

Indonesian Life Expectancy: Role of Health Infrastructure and Socio-Economic Status

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Abstract

The purpose of this study is to analyze the role of health infrastructure and public socio-economic status on life expectancy in Indonesia. Health infrastructure indicators are health personnel, health facilities, and health insurance. Meanwhile, socio-economics indicators are dependency ratio, income inequality, and poverty. The models are estimated using a panel data set for 34 provinces in Indonesia from 2010 to 2016. This research is using a fixed-effect panel data approach. Empirical results show that health personnel and health insurance have a positive relationship with life expectancy. Dependency ratios and poverty also show a negative relationship with life expectancy. On the other hand, the availability of health facilities and income inequality have a weak relationship with life expectancy. This empirical examination result will help Indonesian governments to improve several aspects in order to increase life expectancy in Indonesia.

Keywords: human development, life expectancy, health infrastructure, socio-economic

Abstrak

Tujuan penelitian ini adalah untuk menganalisis peran infrastruktur kesehatan dan status sosial ekonomi masyarakat terhadap angka harapan hidup di Indonesia. Indikator infrastruktur kesehatan diantaranya tenaga kesehatan, fasilitas kesehatan, dan jaminan kesehatan. Sedangkan indikator dari sosial ekonomi adalah beban ketergantungan, ketimpangan pendapatan, dan kemiskinan. Model diesimasi menggunakan panel data dari 34 provinsi di Indonesia periode tahun 2010 hingga 2016. Pendekatan fixed effect digunakan untuk tujuan penelitian ini. Hasil empiris menunjukkan tenaga kesehatan dan jaminan kesehatan memiliki hubungan positif dan signifikan dengan angka harapan hidup. Beban ketergantungan dan kemiskinan juga memiliki hubungan negatif dan signifikan dengan angka harapan hidup. Pada sisi yang lain ketersediaan fasilitas kesehatan dan ketimpangan pendapatan memiliki hubungan yang lemah dengan angka harapan hidup. Hasil empiris ini akan membantu pemerintah Indonesia untuk meningkatkan beberapa aspek dalam rangka untuk meningkatkan angka harapan hidup di Indonesia.

Kata Kunci: pembangunan manusia, angka harapan hidup, infrastruktur kesehatan, sosial-ekonomi

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Introduction

All citizens have a vital role in the national economy. This fact is the basis for the Indonesian government to prioritize policies related to improving the quality of human resources. One of the policy targets aims in the health sector. One dimension of public health status in Indonesia is life expectancy. This dimension describes longevity and health, which is the basis for shaping people's productivity in their daily activities.

The commitment of the Indonesian government to improve and maintain the quality of public health is carried out through health infrastructure investments. Health sector infrastructure investment in Indonesia has increased from previous years. In 2016, there were already 9,767 health centers, 2,601 hospitals, and 736,077 health workers. In addition to physical infrastructure, there is also a government health insurance program through the Indonesia Healthy Program. Distributing the Indonesia Healthy Card and National Health Insurance to more than 171 million poor people carried out the program. The results of this government effort can increase the life expectancy of Indonesian people nationally, from 69.55 years to 70.18 years in 2016. This increase indicates that the level of public health in Indonesia is quite good.

However, the United Nations Development Program (UNDP) showed different results in 2016. The UNDP report shows that in Indonesia, there is still a significant gap in the health sector. This gap is like 19.4 million people who suffer from malnutrition, a maternal mortality rate of 305 per 100,000 births, and a gap in access to essential services. Differences in the level of regional development are also the cause of differences in the quality of health services that can be accessed by the community.

Several previous empirical studies on health infrastructure also show contradictory results. Amaghionyeodiwe (2009) and Craigwell et al. (2012) found an essential role in infrastructure investment in strengthening public health status. On the other hand, other researchers are showing that there is no significant influence of infrastructure on improving the quality of human resources. They revealed that the cause of these conditions was limited government resources (Monteiro & Turnovsky, 2008), lack of trust from policymakers (Qureshi, 2009), economic conditions such as recession (Gilmour, et al., 2010) and structural barriers to infrastructure (Freed, et al., 2013; Gupta, et al., 2014; Pulok, et al., 2016).

Research by Engineer et al. (2008), De Mello & Pisu (2009), and Craigwell, et al. (2012) suggest that to improve the quality of human resources not only from the role of government through infrastructure investment. However, also must pay attention to other aspects that have the possibility of influencing the health sector. Considering these suggestions, in this study included three socio-economic aspects in this study, including dependency ratio, income inequality, and poverty. These three socio-economic aspects are still obstacles that are faced by developing countries (Todaro & Smith, 2011; Cournane et al. 2015; Chokkanathan & Mohanty, 2017). In previous studies, socioeconomic status could be the cause of various health problems in people's lives. Grzywacz, (2000) in the results of his research, shows that weak socioeconomic status can reduce health-related behavior. Chaabouni et al. (2016)

conclude that there is bi-directional causality between CO2 emissions and economic growth, between health expenditure and economic growth.

The importance of forming synergies between the government and the community is the basis that the priority of improving the quality of human resources must prioritize. The Indonesian government currently believes that if there is still an infrastructure imbalance, there will be social injustice. The government's political will in overcoming health infrastructure problems is by implementing an infrastructure equalization policy. The Indonesian government policy on infrastructure contained in the Government Work Plan that refers to the Third National Long-Term Development Plan for 2005 to 2025. This infrastructure investment aims to improve the quality of human resources and realize universal access by 2019. On the other hand, the government realizes that public health status is sensitive to any changes that occur, both in terms of infrastructure changes and socio-economic changes.

Therefore, the objective of this study is to analyze how health infrastructure and public socioeconomic status can improve life expectancy in Indonesia. Both of these aspects are very dynamic and continue to evolve, so this topic is interesting for further analysis. Realization of government policies related to the health sector must be evaluated based on the consequences or benefits generated in the economy, productivity, and public welfare.

Method

Panel data regression analysis is using as the tools of analysis. This study uses annual data from 34 provinces in Indonesia from 2010 to 2016. Life expectancy as a dependent variable, health infrastructure, and socioeconomic as independent variables. Health infrastructure indicators consist availability of health personnel (ratio per 10,000 population), availability of health facilities (ratio per 300,000 population), and recipients or participants of health insurance (percent). Then, for socio-economic status indicator consists of the dependency ratio (percent), income inequality (percent), and poverty (percent). The Panel data regression equation used in this research is:

$$Y_{it} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu_{it} \quad (1)$$

The difference of the unit value of research variable in the equation, cause regression equation must be made with natural logarithm model to avoid heteroscedasticity, know coefficient showing elasticity, and closer scale of data. Thus, the panel data equation changes to:

$$\begin{aligned} \text{Log}Y_{it} = & \beta_0 + \text{Log}\beta_1 X_1 + \text{Log}\beta_2 X_2 + \text{Log}\beta_3 X_3 + \text{Log}\beta_4 X_4 + \text{Log}\beta_5 X_5 \\ & + \text{Log}\beta_6 X_6 + \mu_{it} \end{aligned} \quad (2)$$

Where: Y is Life expectancy; X_1 is Health personnel; X_2 is Availability of health facilities; X_3 is Recipients or participants of health insurance; X_4 is Dependency ratio; X_5 is Income inequality; X_6 is Poverty.

Likelihood tests and Hausman tests are performed to determine the best approach

between Common Effects, Fixed Effects, and Random Effects. The last step is the coefficient of determination (R^2) and the t-statistic test to determine the correlation value between variables in this study.

Table 1. Life expectancy in Indonesia

Province (2010) (2015)	2016	Province (2010) (2015)	2016
Aceh (+0.43) (+0.01)	69.51	West Nusa Tenggara (+1.66) (+0.1)	65.48
North Sumatera (+0.87) (+0.04)	68.33	East Nusa Tenggara (+0.76) (+0.08)	66.04
West Sumatera (+1.14) (+0.07)	68.73	West Kalimantan (+0.84) (+0.03)	69.90
Riau (+0.82) (+0.04)	70.97	Middle Kalimantan (+0.59) (+0.03)	69.57
Jambi (+0.82) (+0.15)	70.71	South Kalimantan (+1.27) (+0.12)	67.92
South Sumatera (+0.82) (+0.02)	69.16	East Kalimantan (+0.79) (+0.03)	73.68
Bengkulu (+0.74) (+0.06)	68.56	North Kalimantan (+1.04) (+0.27)	72.43
Lampung (+1.03) (+0.04)	69.94	North Sulawesi (+0.62) (+0.03)	71.02
Bangka Belitung (+0.77) (+0.04)	69.92	Middle Sulawesi (+1.24) (+0.05)	67.31
Kepulauan Riau (+1.03) (+0.04)	69.45	South Sulawesi (+0.89) (+0.02)	69.82
DKI Jakarta (+0.78) (+0.06)	72.49	Southeast Sulawesi (+0.81) (-0.53)	70.46
West Java (+1.15) (+0.03)	72.44	Gorontalo (+0.72) (+0.01)	67.13
Middle Java (+1.29) (+0.06)	74.02	West Sulawesi (+1.81) (+0.09)	64.31
DI Yogyakarta (+0.54) (+0.03)	74.71	Maluku (+0.89) (+0.04)	65.35
East Java (+0.85) (+0.06)	70.74	North Maluku (+0.81) (+0.07)	67.51
Banten (+0.96) (+0.03)	69.46	West Papua (+0.71) (+0.11)	65.30
Bali (+0.8) (+0.06)	71.41	Papua (+0.81) (+0.03)	65.12

Source: Statistics of Indonesia

Result and Discussion

In 2016, the national life expectancy of Indonesians increased from 1.09 to 70.90 compared to 2010. In the five years, life expectancy in 2016 of all provinces also increased (See Table 1). Nine provinces have a life expectancy above the national average. However, the life expectancy of the province of Southeast Sulawesi decreased by 0.53 compared to 2015. This result is because in 2016 in several districts/cities, Southeast Sulawesi Province found cases of HIV/ AIDS and malnutrition due to poverty.

Table 2. District/cities that have achieved long-term health development goals 2025

City	Value	City	Value	City	Value	City	Value
Sukoharjo	77.46	Jepara	75.67	Yogyakarta	74.30	Balikpapan	73.96
Semarang	77.21	Semarang	75.54	Rembang	74.27	Blora	73.88
Karanganyar	77.11	Sragen	75.43	Kendal	74.20	Surabaya	73.87
Surakarta	77.03	Temanggung	75.39	Tegal	74.18	Bandung	73.84
Salatiga	76.87	Demak	75.27	Pekalongan	74.15	South Jakarta	73.83
Magelang	76.62	Kulon Progo	75.03	East Jakarta	74.14	Central Jakarta	73.76
Klaten	76.59	Sleman	74.60	Purworejo	74.14	Gunung Kidul	73.76
Kudus	76.43	Bekasi	74.55	Denpasar	74.04	Bontang	73.71
Wonogiri	75.88	Batang	74.46	Purworejo	74.14		
Pati	75.69	Badung	74.42	Denpasar	74.04		
Boyolali	75.67	Grobogan	74.37	Depok	74.01		

Source: Statistics of Indonesia

One of the long-term health development targets for the period 2005 to 2025 is the increase in life expectancy to 73.7 years in 2025. Three provinces have achieved these targets, i.e., Yogyakarta D.I province, Central Java Province, and East Kalimantan Province. At the district/city level, 39 districts/cities in Indonesia achieved these targets in 2016 (See Table 2). Based on this achievement, the improvement of community health status in each region must continue to be carried out to achieve these long-term targets.

Table 3. Results of Likelihood Test, Hausman Test, and t-statistic Test

Likelihood Test			
Effects Test	Statistic	D,F	Prob
Cross-Section F	546,677542	(33,197)	0.0000
Cross-Section F Chi-Square	1073.141623	33	0.0000
Hausman Test			
Test Summary	Chi-Sq Statistic	Chi-Sq d,f	Prob
Cross-section random	14.268103	6	0.0268

To find out how the role of infrastructure and socio-economy in achieving life expectancy in Indonesia in 2016, is shown in Table 3. Selection of panel data approach or method to be used based on Likelihood test and Hausmann Test in Table 3. The results of the Likelihood and Hausmann tests show that the p-value $0.0000 < 0.05$, which means that the method or approach for the panel data regression used is the Fixed Effect method. The statistical test results show in Table 4.

Table 4. t-statistic Test Results (Fixed Effect approach)

Indicators	Coefficient	Std, Error	t-Statistic	Prob,
C	1.842606	0.001328	1387.031	0.0000
Health Infrastructure				
Health personnel	0.005832	0.001219	4.782885	0.0000***
Health facilities	0.005164	0.005593	0.923211	0.3570
Health insurance	0.005259	0.001538	3.420194	0.0008***
Socioeconomic				
Dependency ratio	-0.030217	0.002620	-11.53167	0.0000***
Income inequality	-0.000990	0.004093	-0.241911	0.8091
Poverty	-0.026126	0.003007	-8.687155	0.0000***
R-squared	0.994445			
Adjusted R-squared	0.993346			

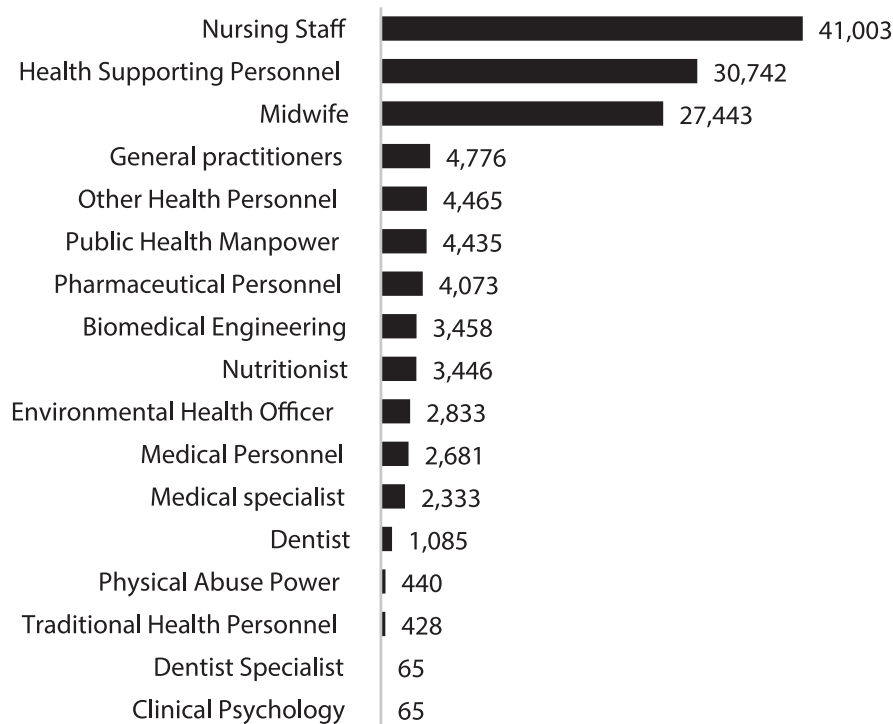
Note: *, **, *** level of significance 10%, 5%, 1%

By using the fixed-effect approach, empirical results in Table 4 confirm a strong and positive relationship between health personnel, health insurance, and life expectancy. Dependency ratio and poverty also confirm a strong and negative relationship with life expectancy. On the other hand, the availability of health facilities and income inequality has a weak relationship with life expectancy. The result of the coefficient of determination shows that health status using a proxy of life expectancy 99.44 percent can be explained by the independent variable in the model.

The availability of health personnel and community health insurance increased public life expectancy in Indonesia. The positive result of the availability of health personnel based on two things, namely the first increase in the number of health workers both nationally and at the provincial level in Indonesia. Second is the distribution of health personnel aims to improve access to health services to the community, especially for those who live in the underdeveloped and border regions in Indonesia.

In 2016, the number of underdeveloped and borders areas reached 143 regions from 27 provinces in Indonesia. The province of Papua became the province with the highest area according to this criterion, reaching 27 districts. The Indonesian government efforts to equalize health personnel for underdeveloped regions and border areas through three ways, such as The appointment of health workers with non-permanent status, particular assignment of resident staff, and particular assignment of program-based health personnel to support the Healthy Nusantara Program (regulated in regulation Minister of Health in Indonesia). From these efforts, data from the Ministry of Health of Indonesia in 2016 indicate that health personnel serving in underdeveloped and borders areas in Indonesia reached 133,771 people consisting of 17 types of health workers (see Figure 1).

Figure 1. Types of Health Personnel Assigned in Underdeveloped and Border Areas Facilities.



Source: Statistics of Indonesia

The availability of health personnel will make people more assured of access to health services needed, keeping the public health status of promotive, preventive, curative, and rehabilitative, and generally can improve the health status of the community. These results are in line with the previous study by Amaghionyeodiwe (2009), Allin, et al., (2010), Craigwell et al., (2012) and Kim et al., (2017), which shows the critical role of health personnel to improve public health status. Through the reduction of inequalities of interregional health care services.

In the 58th World Health Assembly (WHA) resolution of 2005 in Geneva, it requires every country to develop Universal Health Coverage (UHC) for all citizens. Implementation of this resolution in Indonesia is with public health insurance. Until 2016 people in Indonesia who have health insurance increased by 9.66 percent, it reached 171,939,254 people. Increasing ownership of health insurance is the main reason for the strong relationship between health insurance and life expectancy in Indonesia in this study. This result is in line with the findings of Borges et al. (2017) that health insurance can improve public health status.

There are two main benefits of health insurance for the people of Indonesia. First, health insurance participants have an excellent opportunity to get access to health care services, especially for the poor. This opportunity can see from the cooperation made by the government on the health insurance program with health facilities. In 2016, there were 2,069 hospitals increased 222 units from the previous year, and there were 20,708 primary level which also increased 739 units from the previous year, have cooperated with health insurance

from the government. The increase is due to increased cooperation in some provinces in Indonesia. The provinces of Central Java, West Java, and East Java are provinces with high levels of cooperation, as these three provinces have a more significant percentage of the population compared to other provinces in Indonesia. Although there are several cases in the implementation of government health insurance programs, the increased cooperation will increase the opportunities for the community, especially for the poor to get access to health services.

The second benefit with the existence of public health insurance will further ease the financing to get access to health care and intensive medical care. This condition is supported by the declining percentage of people in Indonesia who have no health care costs. In 2016 there are only 2.5 percent of the total population in Indonesia who do not have medical expenses down from the previous year, which reached 4.34 percent. A decrease in the percentage of people who do not have medical expenses is also one of the successes of health insurance in improving public accessibility for health services. The two main benefits of public health insurance can contribute to public health by increasing the life expectancy of people in Indonesia.

The different result show in health facility variables. These variables have a weak relationship with life expectancy. These results contradict some of the previous studies by Amaghionyeodiwe (2009), Allin, et al., (2010), and Kim et al. (2017) that show a strong relationship between the availability of health facilities and public health status. Three indicators cause this condition, such as:

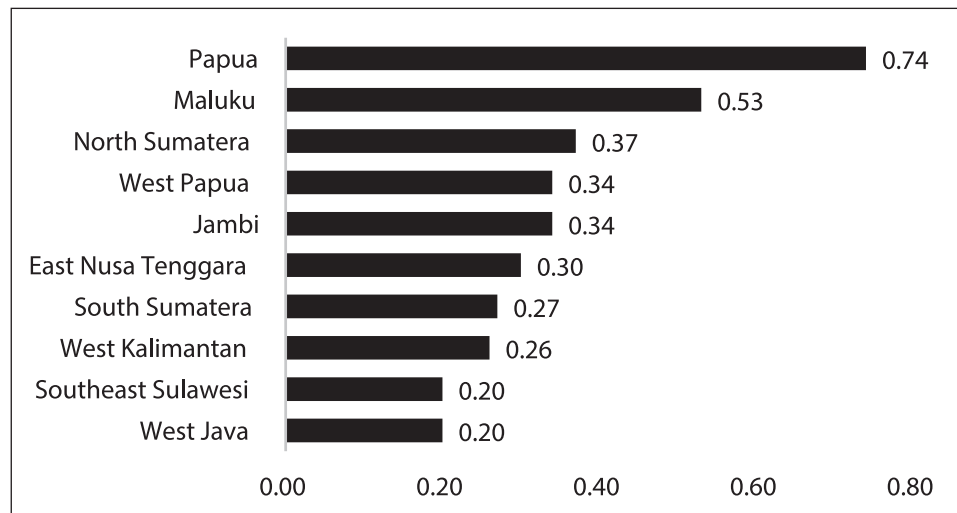
Demographic characteristics of Indonesia

The demography in Indonesia is distributing. Society settlements are not only concentrated in one place. However, some people live in underdeveloped regions, border areas, or on an island far enough from public service facilities. This fact causes transportation access to be one of the problems for people to get care services in health facilities. In 2016, Indonesia's statistical data shows an increase of 0.03 percent to 0.13 percent, who still have difficulty accessing transportation to obtain health services. Sixteen provinces have increased, where the lowest increase of 0.03 percent in East Java Province, until the highest increase 0.26 percent occurred in South Sumatra Province. The province of Papua has become the province with the highest number of people who have difficulty accessing transportation to get health services, which is 0.74 percent (Figure 2).

The geographic characteristics of Papua province have been the main obstacles in the provision of health access so that some districts/cities in Papua Province have low life expectancy rates. Several regions in Papua province still dominate the top ten districts/cities with the lowest average life expectancy in Indonesia, three of them are Mamberamo Raya Regency (56.74 years), Asmat district (5.9 years), and Nduga district (54.5 years). Nduga district has the lowest average life expectancy rate in Indonesia. This district has only eight primary health care units from 32 sub-districts, a considerable distance from the community in some areas, accompanied by demanding access to transportation makes it difficult for

them to obtain health care services. Healthcare assistance from both the government and the private sector is often hampered by transportation access to reach in the district of Nduga, such as the number of transportation facilities and weather factors. This fact causes, the emergence of diseases in the region that can not be resolved optimally until 2016, two of which are pertussis and acute respiratory infections. In October 2015 to January 2016, both types of this disease that causes the death of 54 people.

Figure 2. Top Ten Province in Indonesia with the Highest Number of People who Have Difficulty Accessing Transportation to get Health Services



Source: Statistics of Indonesia

Issues on the implementation of government health insurance schemes

The government's health insurance program has made a positive contribution to improving health status, especially for the poor. However, the implementation of the government health insurance program there are still technical problems. Three of them are discriminatory services, patient rejection, and the flexibility of government health insurance schemes. For example, in 2016, one of the hospitals in Depok West Java Province and Tangerang Banten Province rejected the patient and received more patients without using health insurance from the government. In the same year, regional hospitals in Lebak Banten Province were unable to provide optimal service to the patients receiving health insurance from the government because the treatment room is full, and leaving the patient abandoned in the hospital. Another case in 2016 hit children from Sumedang West Java province as the recipient of health insurance from the government who died, after previously rejected by six hospitals in Jakarta and Tangerang.

Furthermore, regarding the flexibility of implementing health insurance from the government, the participants of this program can only obtain services in health facilities located in an area or city where they are registered. The implementation of this procedure is following the Presidential Regulation of the Republic of Indonesia Number 12 of 2013 regarding Health Insurance, and Regulation of the Minister of Health of the Republic of Indonesia Number 71 of 2013 regarding health services to the National Health Insurance.

Both of these rules describe a first-line healthcare system for participants organized by primary-level health facilities in which the area of participants is register. However, when using in another city or region, there are two specific criteria: the patient in an emergency is acceptable and can only access primary-level healthcare facilities applicable for one-time service with approval or cover letter of service from the management of the health insurance and even weakens the contribution of health facilities. The implementation of this health insurance schemes in the health facilities will contribute to the weakness of the relationship between the availability of facilities and the increase of life expectancy in Indonesia.

Trend of public demand for health services

The trend of public demand in Indonesia for health care services is more inelastic than before. This condition occurs because of the public paradigm about the high cost of health care in hospitals. Two main factors cause the high cost of health care services in hospitals, especially in Indonesia. The first factor is that the cost of technology transfer in the health sector is quite high because more advanced medical equipment and some medicines must be imported from abroad. So far, imported medical and pharmaceutical equipment belong to the category of luxury goods, so the medical requirement is subject to Value Added Tax Luxury, which reached 35 percent. Then, both types of distribution of medical goods still have to be a sales tax charged to the hospital by 10 percent. This condition causes the hospital to set a high price for every disease that requires both medical goods. The second factor is the high value of an educational investment for health personnel accompanied by high responsibilities that potentially lead to the commercialization of health services.

Based on this condition, people in Indonesia have three health care options other than in the hospital, such as doing health care abroad, alternative treatment place, and doing the self-treatment. Data from Indonesia Service Dialog (ISD) in 2015 shows there are about 600 thousand people of Indonesia who choose to seek treatment abroad. The public reason is because of the high level of satisfaction and comfort in the interaction with the team of doctors who handle, to the issue of the cost of a treatment package including doctor consultation which claimed cheaper 30 to 40 percent compared to health care in Indonesia.

The existence of alternative medical facilities is also evolving in Indonesia as one of the alternative health care options. Although there are contradictions about methods for treatment outcomes, there are still many people in Indonesia who use this method. This fact is supporting data from the Regional Hospital Association in 2016. There is 40 percent of Indonesians choose alternative care facilities, and 60 percent choose to go to hospitals and medical facilities. The last option of Indonesian society is to cure their illness. It is supported by an increase of 2.42 percent so that in 2016 there is 63.77 percent of people in Indonesia who do self-treatment. This increase shows that this method is still the most natural solution for people in curing their illness. For example, the people who do this method are the people of the Banjar and Dayak Meratus tribes in South Kalimantan Province. Both tribes still believe with various types of traditional herbs that they create their own to maintain health and cure various diseases. They take advantage of the various types of plants that are around

their residential neighborhood to make it. This condition is also what they do because some of them live in areas far from access to public services such as modern health facilities.

These three indications problems have contributed to a weak link between the availability of health facilities and life expectancy. Nevertheless, the existence or availability of health facilities continues to contribute positively to public life expectancy in Indonesia. Research findings by Pulok et al. (2016) show a correlation between wealth and education owned by parents with malnutrition conditions in Bangladesh. Increased socio-economic inequality in Bangladesh causes poor households to experience severe malnutrition compared to wealthy households.

The estimation results of the regression of infrastructure variables on life expectancy in Indonesia, in line with the theory of historical materialism developed by Karl Marx in the book *The Communist Manifesto* and *Das Kapital*. The growing need of the community to survive to stay healthy and live long, makes them desperately need a variety of facilities or infrastructure that can support their health conditions. This fact makes the parties do specialization to create various means of living needs. The three infrastructure variables show a decisive role in increasing life expectancy, although health facilities have no significant impact.

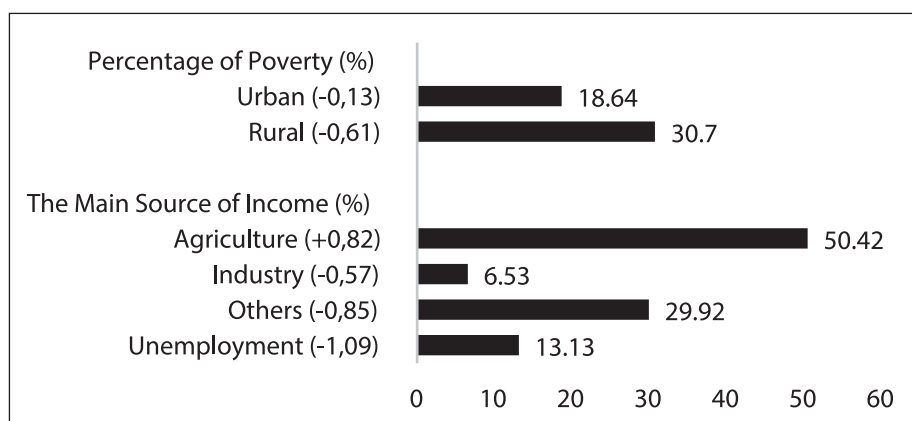
The ratio of dependency and poverty, have a strong relationship with the life expectancy of people in Indonesia. In 2016, there is an increase in the number of people belonging to the productive age ranging from age 15 to 64 years of 0.58 percent or reaching 189,096,722 people. The composition of this amount is 62.62 percent already have jobs, 3.72 percent unemployment, and 33.66 percent is not a workforce (attending school, housekeeping, and others). In Indonesia, there are laws governing employment, such as the Law on Child Protection and Law No. 13 of 2013 on employment, which prohibits employers from employing children less than 18 years of age, unless they have special permits. However, in 2016, people aged 15 to 19 who have worked there was an increase of 7.14 percent, reaching more than four million people. According to Indonesian statistical data, this age group works in agriculture, forestry, hunting, fisheries, professionals, technicians or the like, free workers, and some are self-employed.

Percentage of productive, employed communities reaches more than 50 percent in all provinces in Indonesia. Bali province is the highest percentage (75.78 percent) for this criterion, as it is supported by the tourism sector, which is the sector with the highest employment in this province. Another example is in Papua Province, in 2016, Freeport Indonesia Limited Company can absorb approximately 32 thousand workers, consisting of 12 thousand workers and 20 thousand contractors. There are 4,000 direct workers in Freeport, 35 percent are people from Papua, 1.26 percent of foreign workers, and the rest are workers from Indonesia from outside the Papua Province. The ability of the mining sector to absorb labor in the province of Papua has a significant contribution to reducing the unemployment rate in the province.

The growing number of productive societies, especially for those who already have jobs can contribute to improving the public health status in Indonesia. They can allocate their

resources or income effectively, mainly to more intensively conduct health care for themselves and their families. So that this condition can improve health status, one of which can be shown by the increase of public life expectancy in Indonesia. These results are in line with the previous study by Cournane et al. (2015) that concluded the same result, a decrease in dependency ratio could improve public health status.

Figure 3. The Characteristics of Poverty in Indonesia 2016



Source: Statistics of Indonesia

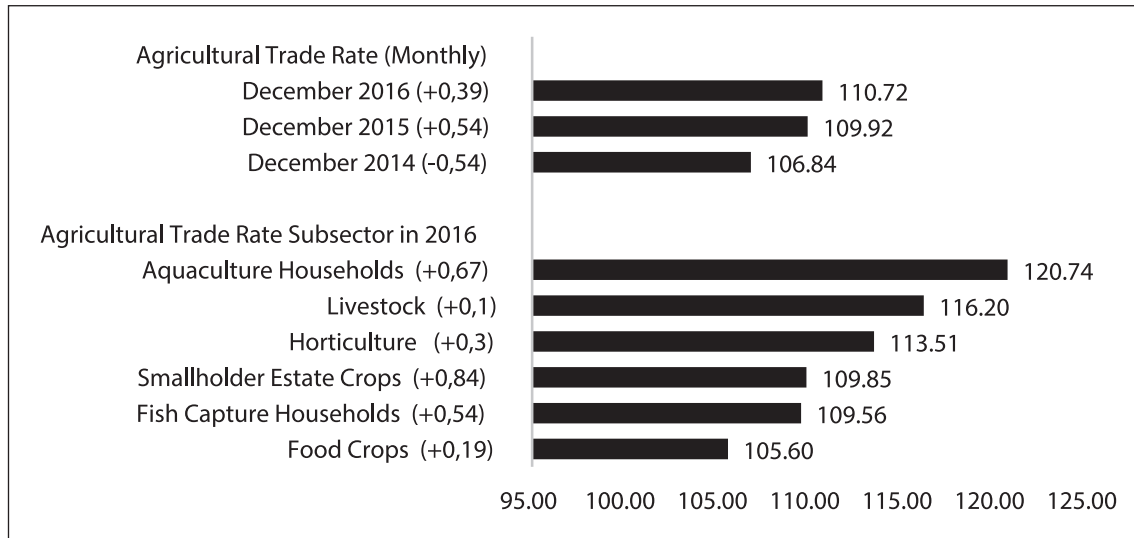
In 2016, poverty also declined from the previous year (Figure 3). The highest percentage of poor people in Indonesia is in rural areas which reached 17,28 million people, while in urban areas reached 10.49 million people. This decline in poverty has contributed to increasing the life expectancy of the community in Indonesia. Two of which are due to an increase in the daily wage of agricultural laborers and surpluses in the Agricultural Trade Rate (ATR). According to the sources of income of the poor in Indonesia, agriculture as the highest, reaching 50.42 percent (Figure 3).

The average daily wage of agricultural laborers continues to increase from January to December of 2016 to IDR 48,627 per day (Figure 4). Increasing the wages of these farmworkers did not have an impact on ATR. Agricultural Trade Rate (ATR) is the price index ratio received by farmers compared to the price index paid by farmers for their production process. During 2014 to 2016 per December, the ATR is always more than 100, which means that the farmers have a surplus (Figure 4). This surplus condition occurs in all agricultural subsectors in 2016 ($ATR > 100$).

Another sector that is the primary source of income for the poor is the industrial sector. The industrial sector is not only large industry, but there are also Small and Medium Micro Enterprises (SMEs). SMEs have an economic impact on local people through employment. SMEs have an economic impact on local people through employment. Interesting facts found are SME employees also work as farmers, such as SME centers in the districts of Boyolali, Klaten, Sragen, and Temanggung Province of Central Java. This condition is because income from the agricultural sector is sometimes more challenging to predict, and depends on the season. However, the same condition can also occur in SMEs, because in this small industry

sector sometimes only depends on the order of goods received by SMEs. The condition is quite dilemmatic but shows that there are efforts of people who have the profession of the agricultural sector to keep the income because the level of household needs is quite fluctuating and difficult to predict.

Figure 4. Indonesian Agricultural Trade Rate in 2016



Source: Statistics of Indonesia

Increasing the wages of agricultural laborers, increasing farm surpluses and income from other sectors is one of the reasons for increasing public incomes. Increased public revenues will be in line with efforts that impact on family economic levels and health status. The goal is to maintain a decent life and impact on increasing life expectancy. These results confirm the findings of previous studies by Regidor et al., (2003), Dao (2008), Grzywacz (2015), and Hill & Jorgenson (2018).

Different results occur in income inequality, indicating a weak association with life expectancy. D'Albis & Bonnet (2018) shows that life expectancy does not affect the evolution of world inequality. The decline in income inequality in Indonesia nationally in the last two years is an improvement. Nevertheless, income inequality increased in 22 provinces in Indonesia. There are eight provinces above the average national income inequality, and the province of Yogyakarta is the province with the highest income inequality in 2016. There are three main factors of high-income inequality that occurred in 2016 in the eight provinces compared with other provinces. First, there is a difference in concentration of economic activity as happened in Yogyakarta Province, where the most significant economic activity is in Sleman and Yogyakarta districts cause wide development disparity with Gunung Kidul Regency and Kulon Progo Regency. The same condition also occurred in West Java Province, caused by the characteristics of the area, which is industrial, so it is quite vulnerable to high-income inequality.

Secondly, there is a shift in the structure of the economy from labor-intensive industries to capital-intensive, as happened in East Java Province, Gorontalo Province, and South

Sulawesi Province. There is a positive impact that is the acceleration of economic growth, but the negative impact is the low absorption of labor for the sector so that it can cause increased poverty. Finally, there is a difference in the amount of people's income between a sector of the industry, the government sector, and the traditional sector as happened in DKI Jakarta Province, Papua Province, and West Papua Province, where the gap is quite visible for these three provinces. Differences between sectors of employment also contribute to high-income disparities in the community.

The weak effect of income inequality decline on the life expectancy in Indonesia, caused by three things, among others:

The inequality of income still undermines the income of the community, so the expenditure on health costs is still low.

Indonesia's statistical data in 2016, the highest priority per capita expenditure in the largest month for non-food groups is on the need for housing, fuel, lighting, and water reaching IDR 234,139. Then, the expenses for goods and services (IDR 63,119), durable goods (IDR 47,800), tuition (IDR 29,926), clothing (IDR 25,378), health cost (IDR 21,392) tax and insurance (IDR 18,981), and party/ceremonial purposes (IDR 15,626). Relatively low public expenditure on health costs, as some groups have different amounts of expenditure.

The data from Central Bureau of Statistics Indonesia in 2016 about average monthly expenditure per capita for health costs, shows that people with expenditures of more than 1.5 million rupiahs have expenditures for much higher health costs (reach IDR 77,559). Meanwhile, people belonging to the lowest spending group only prioritize a small portion of their income for health care costs. For an example is a community in the Maritim District of East Nusa Tenggara Province. Public professions generally as coffee farmers have relatively low incomes. This fact is because the sale of crops based on the price of the local entrepreneur is not from the market price. The limited revenues make people in the district of Maritim believe that healthcare is a luxury that is rarely accessible.

Revenue dramatically affects the amount of expenditure on health costs, and it had shown that there are still differences between groups. As is known, the costs for health care continue to increase. Despite the decline in income inequality, if not accompanied by a significant increase in community income, the community's ability to get health care will be weakened. Social protection expenditures become the primary determinant of life expectancy (Wim et al., 2017).

Income inequality has contributed to increasing public difficulties to access health services due to transportation costs.

community is still weak, the high cost of transportation becomes one of the problems for the community to get health services in health facilities. By 2016, there are still people in Indonesia who do not have transport costs to access health services, and there are 18 provinces that have increased. The province of Nusa Tenggara Timur still has the highest

percentage, although it managed to reduce the number of people experiencing transportation cost difficulties by 0.91 percent. One example of the East Nusa Tenggara Province whose community is still experiencing the high cost of transportation is in Flores Regency. The distance between residents in Flores Regency with health facilities can reach 4 to 20 kilometers. The required transportation costs range from IDR 60,000 to IDR 600,000 and exclude health care costs if the community is not a participant of health insurance. The high cost of transportation makes people not always able to receive health services from health facilities.

Lack of public savings.

The International Monetary Fund (IMF) calculations, released by the Indonesian Financial Services Authority in November 2016, show that the average saving ratio of Indonesian households to total income is only 8.5 percent. Based on income levels, low-income households save only 5.2 percent of income, while those with high incomes have a share of 12.60 percent for savings. The majority of people's income causes this condition is still low, so it is used up to meet basic needs. Community-owned savings can ease the burden of living costs, especially for their future health care. However, the lack of community savings due to income inequality can affect consumption patterns, especially for health care. This condition can cause the healthcare process is not intensive.

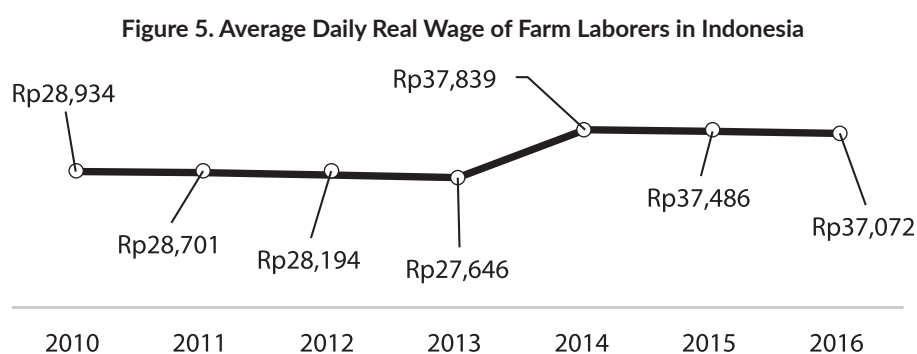
Although there is a weak relationship between income inequality and life expectancy in Indonesia, the results of this study remain in line with previous studies by Rodgers (1979), Lynch (2000), Deaton (2002), Bakhtiari & Meisami (2010), Nakamura & Murayama (2011), Kim et al., (2017), and Sarti et al., (2017). Some of these studies indicate that income inequality harms the health status of the community.

The impact of the three socioeconomic variables on life expectancy is following the theory of life cycle hypotheses developed by Franco Modigliani, Richard Brumberg, and Albert Ando in the 1950s. This theory states that someone will make a consumption decision based on the resources available to them during their lifetime, including at their current stage of life. When income gets higher, consumption will also increase, and consumption will decrease when income begins to decline. This condition is what happens in regression estimation results for socio-economic aspects. Income and accumulated wealth or community savings will be in line with the level of health care. It is necessary to improve specific aspects of social development to improve life expectancy and population health (Jiang et al., 2018). The policymakers should strengthen primary care systems to reduce inequality in health (Detollenaere et al., 2018).

Based on the result and discussion in this study, here are some recommendations that can be offered, among others. First, increase access to health facilities by adopting the central place theory. The German geographer Walter Christaller developed the central place theory in 1933. In theory, it stated that sometimes the distribution of rural and urban settlement patterns was different in size. So the best way to provide public services is based on spatial aspects. It is placing the activity center in a residential hierarchy on a hexagonal network node. The basic principle of the central place concept is to place a

health service center in a strategic location and can be reached by people in certain areas. The conditions that must be met to adopt this scheme are demographic characteristics. This scheme should be implemented on a flat demographic with adequate infrastructure support to support the mobility of each activity. However, it is still possible to implement this scheme in Indonesia, especially with the extreme demographic conditions of several regions in Indonesia, such as in Papua Province or other provinces. This scheme is in line with the government program for the period 2014 to 2019 that focuses on improving the infrastructure of roads, bridges, ports, airports, on opening up areas that have been isolated. The possibility of successful implementation of this scheme to increase the distribution of health facilities is quite high because it is in line with the current government program. All communities in rural and urban areas will have the same opportunity to get care services at health facilities.

Second, increase government health insurance cooperation with financial institutions or banks through the supply chain financing mechanism. This mechanism will reduce the problem of claims that have been complained about by the hospital. The flexibility of the government's health care usage system is also essential because health problems are sometimes unpredictable. Thus, the flexibility of the system will increase the ease of access to the nearest health facility. This system is also an anticipatory effort in dealing with public health problems.

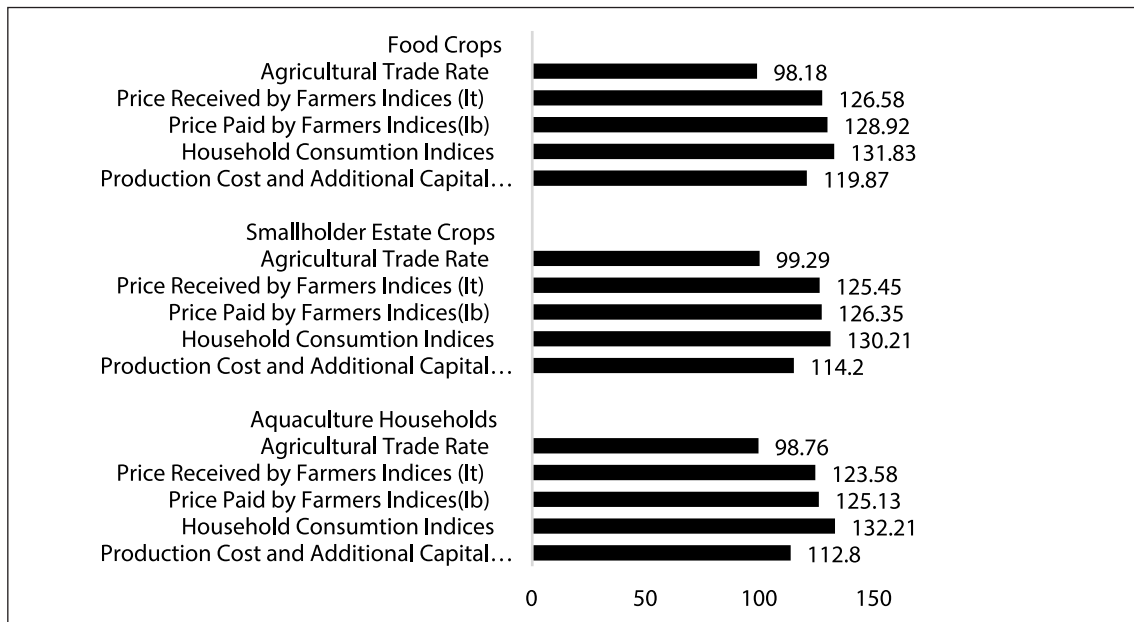


Source: Statistics of Indonesia

Third, pour value-added tax on luxury goods for imported medical equipment. This strategy aims to reduce the cost of health care services following the percentage of the amount of tax eliminated. The medical education system will reduce the level of commercialization of health services while increasing quality graduates and able to meet the needs of the number of health workers nationally.

Fourth, although there is an increase in nominal wages of farmworkers in Indonesia, their real wages or purchasing power have decreased (Figure 5). In addition to farm laborers, farmers of food crops, small-holders of plantation crops, and aquaculture farmers in 2016 experienced a deficit when viewed through Farmer Exchange Rate (Figure 6).

Figure 6. Indonesia's Three Agricultural Sub-sectors were Deficit in 2016



Source: Statistics of Indonesia

This value is used to measure the purchasing power of farmers from changes in the behavior of the price index. The deficit in the three agricultural sub-sectors is due to the index that farmers must pay higher than the index received by farmers. The most significant contribution to the index that farmers have to pay is household consumption. The deficit that occurs shows the purchasing power of farmers who are still quite weak. The decline in purchasing power in the agricultural sector is one of the considerations so that government intervention through the social assistance program becomes more targeted. Target accuracy in government intervention programs will have a multiplier effect. In the short term, the accuracy of government intervention programs such as health, education, food, and subsidies in the agricultural sector can ease the burden of community needs, especially for the poor. So that the income earned at this time can be maximized to obtain other means of life that can improve the quality of their lives today. In the long run, it will create social independence and increase the socio-economic conditions of the community.

Conclusion

People's need for an ever-growing survival to stay healthy and live longer. They desperately need a variety of facilities or infrastructure that can support their health condition. So that the government and the private sector in Indonesia continue to develop the health infrastructure and various health programs for the community. These results prove that improvements in two aspects of infrastructure such as health personnel and health insurance have shown a positive and strong role to increase the life expectancy of people in Indonesia. Although health facilities have an insignificant correlation due to several problems, the role of health facilities is still able to increase public life expectancy in Indonesia.

The socioeconomic status of the public generally plays a role in influencing the consumption pattern during their life cycle. The decline in the ratio of dependence and poverty is a sign of strengthening the socioeconomic status of society. Public spending will be higher and more efficient for health care and to meet the needs that support their health, such as the fulfillment of nutrition for their families. The income inequality has a weak relationship in increasing life expectancy. This fact is because there are still indications of weak income and savings they have to support their health care needs. Nevertheless, the decline in income inequality still contributes to increasing life expectancy in Indonesia.

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