,357
Brunei Darussalam	0.853	437,483	217,212
Indonesia	0.694	273,523,621	134,616,083
Cambodia	0.582	16,718,971	9,163,843

<b>Lao PDR</b>	0.601	7,275,556	3,828,776
<b>Myanmar</b>	0.578	54,409,794	22,951,469
<b>Malaysia</b>	0.802	32,365,998	15,904,215
<b>Philippines</b>	0.699	109,581,085	43,719,193
<b>Vietnam</b>	0.694	97,338,583	56,542,377
<b>Singapore</b>	0.932	5,685,807	3,446,291

Source: United nations development programe (2020); World Bank (2022a, 2022b)

In Table 1 will show about Human capital on ASEAN, which population and labor force are number of human capital on ASEAN that government can develop in each country, In 2020 Indonesia remains the largest population with a population of 273,523,621 people followed by Philippines that have population around 109,581,085 people and Thailand have 69,799,978 people by the country on ASEAN that have the lower rate of population is Brunei Darussalam that have population only 437,483 people.

And in the same year, the countries in ASEAN economies also have labor force that is all the members of a particular organization or population who are able to work, viewed collectively in each country on ASEAN, which have number that different from number of population due to population means all people in country by in 2020 labor force of Indonesia have the high rate at 134,616,083 people

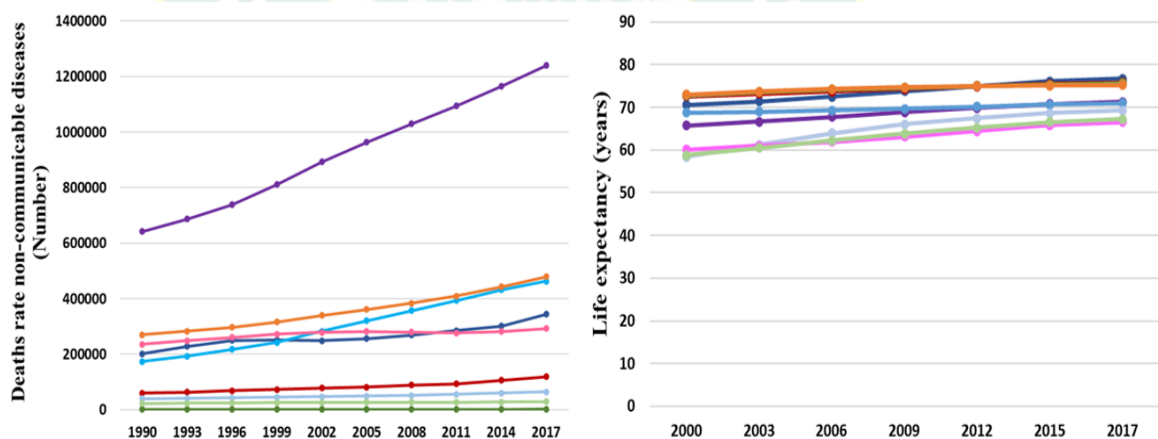
followed by Vietnam at 56,542,377 people that have population lower than Philippines, by Philippines have labor force only 43,719,193 people and Thailand have labor force at half of population is 38,483,357 people, which the country that have lower rate of labor force is Brunei Darussalam that have only half of population at 217,212 people as well as with the number of labor force in Thailand.

However, the large population or large number of labor force in market workers is not indicative of the quality or efficiency of the human capital resources in a country, which we can see that Human Development Index from Table 1 by the country that have higher rate of Human Development Index is Singapore at 0.932 and followed by Brunei Darussalam at 0.853 which is the country that have high number of population and labor force but have Human Development Index less than Singapore and the country that have the lower rate of Human Development Index is Myanmar at 0.578, which government should give great importance and attention to development on human capital in country.

ASEAN's evolving demographics and lifestyle is driving changes in the healthcare sector, by life expectancy of population in Southeast Asia is expected to long exceed other areas in Asia make healthcare providers have improve skills and equip resources in caring for elderly people to prepare for changes, also in many ASEAN countries have focus on treating chronic diseases and injuries which are most death causes in ASEAN (The official investment promotion website of the Association

of Southeast Asian Nations, 2021). Which will can see from deaths rate from non-communicable diseases in ASEAN countries (left panel of Figure 6) by non-communicable diseases often be chronic or long-term illnesses such as cardiovascular diseases, cancers, diabetes and chronic respiratory diseases etc (Our world in data, 2021b). In 2017 Indonesia has highest rate at 1,239,737.67 persons, followed by Vietnam at 478,942.98 persons and Philippines at 462,182.09 persons. Also, the country that has lowest rate of deaths rate from non-communicable diseases is Brunei at 1,538.23 persons in 2017.

In right panel of Figure 6 will show rate of life expectancy in population on ASEAN countries by Thailand has the most rate of life expectancy at 76.683 years in 2017, followed by Malaysia at 75.828 years and Myanmar has lowest rate at 66.558 years. By the both rates have trend are increasing continuously.



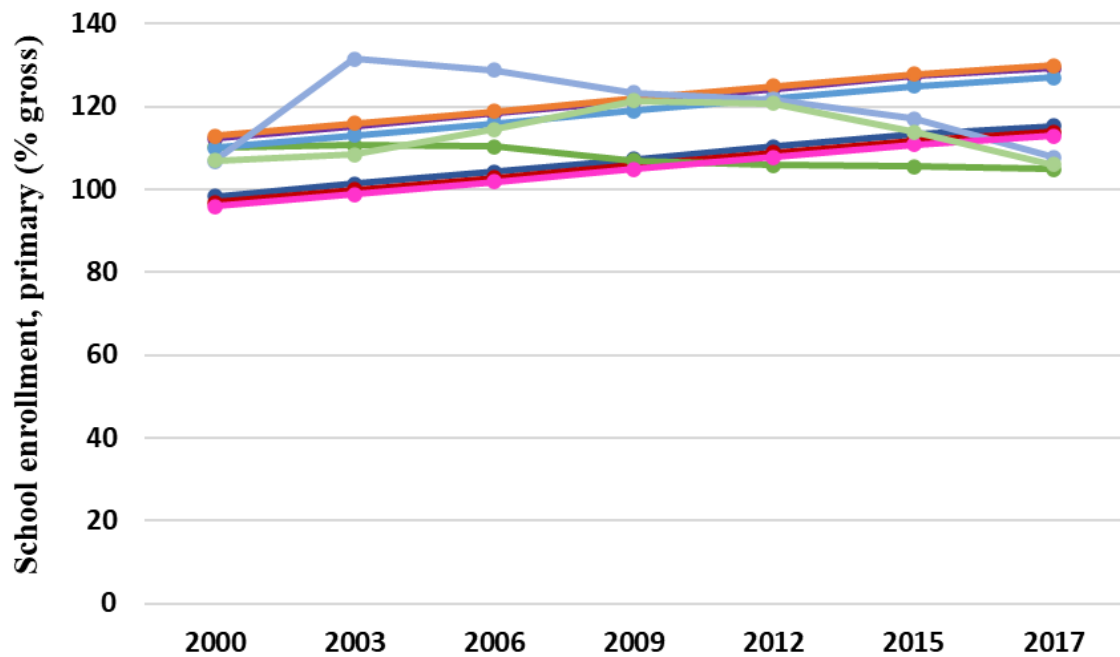
**Figure 6** Deaths rate from non-communicable diseases (left panel) and Life expectancy (right panel) within ASEAN countries.

Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is Cambodia, Pink line is Myanmar and Light green line is Lao.

Source: Our world in data (2021a) and World bank (2021b)

In addition, human capital can drive economic growth by make labor access to education increase due to development must focus on building knowledge infrastructure (Muhamad et al., 2018). And intensity of skills and knowledge for labor in economy can improve through education and training (Ahmed, 2017). Which ASEAN countries have challenge about education and skills development of labor because differences in economic prosperity and social development between member countries such as Malaysia, Myanmar and Cambodia (Feuer and Hornidge, 2015).

As can be seen in the figure 7, rate of school enrollment primary has increasing continuously. By in 2017 the countries that has the most rate is Vietnam at 129.92 percent gross and followed by Indonesia at 129.35 percent gross. Which the countries that has lowest rate is Brunei at 104.86 percent gross.



*Figure 7 School enrollment, primary within ASEAN countries.*

Note: Dark blue line is Thailand, Red line is Malaysia, Green line is Brunei, Purple line is Indonesia, Sky blue line is Philippines, Orange line is Vietnam, Blue gray line is Cambodia, Pink line is Myanmar and Light green line is Lao.

Source: World bank (2021c)

From above mention as we can see government in ASEAN countries have promote and improve human capital by develop health and education. Because populations have healthier and better educated are likely to be more productive, which make income per capita increase and improved welfare by labor that have good health will promote workforce productivity and wages in developing countries (Olagunju et al., 2019).



### 2.3 HUMAN CAPITAL AND ECONOMIC GROWTH

Economic growth have defined meaning that basic are the increase in goods and services produced in a country and have a continuous increase in gross domestic product per capita, by have labor is important production factor that produce of goods and services for make economic growth increase, it mean when have invest in labor will make the productivity of human capital increase and improve economic growth (Boztosun et al., 2016). Therefore, the major of factor that affect to economic growth are trade openness and human capital due to promote develop new technologies, flows of new ideas and knowledge that will make economic in country have increasing trend by trade openness will make the country have develop in technological in an economy and will make human capital that is factor of economy have performance and quality increase (Intisar et al., 2020). It is also plausible that population health make economic growth increase (Lange and Vollmer, 2017).

Human capital is one of the key factors of economic growth and has an important role to the country's technological advancement (Teixeira and Queirós, 2016). Human capital is the concept that identifies human characteristics by generally combines the knowledge and skills of people which some part comes through education, but may include strength and liveliness, which depends on their health and nutrition (Appleton and Teal, 1998). Which, has determine human capital as the set of knowledge, skills and abilities that exist within the person by the person will receive when through training, education, work experience, medical treatment, and



migration and also human capital can be divided into three main components are health, education, and experience or training may the reason for the increased economic growth because of improved education, higher health status, and new learning (Ogundaria and Awokuse, 2018). And the study by Ogundari and Abdulai (2014) shows employees that have educated and healthy are more likely to create or be able to effectively apply new technology to their jobs.

In addition, Human Capital Development can be divided are the principles of human resource development and the concept of professional development and advancement due to employee that have high quality will make the organization performance increase, by should have planning and development on labor that needed in organization, which that the success of the organization is the success of the human capital development (Sriwiboon, 2013). By human capital not only as a component of the production function but also as the realization of economic progress, which will show about knowledge and technology factors in economic growth by have focus on human capital accumulation due to human capital have affect to economic growth (Boztosun et al., 2016). Which, foreign direct investments that is important factor of economic growth have affect to human capital when foreign direct investments increase (Zhuang, 2017).

By human capital theory focuses on health and education for as inputs to economic production but contrast to the concept of human development which

views health and education as measures of human welfare that to be placed alongside economic production (Appleton and Teal, 1998). Thus, human capital is an intangible source managed mutually by the individuals and groups within the population or many social indicators such as school enrolments, life expectancy, health, knowledge, and skills are collectively known as human capital (Kazmi et al., 2017).

From study by Escosura and Rosés (2010) in Spain find human capital provided a positive albeit small contribution to labor productivity growth facilitating technological innovation. And study from Zhang and Zhuang (2011) tertiary education has more important role than primary and secondary education on economic growth in China and human capital have role to economic growth in development. And study about impact of foreign direct investment and human capital on economic growth in China suggests that human capital contributes to growth is to serve as a facilitator for technology transfers stemming from FDI (Su and Liu, 2016).

In addition, from study of Matousek and Tzeremes (2021) about the effect of human capital stock on economic growth in country found human capital have different behavior of human capital stock on economic growth, which labor that have skilled and unskilled workers cannot substitute and result in developing and developed countries have different. And study of Afandi et al. (2019b) shows that

human capital affects income and economic growth will make have increase productivity and wages for develop human capital and advantage of population, which found positive effect of human capital on output particularly industrial sector. Which, the quality of the population and infrastructure as the primary determinants of economic growth including a direct way to increase in human capital or indirect activities of human capital such as training or research and development, it make human capital have positive affect to economic growth (Boztosun et al., 2016).

Thus, can see that be it human capital on education or health. The both have an effect on the economic growth. Human capital on education has affect to economic growth by affect to level income, when people have education more will make higher income from participation in the labor market (Jorgenson and Fraumeni, 1992). In respect to human capital on health from study by Li and Huang (2009) found health increases economic growth through channels of improved education, productivity, and economic participation.

There are been many arguments about the relationship between human capital in health and economic growth, which can be seen from Table 2 that will show about main finding and methodology of previous studies about relationship between human capital on health and economic growth.

**Table 2** Main finding and Methodology of previous studies about relationship between human capital on health and economic growth

Author (Year)	Title	Country	Methodology	Main Findings
Thoa et al. (2013)	The impact of economic growth on health care utilization: a longitudinal study in rural Vietnam	From 11,260 households in a rural district of Vietnam.	Double-difference propensity matching technique and use Logistic regression estimating.	Human capital on health have negative affect to economic growth due to households that have economic growth less will have rate to spent for expenditure on health care less but will have high rate to use medical welfare from the government such as provincial or central hospitals.
Lopreite and Zhu (2020)	The effects of ageing population on health	China	Bayesian-VAR (B-VAR) models	Health have negative affect to economic growth due to ageing

	<p>expenditure and economic growth in China: A Bayesian-VAR approach</p>			<p>population induces a relatively strong reaction from health expenditure per capita in China.</p>
<p>Raghupathi and Raghupathi (2020)</p>	<p>Healthcare Expenditure and Economic Performance: Insights From the United States Data</p>	<p>The various states in the United States</p>	<p>Visual analytics method</p>	<p>Health have positive affect to economic growth through healthcare expenditure and economic indicators of income, GDP and labor productivity.</p>
<p>Yang (2019)</p>	<p>Health expenditure, human capital, and economic growth: an empirical</p>	<p>From 21 developing countries from 2000 to 2016.</p>	<p>Method of a single threshold model</p>	<p>Health will have positive effect to economic growth when human capital is at a medium level and will increase when</p>

	study of developing countries			level of human capital is high but health have negative effect when human capital levels are low.
Brempong and Wilson (2004)	Health human capital and economic growth in Sub-Saharan African and OECD countries	Sub-Saharan African and OECD countries.	Solow growth model	Health have positive affect to economic growth when investment in health human capital after controlling for other variables will make the growth rate of per capita income is strongly and positively influenced.
Li and Huang (2009)	Health, education, and economic growth in China:	China	Solow growth model	Health and education have positive significant effects on economic growth and

	Empirical findings and implications			the results also show that the interaction of health and education stock will not reduce their impact on growth.
Piabuo and Tieguhong (2017).	Health expenditure and economic growth a review of the literature and an analysis between the economic community for central African states (CEMAC) and selected African countries	Central African states (CEMAC) and selected African countries	Solow growth model	Health expenditure has a positive and significant effect on economic growth due to health expenditure can potentially increase GDP per capita. In addition, a long-run relationship also exists between health expenditure and economic growth for both groups of countries.



<p>Bloom et al.  (2018)</p>	<p>Health and  Economic Growth</p>	<p>Cross country</p>	<p>Causality between  health and  economic growth</p>	<p>Health have positive  effect to economic  growth because health  improvements for  these populations spur  increased investment  in human capital that  will have effect to  economic growth and  strongest for less  developed.</p>
<p>Cervellati and  Sunde (2011)</p>	<p>Life expectancy  and economic  growth: the role  of the  demographic  transition</p>	<p>From 47  countries</p>	<p>RESET test methods</p>	<p>The causal effect of  life expectancy on  income per capita will  have possibly negative  before the  demographic transition  but unambiguously  positive after its onset.</p>



Ercelik (2018)	The Relationship between Health Expenditure and Economic Growth in Turkey from 1980 to 2015	Turkey	Autoregressive distributed lag	Have positive relationship between GDP per capita, public and private spending for health and investment due to health and investment affect GDP per capita will make productivity of the country increase.
Wang (2011).	Health care expenditure and economic growth: Quantile panel-type analysis	31 countries are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland,	Solow growth model	The country that have low economic growth will make health care expenditure have negative affect. But in country that have high level will have health care expenditure positive affect to

		<p>Ireland, Italy,</p> <p>Japan, Korea,</p> <p>Luxembourg,</p> <p>Mexico,</p> <p>Netherlands,</p> <p>New Zealand,</p> <p>Norway, Poland,</p> <p>Portugal, Taiwan,</p> <p>Slovak Republic,</p> <p>Spain, Sweden,</p> <p>Switzerland,</p> <p>Turkey, the</p> <p>United Kingdom,</p> <p>and the United</p> <p>States</p>		<p>economic growth.</p>
<p>Kazmi et al.</p> <p>(2017).</p>	<p>Impact of Human</p> <p>capital on</p> <p>Economic Growth:</p> <p>Evidence from</p> <p>Pakistan</p>	<p>Pakistan</p>	<p>Solow growth</p> <p>model</p>	<p>Human capital and</p> <p>economic growth have</p> <p>relationship due to is a</p> <p>long run relationship</p> <p>between both and</p>

				also contributes to economic development of the country.
Pasara et al. (2020)	The Trivariate Causality among Education, Health, and Economic Growth in Zimbabwe	Zimbabwe	Granger causality tests were employed in a Vector autoregressive (VAR) model	Health is a transmission mechanism to drives economic growth due to education will affect to economic growth is not direct, but will through improved health.
Afandi et al. (2019a)	Human capital and economic growth across regions: a case study in Indonesia	Indonesia	Solow growth model	Human capital is a main driver for economic growth by elasticity of human capital to economic growth will different on each region.

<p>Haseeb et al. (2019)</p>	<p>Impact of Economic Growth, Environmental Pollution, and Energy Consumption on Health Expenditure and R&amp;D Expenditure of ASEAN Countries</p>	<p>ASEAN countries</p>	<p>The Auto-Regressive Distributed Lag (ARDL) approach</p>	<p>Health expenditure have positive affect to economic growth including environmental pollution and energy consumption.</p>
<p>Lupu et al. (2018)</p>	<p>The Impact of Public Expenditures on Economic Growth: A Case Study of Central and Eastern European</p>	<p>Central and Eastern European Countries</p>	<p>Autoregressive distributed lag (ARDL) model</p>	<p>Health care has a positive affect to economic growth but in part of expenditures on defense, economic affairs, general public services, and social welfare has a negative effect.</p>

	Countries			
Wang et al. (2018)	The effects of health shocks on life insurance consumption, economic growth, and health expenditure: A dynamic time and space analysis	22 countries are Austria, Belgium, the Czech, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Netherlands, Norway, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, the United Kingdom, and the United States	Time varying parameter panel vector autoregression model	The health shocks variable have negative affect to economic growth when have low income but is positive affect when have high income.

<p>Sarpong et al. (2020)</p>	<p>Health and Economic Growth Nexus: Evidence from Selected Sub-Saharan African (SSA) Countries</p>	<p>Sub-Saharan African (SSA) Countries</p>	<p>Using panel co-integration tests, panel Granger causality tests and the dynamic OLS estimator.</p>	<p>Health on human capital that have effectively will affect to institutional quality and country that have high GDP per capita will make can better allocate resources for improve health status.</p>
<p>Eggoh et al. (2015)</p>	<p>Education, Health and Economic growth in African countries</p>	<p>African countries</p>	<p>The Generalized Method of Moment (GMM)</p>	<p>Health have negative affect to economic growth but government should investment in education and health as jointly, will make efficiency and positive affect of human capital and growth in African countries</p>

				increase.
Mehrara (2011)	Health Expenditure and Economic growth: An ARDL Approach for the Case of Iran	Iran	The autoregressive distributed lag (ARDL) approach	Health care expenditures are among the most important factors in the lowering of infant mortality but not significant for economic growth in Iran due to allocation of resources in health sector.

Therefore, as we can see from Table 2 about the relationship between human capital in health and economic growth, which will show about main finding of previous studies about relationship between human capital on health and economic growth, by effect of health to economic growth have different due to different of health system and structure in each country, which if government have expenditure in population that sick more will make health have negative affect to economic growth and often occurs in developing countries.



And in part of methodology about relationship between human capital on health and economic growth will often use Solow growth model in this relationship and have some previous studies that use different by focus on method of causality tests for relationship between human capital on health and economic growth.

#### **2.4 HUMAN CAPITAL ON HEALTH**

Health is considered the basis of economic growth and development and is one of the important factors for increasing economic efficiency at both the micro and macro levels and health is considered a direct component of human well-being and forms of human capital that increase personal ability (Bloom et al., 2004). Also, health improves an individual's mental and intellectual capabilities and increased health can raise the growth rate of income through technical innovation leading to better educational outcomes due to long-term economic growth (Schultz, 1999). If human or labor have good health, energetic and strong physically and mentally. They will be more productive in their work or productivity and receive higher wages. Illness and disability have an effect on hourly wage cuts directly in developing countries, which has a greater proportion of use labor in the production than in industrial countries (Bloom et al., 2004).

Human capital consist workforce, efficient labor, skilled employees and efficient managerial staff, which make human capital is the factor that companies want and technology will make health care agility increase, which in current have more and more companies are paying more attention to development due to

improve in human capital will make they get share of market increase through health care supply chain performance (Rungsrisawat and Jermsittiparsert, 2019). By health care very important about human capital, due to mortality rates and the quality of their health including developments in the medical field and epidemics, which have affect to labor productivity, while population will find maximize utility over time but depend on resources that they have, by the willingness to pay for improvements in probabilities of surviving have different and will decrease when have age and income decrease (Becker, 2007).

However, when people are sick or their health is damaged will affect to human performance due to labor that sick will can work and less quality when compare with labor that have good health will supporting human performance make can work efficiently, in addition expenditures on health is investments because will generate returns in the future, which improve in health of labor that will affect to the productivity and income of labor increase in the future (Widarni and Wilantar, 2021).

Life expectancy has direct effects on economic growth on the level of demographic development and improvements in life expectancy may also have indirect effects on income growth by increasing the probability of observing the onset of the demographic transition (Cervellati and Sunde, 2011). By the higher life expectancy promotes investment in earning skills and leads to better performance by labor force (Oster et al., 2013). Also, low health usually makes life expectancy

decrease and poor health labor force will have less productive and cannot to learn or adapt to technological innovations (Mahyar, 2016). Which, from studying by Lopreite and Zhu (2020) in the relationship of human capital in health and economic growth in developed countries found that the life expectancy rate of the population increase will affect to health expenditure per capita increase due to the higher demand for medical and care services in long-term, by will affect to public finances in China.

Health is an important indicator to see the standard of living in a country by productivity of labor depends on health and education, which makes government expenditures on health is an important factor to accumulate human capital (Erçelik, 2018). Furthermore, the relationship between health expenditure and economic development come from hypothesis that said health is capital, which make investments on health can lead to an increase in labor productivity, increase in incomes and increase in the wellbeing of the population (Piabuo and Tieguhong, 2017).

In developed and developing countries, health expenditure plays an important role in people's wellness and economic growth make increases in demand for medical services, by greater health expenditure leads to increased availability of medical products and long-term healthcare services, which make labor force have good health affects labor quality and labor productivity and therefore drives

economic development and growth (Lopreite and Zhu, 2020). However, health care expenditure varies in countries with different levels of economic development by increasing health care expenditure as a result of economic growth (Wang, 2011).

Hence, human capital on health in each country have different due to different structure of economic, infrastructure, population and political will affect to system of health in each country that do not the same. And from this study investigate the relationship between health as a form of human capital and economic growth in selected ASEAN countries by system of health in ASEAN countries have different as we can see from Table 3 that will show about health system in each country on ASEAN.

**Table 3** Health system on ASEAN countries.

Author (Year)	Country	Health system
Tangcharoensathien et al.  (2018)	Thailand	Thailand has universal health coverage (UHC) policy and focus on the primary health care infrastructure, health workforce training and distribution and the extension of financial risk protection to different target populations, by tax is finance the Universal Health Coverage Scheme for

		help population that have low income.
Leong et al. (2020)	Brunei Darussalam	Brunei Darussalam healthcare services have use technology for help in part of health system such as electronic medical record system to enhance the accuracy, timeliness and completeness of the country's cancer registry.
Mahendradhata et al. (2017)	Indonesia	The Indonesian health system has a mixture of public and private providers and public and private financing by in part of public will have central ministry of health is responsible for management of some tertiary and specialist hospitals, which have relation from central to provincial and district level by planning process have work together.
Jacobs et al. (2015)	Cambodia	Cambodia have developed health system by use public health system

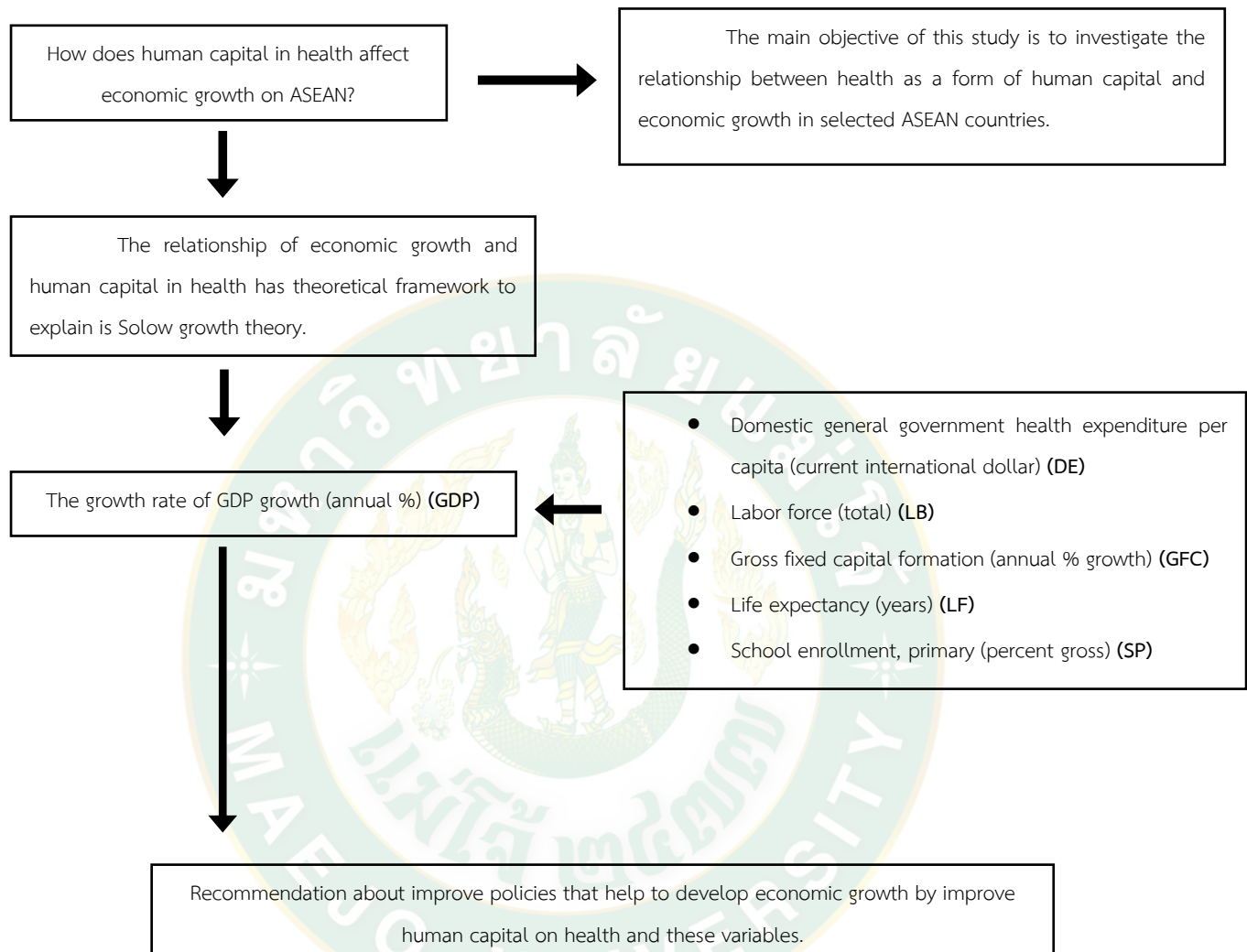
		<p>along the principles of the district model and geared its services towards managing communicable diseases and maternal and child health issues, which non-communicable diseases have emerged cause of adult mortality by district health system focus on access to medicine for these chronic conditions.</p>
Kounnavong et al. (2017)	Lao PDR	<p>In Lao, the most of health system is the public system that responsible by government and have managed provincial and district hospitals and health centers or clinics, in addition the village level, there are village health volunteers (VHVs), members of community health committees, and traditional birth attendants (TBAs) by community health committees and village (zonal) will have linked with</p>

		staff from their local health centers.
Brennan and Abimbola (2020)	Myanmar	Myanmar have public health system and population need to improve processes and the improvement of services such as health care by peace make have peace talks as a potential peace dividend for signatories and their constituents for promote effective and thorough health distribution.
Hussein et al. (2015)	Malaysia	The health system in Malaysia by government have focus on the care of acute, episodic illnesses as well as maternal and child health such as dengue fever, tuber-culosis and acute emergencies and adaptation of the delivery system and decision support for these acute illnesses are relatively nimble in primary care settings despite pressures on human resources.



Dayrit et al. (2018)	Philippines	<p>Health services in Philippine in part of the public sector are provided by health facilities that operated by the National and local governments and give promote by tax in country by health services are generally paid for through user fees at the point of service, although the Philippine Health Insurance Corporation (PhilHealth) also purchases services from both the public and private sectors.</p>
Tran et al. (2016)	Vietnam	<p>The health system operating in Vietnam have to use the integration of modern and traditional medicine at grassroots level as well as health promotion programs but in population have high rate of self-medication due to long distance, quality and availability of demanding services.</p>

## 2.5 CONCEPTUAL FRAMEWORK



*Figure 8 Conceptual framework*

The figure 8 will show conceptual framework of this study by starting from research question is How does human capital in health affect economic growth on ASEAN? in the first square on the left when have research question we will set the objective of this study in order for this study to be consistent and relevant to what we are interested in studying in order to avoid errors or ambiguities that will occur in the study, which we can see the objective from first square on the right by the main objective of this study is to investigate the relationship between health as a form of human capital and economic growth in selected ASEAN countries.

However, this study is investigating the relationship between health as a form of human capital and economic growth, which has theoretical framework to explain is Solow growth theory because Solow growth theory study about factor that have affect to economic growth, which have labor, physical capital and human capital.

Hence, dependent variable of this study is economic growth and we will proxy by the growth rate of GDP growth measured by annual percent and have independent variable or variable that will affect to economic growth by set from Solow growth theory are the variable growth of physical capital proxy by gross fixed capital formation measured by annual percent growth, growth of labor we will use labor force is measured by total and divided the human capital into two variables are education and health which in part of health we will use domestic general government health expenditure per capita is measured by US dollar and life

expectancy measured by years of life. In part of education we will use school enrollment, primary measured by percent gross.

By the data that we use are secondary data in annual of nine ASEAN countries from 2000-2017 and obtained from The World Bank. The finally, we will get the result or conclusion for recommendation about improve policies that help to develop economic growth by improve human capital on health and these variables.



## CHAPTER 3

### METHODOLOGY

In this study, the aim is to explain the relationship between human capital in health and economic growth of ASEAN-1 countries by except Singapore.

#### 3.1 DATA

In this study we use panel data of 9 ASEAN countries comprising Lao, Myanmar, Brunei, Cambodia, Indonesia, Malaysia, Philippines, Thailand and Vietnam from 2000 to 2017. The data use gathered includes GDP growth (annual %), life expectancy (years), Domestic general government health expenditure per capita (current international dollar), Labor force (total), Gross fixed capital formation (annual % growth) and School enrollment, primary (percent gross).

The data of GDP growth (annual %), Domestic general government health expenditure per capita (current international dollar), Labor force (total), Gross fixed capital formation (annual % growth), life expectancy (years) and School enrollment, primary (percent gross) was obtained from The World Bank National.

#### 3.2 THEORETICAL MODEL

The relationship of economic growth and human capital in health has theoretical framework to explain is Solow growth model due to economic growth is the dynamic process between inputs (capital, labor, and technology) and analyzes changes in the level of output in an economy over time (R.A, 2019). The growth-

accounting framework is the most popular method to estimate contributions of the factors of production to growth, according to this theory, a sizable share of the observed growth in output can be explained by the growth of the primary factors of production such as capital and labor and the remainder that cannot be explained by the growth of capital and labor could be attributed to a 'residual' known as the Solow residual, which the residual is in fact a measure of contribution of the total factor productivity to output growth (Yousefi, 2011). In addition, Isola and Alani (2012) have studied the relationship of human capital development and economic growth. By examining the contribution of human capital development to economic growth in Nigeria and use Solow growth theory in the study of growth. It was found that both education and the health component of human capital development are important to economic growth in Nigeria. But a study by Brempong and Wilson (2004) found that the growth rate of per capita income is strongly and positively influenced by investment in health human capital. It also, affects the income growth rate in quadratic form. By using Solow growth model in study about effect of human capital in health to income growth per capita in Sub-Saharan Africa and OECD countries.

The Solow growth model is essential to help understand in theory of growth on present and is the model that very important for economic growth and moreover, this model is a model of the manufacturing process from capital, labor and technology (R.A, 2019). The theory suggests that economic growth depends not only

on labor and capital but also on other factors such as education and skill levels of the labor force, property rights, cultural attitude toward work and entrepreneurship, the nexus of the infrastructure etc (Yousefi, 2011). And in neoclassical model, human capital was not considered a major input for production and hence was not included in growth models but Solow growth model incorporated human capital as one of the independent variables in model, which Solow model attributed growth in national income to three sources are increase in the stock of physical capital, increases in the size of labor force, and a residual representing all other factors (Isola and Alani, 2012).

Solow uses the aggregate production function which is continuous and homogenous of degree one. By in capital have human capital and physical capital make we can divide the capital into two parts are human capital and physical capital. Thus, can be modified as:

$$Y = Af(K, L, H, A) \quad (1)$$

Where  $Y$  is aggregate real output,  $K$  is physical capital,  $L$  is labor,  $H$  is human capital and  $A$  is technical change. Give technical change as constant, *Equation 1* can be re-written as:

$$Y = Af(K, L, H) \quad (2)$$



The commonly used production function has a variety of forms, and the Cobb–Douglas production function is a widely used form (Cheng and Han, 2014). The form of Cobb–Douglas production functions as follow:

$$Y = A^{\beta_0} K^{\beta_1} H^{\beta_2} L^{\beta_3} \quad (3)$$

Where  $K$  is physical capital,  $H$  is human capital and  $L$  is labor. They are the input and  $Y$  (economic growth) is the output. And  $\beta_i$  ( $i = 1, 2, 3$ ) is the output elasticity of the determinant and  $A$  is the level of the technical progress.

And then, taking the natural logarithm of both sides of the equation for make equation to the linear and the first difference of the equation. Thus, we can get Equation 4.

$$\Delta \ln Y_{it} = \beta_0 + \beta_1 \Delta \ln K_{it} + \beta_2 \Delta \ln H_{it} + \beta_3 \Delta \ln L_{it} \quad (4)$$

Where  $\Delta \ln Y_{it}$  is the growth rate of economic growth,  $\Delta \ln K_{it}$  is the growth rate of physical capital,  $\Delta \ln H_{it}$  is the growth rate of human capital and  $\Delta \ln L_{it}$  is the growth rate of labor.

The health plays an important role in economic growth by health increases economic growth through channels of improved education, productivity, and economic participation for women (Li and Huang, 2009). In academic and policy holds that differences in environmental, disease and health conditions are the factors contributing to many income disparities in all countries today and argues that

improving health not only will improve lives but will by itself spur rapid economic growth (Daron Acemoglu and Simon Johnson, 2007). By the effect of health on individual productivity implies a relationship between population health and aggregate output and find that differential levels of health make differences in income levels (Shastri and Weil, 2003).

Thus, meaning better health will make increases workforce productivity and wages due to good health make wage rates and hours of work increase effect on the growth of per capita income (Brempong and Wilson, 2004). In contrast, poor health affects both the ability to saving and motive to saving, which sickness can impose large out-of-pocket medical expenses that reduce current and accumulated household savings (Smith, 1999). Cause make families may be thrown into poverty if there is a lack of insurance and productive assets such as land or animals must be sold to pay for medical expenses (Xu et al., 2003). And poor health will make loss in work-hours affect to productivity and wage decrease. So, make life expectancy have affect to economic growth by higher life expectancy will make productivity and investment increase (Ogundaria and Awokuse, 2018). And from study of Lee et al. (2000) argue that rising life expectancy is the reason of situation that saving increase in Taiwan, China since the 1960s. And also, the effect of a longer life expectancy make population can choose increased saving for retirement or work longer because

depends on social security arrangements and retirement incentives (Bloom et al., 2007).

Human capital in part of education is widely agreed to affect economic outcomes, and health affects education by better child health has affect to school attendance, cognitive ability, and learning (Bloom and Canning, 2008). Moreover, malnourished children are less likely to enroll in school according to criteria of age requirement in education and will have opportunity that enroll in school late or later (United Nations, 2004).

Furthermore, education has affect to economic growth by affect to level income, when people have education more will make higher income from participation in the labor market which make more highly educated or better trained people are more productive than less educated or poorly trained people, thus make people that have education will make increases labor productivity (Jorgenson and Fraumeni, 1992). But if population have poor education results in unskilled labor and unemployment and this may have serious impact on economic growth (Li and Huang, 2009).

Thus, in order to examine the impact of human capital in health on economic growth. By human capital have variety part but we will focus on health and education because education and health are the important part that improving

the quality of human resources. Thus, make required for economic growth and development (Isola and Alani, 2012).

As a result, we divide the human capital into two parts are education and health. Thus, model that specific for relationship between human capital in health and economic growth can be modified as:

$$\Delta \ln Y_{it} = \beta_0 + \beta_1 \Delta \ln K_{it} + \beta_2 \Delta \ln H_{it} + \beta_3 \Delta \ln L_{it} + \beta_4 \Delta \ln E_{it} \quad (5)$$

Where  $\Delta \ln Y_{it}$  is the growth rate of economic growth,  $\Delta \ln K_{it}$  is the growth rate of physical capital,  $\Delta \ln H_{it}$  is the growth rate of human capital on health,  $\Delta \ln L_{it}$  is the growth rate of labor and  $\Delta \ln E_{it}$  is the growth rate of human capital on education.

$\Delta \ln K_{it}$  affect to  $\Delta \ln Y_{it}$  because investment is important to economic growth and promotes development in the areas of infrastructure, good governance, etc (Chowdhury and Mavrotas, 2006).  $\Delta \ln H_{it}$  affect to  $\Delta \ln Y_{it}$  because good health makes wage rates and hours of work increase effect on the economic growth (Brempong and Wilson, 2004).  $\Delta \ln L_{it}$  affect to  $\Delta \ln Y_{it}$  because growth rate of labor is considered as productivity indicators that affect to economic growth (Korkmaz and Korkmaz, 2017).  $\Delta \ln E_{it}$  affect to  $\Delta \ln Y_{it}$  because education will make increases labor productivity, which affect to economic growth (Jorgenson and Fraumeni, 1992).

### 3.3 EMPIRICAL MODEL

Based on *Equation 5*, we can propose the following econometric model:

$$\Delta \ln Y_{it} = \beta_0 + \beta_1 \Delta \ln K_{it} + \beta_2 \Delta \ln H_{it} + \beta_3 \Delta \ln L_{it} + \beta_4 \Delta \ln E_{it} + \varepsilon_{it} \quad (6)$$

Where  $\Delta \ln Y_{it}$  is the growth rate of economic growth,  $\Delta \ln K_{it}$  is the growth rate of physical capital,  $\Delta \ln H_{it}$  is the growth rate of human capital on health,  $\Delta \ln L_{it}$  is the growth rate of labor and  $\Delta \ln E_{it}$  is the growth rate of human capital on education.

From the *Equation 6* that we modified to a specific model to fit our problem. We proxy the variable of economic growth by GDP growth measured by annual percent (Yang, 2019). The variable growth of physical capital proxy by gross fixed capital formation measured by annual percent growth (Yakubu et al., 2020; Yang, 2019).

The variable of human capital we have divided the human capital into two variables are education and health. By the variable of human capital in health proxy by life expectancy measured by years of life (Daron Acemoglu and Simon Johnson, 2007) and human capital in health proxy by domestic general government health expenditure per capita is measured by the current international dollar (Raghupathi and Raghupathi, 2020; Yang, 2019)

The variable of education proxy by school enrollment, primary measured by percent gross (Gumus and Kayhan, 2012; Yang, 2019). And the finally, the variable

growth of labor proxy by labor force is measured by total (Yakubu et al., 2020) . So, the equation can be expressed as:

$$\Delta \ln GDP_{it} = \beta_0 + \beta_1 \Delta \ln GFC_{it} + \beta_2 \Delta \ln LB_{it} + \beta_3 \Delta \ln DE_{it} + \beta_4 \Delta \ln SP_{it} + \beta_5 \Delta \ln LF_{it} + \varepsilon_{it} \quad (7)$$

Where  $\Delta \ln GDP_{it}$  is the growth rate of GDP growth (annual %),  $\Delta \ln GFC_{it}$  is the growth rate of gross fixed capital formation,  $\Delta \ln LB_{it}$  is the growth rate of labor force (total),  $\Delta \ln DE_{it}$  is the growth rate of domestic general government health expenditure per capita,  $\Delta \ln SP_{it}$  is the growth rate of school enrollment, primary and  $\Delta \ln LF_{it}$  is the growth rate of life expectancy (years).

However, the variable that we use to proxy in human capital on health aren't growth rate because Gumus and Kayhan (2012) have study about causality of education and economic growth by use gross school enrollment ratio primary level (%) with GDP per capita, which find significant make we will use only gross school enrollment ratio primary level (%) that not growth rate in study about human capital in health and economic growth in ASEAN. And Yang (2019) study about the relationship between health expenditure and economic growth in developing countries by use Domestic general government health expenditure (% of GDP) to GDP per capita growth (annual %) find suggest that health expenditure and economic growth will have significant interval effects. Make we will use only Domestic general government health expenditure (% of GDP) that not growth rate in study about human capital in health and economic growth in ASEAN. In particular, OLS estimates



will have taken log in life expectancy because reduce variation in life expectancy (Daron Acemoglu and Simon Johnson, 2007). Make we will use log life expectancy in study about human capital in health and economic growth in ASEAN.

So, we can modify to specific model of the relationship human capital on health and economic growth in ASEAN as:

$$\Delta \ln GDP_{it} = \beta_0 + \beta_1 \Delta \ln GFC_{it} + \beta_2 \Delta \ln LB_{it} + \beta_3 DE_{it} + \beta_4 SP_{it} + \beta_5 \ln LF_{it} + \varepsilon_{it} \quad (8)$$

Where  $i$  is countries ( $i=1,2,\dots,9$ ),  $t$  is year ( $t= 2000-2017$ ),  $\beta_0$  is constant amount,  $\beta_1 - \beta_5$  are coefficients of the explanatory variables, there are  $\Delta \ln GDP_{it}$  is the growth rate of GDP growth (annual %),  $\Delta \ln GFC_{it}$  is the growth rate of gross fixed capital formation,  $\Delta \ln LB_{it}$  is the growth rate of labor force(total),  $DE_{it}$  is domestic general government health expenditure per capita,  $SP_{it}$  is school enrollment primary and  $\ln LF_{it}$  is log of life expectancy (years).

We using panel data and estimated the equation by use Ordinary least squares (OLS) and use Estimated generalized least square period weight to solve problem about period heteroscedasticity. And our study is human capital in health and economic growth on ASEAN countries but except Singapore because Singapore is a developed country and the most stable country. Whether it be economic, education, and health. Which, the most effective population can be seen from Human Development Index (HDI) that has a high rate of up to 0.935 (National Statistical Office, 2019; United nations development program, 2020). And from



objective we interest study about human capital on health in developing countries and for reduce size of data that different. Thus, make us except Singapore.

Based on the empirical framework, the test hypothesis we expect that the variable of life expectancy (years) increases, will result in GDP growth (annual %) increase because higher life expectancy will promote investment in earning skills and leads to better performance by labor force (Mahyar, 2016). By better health will make increases workforce productivity and wages. In contrast, poor health will make loss in work-hours affect to productivity and wage decrease. Thus, make life expectancy have affect to economic growth by higher life expectancy will make productivity and investment increase (Ogundaria and Awokuse, 2018). So, will make life expectancy (years) has a positive effect to economic growth.

We expect the variable of Domestic general government health expenditure per capita (current international dollar) has a positive effect to economic growth because health investments will increase economic growth at the income level due to capital increases or government expenditures will increase the growth of per capita income (Brempong and Wilson, 2004). And expect the variable of school enrollment, primary (% gross) has a positive effect to economic growth because the economic growth will cause the family to send more children to school. So, will make the rate of school enrollment increase, when the population is more

educated, it shows that the labor force is more efficient causing more revenue growth and economy (Gumus and Kayhan, 2012).

We expect by base on theory gross fixed capital formation (annual % growth) has a positive effect to economic growth because theoretically, an increase in investment is expected to provide more jobs or increase the employment level. Meanwhile, higher growth rate of the economy has also been agued to stimulate domestic investments. Which, make gross fixed capital formation has in terms of theory recognized as an essential component to facilitate economic growth and employment (Meyer and Sanusi, 2019). And expect labor force (total) increase, will result in GDP growth (annual %) increase because increasing the labor force will cause the size of the labor force to increase. When the labor force is increased, it will result in increased productivity and economic growth (Council of Economic Advisers on The White House, 2019). So, will make labor force (total) has a positive effect to economic growth.

## CHAPTER 4

### RESULT AND DISCUSSION

In study about relationship between human capital in health and economic growth on ASEAN, there is positive coefficient in growth rate of gross fixed capital formation and GDP growth, which have statistically significant at the level 5%. It means if growth rate of gross fixed capital formation increase 1 percent is results in GDP growth increase by 0.291 percent. By the result of study is consistent with the study of Hussin et al. (2013) economic growth of a country needs capital formation to assist in development, which gross fixed capital formation will increases productivity and GDP growth. In addition, as instrument for reducing poverty in developing countries by improved infrastructure (Akobeng, 2017).

Due to, gross fixed capital formation as an essential component to facilitate economic growth and employment by increasing in investment will make more jobs or the employment level increase at the same time higher growth rate of the economy has also been agued to stimulate domestic investments (Meyer and Sanusi, 2019). Thus, make growth rate of gross fixed capital formation can promote to increase in GDP growth in ASEAN.

*Table 4 Regression analysis results of this study*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	54.770	10.771	5.085	0.0000***
$\Delta \ln \text{GFC}$	0.291	0.122	2.380	0.0190**
$\Delta \ln \text{LB}$	-4.361	9.850	-0.443	0.6588
SP	-0.032	0.017	-1.841	0.0682*
DE	-0.004	0.001	-7.524	0.0000***
$\ln \text{LF}$	-10.326	2.703	-3.820	0.0002***
$R^2$	0.619			
Adj $R^2$	0.602			
DW	0.837			
F :	36.745			

Note:  $\Delta \ln \text{GFC}$  refers to growth rate of gross fixed capital formation,  $\Delta \ln \text{LB}$  refers to growth rate of labor force, SP refers to school enrollment, primary (%gross), DE refers to domestic general government health expenditure per capita and  $\ln \text{LF}$  refers to life

expectancy. The level of significance at 1%, 5%, 10% by \*\*\*, \*\* and \*represent significant level respectively.

In turn, there is in relationship between growth rate of labor force and GDP growth not significant which the results did not consistent those our expect but same as the result of Isola and Alani (2012) that labor force does not has a significant impact on economic growth. In ASEAN have use technology to produce increase to substitute hiring labor make labor force don't have effect to productivity. By productivity is the reason that makes GDP growth increase.

The coefficient of gross school enrollment, primary is negative and statistically significant at the level 10%. It means if gross school enrollment, primary increase 1 percent is results in GDP growth decrease by 0.032 percent. Which, the result of study is consistent with Hanushek (2013) the low quality of education causes population to lack the knowledge and skills that are important, which make labor haven't efficient and effect to productivity decrease. The same result with Keller (2006) increasing primary enrollment rates inadequate in generating higher per capita growth. Thus, make gross school enrollment, primary in ASEAN have affect that will make GDP growth decrease. However, conflict with study of Gumus and Kayhan (2012) that found the economic growth will cause the family to send more children to school, which will make the rate of school enrollment increase and

cause have population is more educated, it shows that the labor force is more efficient and more revenue growth.

As can be seen in the Table 4 has negative relationship of domestic general government health expenditure per capita and GDP growth. From coefficient of domestic general government health expenditure per capita as show that when domestic general government health expenditure per capita increase 1 percent is results in GDP growth in ASEAN countries decrease 0.004 percent. Which, statistically significant at the level 1%. Even though, will conflict with Raghupathi and Raghupathi (2020) that investing in healthcare aspects would boost income, GDP, and productivity, and alleviate poverty. But the same direction of coefficient with the study of Yang (2019) in developing countries, health expenditure is negatively correlated with economic growth due to government expenditure on health have spending to help people that sick more than other develop such as welfare or technology in medical, which make human capital has not been improve or development effectively. In addition, study from Halıcı-Tülüce et al. (2016) high healthcare expenditure may be an indicator of bad health status and bad health make invest in health sector rather than highly productive sectors, which negatively affect to economic growth by reduce aggregate productivity. Thus, domestic general government health expenditure per capita on ASEAN as the reason that make GDP growth on ASEAN decrease.

And the last variables is life expectancy has direction of coefficient is negative with GDP growth in ASEAN countries and statistically significant at the level 1%. When life expectancy increase 1 percent is results in GDP growth decrease by 10.326 percent. And the same result of coefficient with the study of Zaman et al. (2017) when population have life expectancy increase will affect to increasing of elderly , which elderly requires an extra care and more sophisticated in health care services may result in higher health expenditure. As a result, life expectancy is reason that makes GDP growth decrease in ASEAN countries. On the other hand, the result of study is conflict with Mahyar (2016) that find higher life expectancy will promote investment in earning skills and leads to better performance by labor force.

Hence, human capital on health has negative affect to economic growth by this study have proxy variable of health are domestic general government health expenditure per capita is measured by US dollar and life expectancy measured by years of life, which domestic general government health expenditure per capita have negative affect to economic growth on ASEAN. As we can see from Figure 2 that show about the domestic general government health expenditure per capita within ASEAN countries from 2000 to 2017 by the country that have higher rate is Brunei follow by Malaysia and Thailand, which that domestic general government health expenditure per capita have negative affect to economic growth due to government have expenditure for help population that sick increase.



However, health system of developing country will focus on help population that have low income in order to receive medical treatment. This can be seen from the example of the three countries above by health system in Brunei will focus on help population that are cancer (Leong et al., 2020). The health system in Malaysia by government have focus on the care of acute, episodic illnesses as well as maternal and child health (Hussein et al., 2015). And Thailand has universal health coverage (UHC) for help population that have low income (Tangcharoensathien et al., 2018). Therefore, domestic general government health expenditure per capita will have negative affect to economic growth due to health system on ASEAN that focus on spending for help population that sick and most of the population is dependent on the public health system mainly.

And part of life expectancy has negative affect to economic growth on ASEAN by the country that have the higher rate is Thailand follow by Malaysia and Vietnam, by when population have life expectancy increase will affect to increasing of elderly. Which in Thailand have the most rate of life expectancy make affect to increasing of elderly, which as a result that government in Thailand must increase about universal health insurance coverage (UHI) by is challenges to financing the health care system in Thailand due to elderly have high cost for care (Hsu et al., 2015). And Malaysia have elderly increase make economic cost for specific age related diseases such as dementia increase make government have spending more for health care services in

elderly (Nur et al., 2017). Vietnam have proportion of elderly people is growing rapidly, which make health and efficiency of work decrease, as a result that make population needs for healthcare services due to musculoskeletal disorders and chronic diseases followed by hypertension (Bang et al., 2017).

Therefore, from three countries that have high rate of life expectancy on ASEAN as we can see life expectancy make elderly in ASEAN increase, which make country in ASEAN enter the aging society that led to the impact of reduced labor efficiency due to problem of health and productivity when have age increase. As a result, expenditure by government in health increase make cost for help population that are elderly increase, which affect to proportion of expenditure for improve health facility that will make human capital on health increase.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 CONCLUSION

The study of relationship between human capital in health and economic growth on nine countries in ASEAN comprising Lao, Myanmar, Brunei, Cambodia, Indonesia, Malaysia, Philippines, Thailand and Vietnam by except Singapore in over period 2000 to 2017. We can see that health as form of human capital have negative affect to economic growth on ASEAN. Results show that domestic general government health expenditure per capita and life expectancy find have negative affect to economic growth in developing countries on ASEAN.

In the main finding show that from selected countries in ASEAN, domestic general government health expenditure per capita have negative affect with GDP growth due to government expenditure on health have spending to help people that sick more than spending to develop on health such as welfare or technology in medical. Thus, makes human capital has not been improve or development effectively. And when population have life expectancy increase will affect to increasing of elderly, which elderly requires an extra care and more sophisticated in health care services may result in higher health expenditure. By high healthcare expenditure affect to government expenditure. Causing invests in health sector rather than highly productive sectors, which negatively affect to economic growth by

reduce aggregate productivity. As the reason, human capital in health on ASEAN has negative relationship between economic growth on ASEAN.

The current have coronavirus SARSCoV-2 or covid 19 that have effect to health of human capital by have centered from Hubei Province of the People's Republic of China has spread to many other countries, which make SARSCoV-2 have transition from animals to humans on the Huanan seafood market in Wuhan, China (Velavan and Meyer, 2020). Because lungs are definitely the first target organ of SARSCoV-2 infection but have evidence indicates that the virus can spread to many different organs, including the heart, blood vessels, kidneys, gut and brain etc (Gemelli Against COVID-19 Post-Acute Care Study Group, 2020). Therefore, that have epidemic situation of covid 19 resulting from the mutation of the virus which is a virus that has never occurred on earth before, causing a scarcity of treatments and medicines to treat it and the epidemic lasts from the end of 2019 to 2022, when the situation has a huge impact on human capital in health that is a key factor in economic growth from the variables that we use to proxy human capital in health are life expectancy and government health expenditure.

It can be seen that when the covid 19 epidemic occurs, both variables are affected because covid 19 affects the health conditions of labor causing unhealthy health and increasing morbidity and caused a large number of deaths from such situations. This is why the life expectancy of the population is reduced due to the

increase in premature deaths. It also resulted in governments in many countries, including countries in ASEAN. There are higher health costs due to the larger number of patients and the cost of supporting research and development for vaccine discovery including effective treatment.

Moreover, from health system in each country on ASEAN we can see that have focus on support for population that have low income to obtain treatment or health services by in each country will have health system has a mixture of public and private health system. Most of which are the proportion of the government sector or public health system such as in Thailand has universal health coverage (UHC) for help population that have low income, Cambodia have developed public health system in district for help population that far away and in Lao has village health volunteers (VHVs) for help population in rural that have problem from health etc. Therefore, the case of covid 19 situation will make government spending more to help population that has sick instead development infrastructure in human capital on health due to health system in ASEAN countries is public health system mainly. As a result, the amount of money in the development of medical treatment decreases which make medical treatment is not cover and less quality. This is the reason that Covid 19 has an impact on economic growth on ASEAN through domestic general government health expenditure per capita.

## 5.2 POLICY RECOMMENDATIONS

Thus, government should promote heavily in proper distribution of health personnel in rural or remote areas have sufficient medical personnel to promote human capital in health that have efficiency. And prepared with the increasing life expectancy of the population such as new career for elderly and welfare etc. Or set policies in support of economic growth by health human capital. Which, is another factor that affects to economic growth in ASEAN countries if development that appropriate.

## 5.3 RECOMMENDATIONS FOR FURTHER STUDIES

From this study we found health as form of human capital have negative affect to economic growth on ASEAN. Results show that domestic general government health expenditure per capita and life expectancy find have negative affect to economic growth in developing countries on ASEAN because government expenditure on health have spending to help people that sick more than spending to develop on health such as welfare or technology in medical. Therefore, we findings point to more questions in part of health insurance.

By Health insurance is a means for financing a person's health care expenses to reduce risk by majority of people have private health insurance through an employer while many populations that do not have health insurance coverage at all will obtain coverage through programs offered by the government (Berchick et al., 2019). Health benefits of expanding insurance coverage is that many other policy



options may also improve health by direct investments in medical care for the poor through increased funding for Federally Qualified Health Centers, especially health insurance improves the health of vulnerable subpopulations such as infants, children, and individuals with AIDS and that it can improve specific measures of health such as low income population that are high blood pressure (Levy and Meltzer, 2008).

The prevalence of health insurance coverage have different across certain social and economic characteristics by individuals aged 15 to 64 with a disability were more likely to be insured around 90.4 percent than were individuals with no disability 88.5 percent and population that have disability were less likely than population that do not have disability about have private health insurance coverage and more likely to have public coverage or coverage by government expenditure in health on human capital, in addition population in households with lower income had lower health insurance coverage rates than population in households with higher income, which in 2018 more than 86.2 percent of people in households with an annual income of less than 25,000 dollar had health insurance coverage when compared with 96.8 percent of people in households with income of more than 150,000 dollar , hence make population that low income will have lower rates of private coverage relying on public coverage increase, which these differences in private and public coverage varied more for lower income groups than for higher



income groups by the private health insurance coverage rate for people in households that are low income will have health insurance in level that second category from households high income (Berchick et al., 2019). Problem in health shocks make two economic costs are an increase in health expenditures due to disease and a decrease in national income due to reducing both productivity and labor force size, which health insurance is used to protect these two costs but the hedging effects are uncertain. Therefore, health problem will generate relationship between health expenditures, national income, and insurance markets, which the relationship would change over time (Wang et al., 2018).

Finally, suggestions for future research are adding variables about human capital in health such as health insurance in study will help able to analyze more comprehensively due to health insurance as index that have interesting for situation in future and compare countries group for result that more efficient. The result that has efficient will promote policy to development economic growth in future. In addition, would be benefit for other research for focus more about policy in human capital in health on ASEAN. Due to human capital in health is considered to be an important factor in driving the economic on ASEAN.

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