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Life Expectancy in Indonesia: The Role of Health Infrastructure, Political, and Socioeconomic Status

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ABSTRACT

Health development is an effort to fulfill one of the fundamental rights to access good health services. Life expectancy marks the success of development in the health sector. We carefully selected the determinants of life expectancy in Indonesia and collected data in 2010-2018. All 34 provinces in Indonesia were included as the unit of analysis. We use panel data modeling. We carried out a cluster analysis to develop an inter-provincial cooperation group in Indonesia. Life expectancy shows a strong correlation with GRDP per capita, immunization, mean years of schooling, and insurance. GRDP per capita being the strongest of all constructions. Rights, democracy, poverty, Gini index, dependency ratio, illiteracy, and breastfeeding harm life expectancy. Beds, resources, water, toilet, sanitation, and neonatal have a weak influence on life expectancy. The novelty of this paper is to incorporate the impact of health infrastructure development, political regime, and socioeconomic status, and the cluster of provinces that can increase life expectancy. Studies in full democracies prove that politics has a significant on life expectancy. However, this is not confirmed when Indonesia's democracy index from political rights aspects and institutions of democracy aspects is used to see its impact on life expectancy. This study may be the first to look at the effects of health infrastructure development, political regime, socioeconomic status, and clustering in 34 provinces in Indonesia. The results of this study may be helpful for policymakers, and efforts need to be made to ensure a healthy life and support well-being for all ages.

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1. Introduction

Life expectancy is a measure of a country's public health (Hum et al., 2015). Life expectancy has doubled in the last century is evidence of substantial advances in science and health (Jamison et al., 2013; Vallin and Meslé, 2009). Factors affecting life expectancy have become topics of ongoing debate in medicine, public health, health economics, and politics (Muntaner et al., 2011; Selck and Deckarm, 2015).

A country has an old population structure if the proportion of the elderly population (>60 years) reaches 10% or more (Adioetomo and Mujahid, 2014). Indonesia will enter the country with an elderly population structure because the elderly population has reached 7.6% of the total population (Central Bureau of Statistics, 2015) and is projected to double to 15.77% in 2035. This increase occurs as Indonesia's life expectancy increases from 69.8 years in 2010 and is projected to be 72.4 years in 2035 (Central Bureau of Statistics, 2013). The aging population structure is one indicator of the success of achieving human development nationally due to improvements in nutrition, sanitation, advances in medical technology, health services, and increased education, as well as a challenge in how to maintain the quality of life of the elderly (Martínez and Oller, 2019).

In 2019, Indonesia's State Budget (APBN) was IDR 2,461.1 trillion. The education budget allocation is IDR492.5 trillion, the health budget is IDR123.1 trillion, and the social protection budget is IDR387.3 trillion. Based on data, 20.01% of the APBN is allocated for the education budget, 5% for the health budget, and 15.74% for the social protection budget. This means that 40.8% of the APBN is allocated for essential services (education, health, and social protection). The increase in the health budget indicates an improvement in the health of the Indonesian people towards a better direction, as mandated in Law Number 9 of 2009 concerning Health. However, UNDP (2019) reports that Indonesia's Human Development Index (HDI) in 2018 was 0.707 and ranked 111 out of 189 countries and regions. The ranking places Indonesia below the average of 0.750 for countries with high HDI and below 0.741 for

countries in East Asia and the Pacific. Indonesia, compared to China and the Philippines, has HDI ranked 85 and 106, respectively. The report notes that countries with high HDI have fixed broadband subscriptions 15 times faster, and adults who study more than six times faster than countries with have low HDI.

Previous studies on the impact of health infrastructure development, political regime, and socioeconomic status showed contradictory results. Amaghionyeodiwe, (2004) and Craigwell et al. (2007) argue that investment in health infrastructure development improve the health status. However, Monteiro and Turnovsky (2008) argue differently that the development of health infrastructure does not impact improving the health status.

The government is faced with limited budgets to provide access to health services, there is distrust of government programs as policymakers (Qureshi, 2009), economic conditions such as budget constraints and experiencing a recession (Gilmour et al., 2010), and the community does not have access to health services. Access to primary health facilities because many of them live in rural and semi-urban areas, and another stumbling block is that the health infrastructure in the region is inadequate (Jones et al., 2009; Legido-Quigley et al., 2019; Wulandari and Laksono, 2019).

The availability of infrastructure is essential for developing a country that can unlock potentials such as employment, alleviate poverty and income inequality, and encourage economic growth (Kustanto, 2020; Negara, 2016; Salim and Negara, 2018). Engineer et al. (2008); Mello and Pisu (2009) said that infrastructure is a factor that affects health development is accessibility, namely whether or not the health infrastructure is affordable by the community. Not all residents live in urban areas, but most of them still in rural areas. Health infrastructure with complete equipment is located in urban areas. In addition, equitable health human resources are also things that must be fulfilled in realizing development in the health sector.

Changes in life expectancy are influenced by the country's political conditions and socioeconomic status (Kabir, 2014; Shen and Williamson, 1997), and political conditions have long been used as variables in determining life expectancy (Franco et al., 2004; Lin et al., 2012; Navarro et al., 2006). Democratic countries will more easily recognize the right of civil liberties to speak out, demanding improvements in public services and act based on their political opinions, and the government is willing to listen and be moved to improve public services that are closely related to the needs of the community (Gerring et al., 2011; Lake and Baum, 2001).

This study examines the impact of health infrastructure, political, and socioeconomic status on life expectancy in Indonesia in 2010-2018. These three factors are dynamic, and the debate is interesting for further investigation of their impact in the Indonesian context. Identification of life expectancy and determining which regional clusters have similar characteristics also need to be done. It helps generate alternative cooperation strategies between local governments to improve people's welfare. However, there is no systematic clustering at the provincial level in Indonesia of these three factors on life expectancy.

2. Literature Review

Constraints faced by many developing countries are infrastructure, political culture, and socioeconomic status (Chokkanathan and Mohanty, 2017; Cournane et al., 2015; Todaro and Smith, 2012). A study in Andhra Pradesh, India, conducted by Lakshmi and Sahoo (2013), showed that health infrastructure such as the availability of hospitals, pharmacies, physician, and hospital beds had a positive and significant effect on health indicators. Studies conducted by Allin et al. (2010); Amaghionyeodiwe (2004); Grzywacz (2000); Kim et al. (2017) show the result that evenly distributed health resources in an area is a determining factor for improving health status.

Building health infrastructure and the availability of human health resources are not enough to produce good health status because this is very dependent on the operational efficiency, implementation,

maintenance of the health infrastructure that has been built in the country (Robson et al., 2007). The causal relationship between CO2, carbon emissions, health spending, and economic growth shows bidirectional causality globally and shows evidence of unidirectional causality of carbon and CO2 emissions on health spending in the middle- and upper-middle-income countries, unless low-income countries do not show causality (Chaabouni and Zghidi, 2016).

Health is an example of a nation's success and vision, with increased longevity of 8 years since 1990 (The Lancet, 2019). According to WHO (2014), public health, it is essential to build synergy between government and society to achieve better health status. The cooperation between the government and the community to help each other, take action and harmonize development plans and priorities in the health sector. The collaboration aims to achieve common goals that have been made in various forms. For example, cross-country cooperation such as the UNOSSC, cooperation between Sudan, South Sudan, and Uganda (Taylor, 2016). Cooperation between countries, cooperation between member countries of the United Nations. In Asia, countries such as Japan, which have prefectures with similar historical, cultural, and geographical backgrounds, are grouped into several regions, and these mapped regions have collaborated in many sectors, including in the field of public health (Nomura et al., 2017).

Under the administration of President Joko Widodo, the Indonesian government currently believes that the availability of infrastructure in Indonesia is lame, which results in social injustice (Ray and Ing, 2016; Warburton, 2016). Today's infrastructure condition in Indonesia is better than after the 1997 Asian monetary economic crisis badly hit the economy (Salim and Negara, 2018). However, the Indonesian government is still struggling to increase investment in infrastructure to a level sufficient to encourage the high economic growth seen in the early 1990s. The Indonesian government realizes that the health status of the community is also essential to respond to changes that are happening today.

3. Research Methods

The data used in this study is panel data (Baltagi, 2015), a combination of cross-sectional data from 34 provinces in Indonesia with time series in the form of an annual period from 2010-2018. This is done to obtain an economic analysis of the influence of infrastructure development, political regime, and socioeconomic status in 34 provinces in Indonesia. The data in this study are sourced from the Indonesian Health Profile, Welfare Statistics, Indonesia Statistics, and Indonesia Population Projection. All data used in this study are public. This study examines health infrastructure development, political regime, and socioeconomic status to life expectancy. The model used to analyze the determinants of life expectancy is adapted from (Kabir, 2008). From the model used by previous study, we develop it as follows:

$$LE = f(G, P, S) \tag{1}$$

Equation (1) assumes the specification from the model that LE is life expectancy, G is health infrastructure capital, P is the political regime, and S is socioeconomic status. Equation (1) can be expanded as follows:

$$LE_{it} = G_{it}^{\beta} + P_{it}^{\gamma} + S_{it}^{\delta} + u_{it} \tag{2}$$

Equation (2) is rewritten in the form of an equation as follows:

$$LE_{it} = \alpha_{it} + \sum \beta G_{it} + \sum \gamma P_{it} + \sum \delta S_{it} + u_{it} \tag{3}$$

Equation (3) in this study for the G variable is aggregated into three types of infrastructure. The P variable is the Indonesian democracy index based on political rights aspects and institutions of democracy aspects. The socioeconomic status variable is aggregated into 12 variables. Equation (3) is then operationalized in the following form:

$$\begin{aligned} LE_{it} = {} & \alpha_{it} + \beta_1 lnBEDS_{it} + \beta_2 lnRESOURCES_{it} + \beta_3 INSURANCE_{it} + \\ & \gamma_1 RIGHTS_{it} + \gamma_2 DEMOCRACY_{it} + \delta_1 POVERTY_{it} + \delta_2 GINI_{it} + \\ & \delta_3 DEPENDENCY_{it} + \delta_4 lnGRDP_{it} + \delta_5 WATER_{it} + \delta_6 HYGIENE_{it} + \\ & \delta_7 SANITATION_{it} + \delta_8 MYS_{it} + \delta_9 ILLITERACY_{it} + \delta_{10} lnIMMUNIZATION_{it} + \\ & \delta_{11} BREASTFEEDING_{it} + \delta_{12} NEONATAL_{it} + u_{it} \end{aligned} \tag{4}$$

where LE is life expectancy, $lnBEDS$ is the natural logarithm of the number of beds in hospitals by class of care, $lnRESOURCES$ is the natural logarithm of health human resources in health centers and hospitals, $INSURANCE$ is the coverage of national health insurance participation, $RIGHTS$ is a Indonesian democracy index based on political rights aspects, $DEMOCRACY$ is an index of democracy based on institutions of democracy aspects, $POVERTY$ is the percentage of poor people, $GINI$ is the Gini index, $DEPENDENCY$ is the dependency ratio, $lnGRDP$ is the natural logarithm of GRDP per capita, $WATER$ is the percentage of the households that has access to clean water and water proper drinking, $HYGIENE$ is the percentage of the households that has toilet facilities, $SANITATION$ is the percentage of the households that has access to proper sanitation, MYS is the mean years of schooling, $ILLITERACY$ is the illiteracy rate, $lnIMMUNIZATION$ is the natural logarithm of immunization, $BREASTFEEDING$ is infant coverage mend can exclusive breastfeeding, $NEONATAL$ is the coverage of neonatal visits, i is the provincial index, t is the time index.

Furthermore, a cluster analysis is carried out whose primary purpose is to group provinces in Indonesia with the same characteristics. The cluster analysis used is K-Means Cluster Analysis to classify objects (Jain, 2010; Mooi & Sarstedt, 2011). This study will divide 5 clusters which will be analyzed by which province clusters in Indonesia are included in the best inclusive characteristics, good, average, poor, and worst.

4. Results and Discussion

4.1 Descriptive Statistical Analysis

The demographic bonus is predicted to occur from 2020 to 2030, which has a big challenge in the health sector. The productive age population dominated the condition of the population structure at that time. In addition, to the growth of the productive age population, the current condition of Indonesian society is characterized by the growth of the elderly population, which has its problems.

Life expectancy in Indonesia has increased. However, the threat of non-communicable diseases whose prevalence is increasing cannot be underestimated. Life expectancy is one indicator of the degree of public health, and longevity continues to increase from year to year. The higher the life expectancy, the better the community's health status, and vice versa (see Table 1). Indonesia's life expectancy in 2010 reached 69.81 years, and in 2018 it reached 71.20 years, an increase of 1.39 years or growing by 0.25% per year. The average life expectancy is 2020-2018 is 69.09 years. The province with the highest life expectancy is Yogyakarta reaching 74.82 years in 2018, and the lowest is West Sulawesi, reaching 62.50 years in 2010.

Table 1. Summary Statistics of Variables Used in the Regression Analysis

Variables	Obs	Mean	S.D.	Min	Max
LE	306	69.09315	2.676365	62.50000	74.82000
lnBeds	300	8.407658	1.041836	5.631212	10.66378
lnResources	302	8.918073	0.771187	7.035269	10.81410
Insurance	302	68.68205	21.69951	11.10000	165.4500
Liberties	301	83.10741	11.08477	47.21000	100.0000
Rights	301	71.34027	10.33211	46.47000	93.98000
Poverty	301	7.889203	4.154832	2.610000	28.16000
Gini	301	0.367209	0.039237	0.270000	0.460000
Dependency	297	47.35219	4.779192	36.80000	58.60000
lnGRDP	303	10.31696	0.569369	9.177393	12.01897
Water	300	59.40950	15.51903	18.89000	93.41000
Sanitation	268	60.18955	15.64046	12.93000	91.15000
Hygiene	300	69.00810	12.19984	33.06000	91.76000
MYS	303	7.950834	0.991066	5.592018	11.05000
Illiteracy	301	5.241694	5.600988	0.130000	35.47000
lnImmunization	301	11.30505	0.977681	9.360483	13.75942
Breastfeeding	225	46.52204	21.14160	4.600000	90.79000
Neonatal	199	40.62683	22.25228	92.21000	1.100000

Source: Research finding.

4.2 Chow and Hausman Test Results

Table 2 shows the results of the Chow and Hausman tests to select the most appropriate estimate from the data panel. Based on the Chow test, it was found that Prob. Cross-section Chi-square < α (5%) or 0.0000 < 0.05. Hausman test shows Prob. Cross-section random 0.0050 < α (5%) or 0.0050 < 0.05. Based on the results of the Chow and Hausman tests, it

can be concluded that the correct model for estimating panel data is to use the FEM.

Table 2. The Result of Chow and Hausman Test

Chow test			
	Statistic	Prob.	Conclusion
Cross-section Chi-square	757.373029	0.0000	fixed effect model (FEM)
Hausman test			
	Chi-Sq. Statistic	Prob.	Conclusion
Cross-section random	35.704900	0.0050	fixed effect model (FEM)

Source: Research finding.

4.3 Inferential Statistics Analysis

Table 3 shows the results of panel data estimation using the FEM approach show that health infrastructure, political, and socioeconomic status lead to different effects on life expectancy. Hospital beds, according to treatment class, have a positive and not significant effect on life expectancy. The results of this study contradict the previous empirical studies of Allin et al. (2010); Amaghionyeodiwe (2004); Kim et al. (2017) that health facilities have a strong relationship with public health status. This phenomenon indicates the recording and reporting of excessive use of care facilities, including hospital readiness. The number of sick people who visit the hospital and undergo medical examinations and inpatients who exceed the number of available beds or exceed the treatment facility's capacity means that many patients are treated outside the treatment room (using only a mattress, chair, or long table). Conditions of patient care in hospitals like this usually occur when an area is attacked by an outbreak of an infectious disease or an extraordinary event, such as dengue fever, diarrhea, COVID-19, which is handled for more than 3-4 weeks.

The lack of health equipment and the unequal distribution of human health resources cause public health services, especially the lower middle class, not to get fair health services. On the same occasion, the upper-middle-class people went for treatment abroad. Health human resources in Indonesia in terms of capacity and credibility, and expertise are not much different from physician in hospitals abroad. However, the problem is that the quality of health services and patient safety is still poor. If this

continues, the country will continue to lose foreign exchange and health services for the community, which will impact the achievement of life expectancy.

Health human resources in health centers and hospitals have a negative and insignificant effect on life expectancy. The results of this study contradict the previous empirical studies of Allin et al. (2010); Amaghionyeodiwe (2004) Craigwell et al. (2007); Kim et al. (2017); Paramita et al. (2020) that human health resources have a positive impact on public health status.

The results of this study indicate that in Indonesia, there is a factor of public trust in medical and alternative medicine. Indonesia ranks fourth on the list of the most populous globally (The World Bank, 2020). The distribution of the population is uneven; more than half of the population lives on the island of Java, which is 6.5% of the total land area of Indonesia (Central Bureau of Statistics, 2020; Ministry of Home Affairs, 2015). In the context of Indonesia as an archipelagic country, public behavior related to health is complex because it consists of a multicultural and multi-ethnic community with various health service providers. As in many low- and middle-income countries, informal or non-conventional health care providers are an essential component of public health care providers (Sudhinaraset et al., 2013).

Leonti and Casu (2013) argue that in the era of globalization, the health care system with traditional medicine still functions in people's lives, even though the modern medical treatment system has been widely known and even applied in urban and rural areas (Zank and Hanazaki, 2017). Traditional medicine that is carried outcomes from ancestors or based on hereditary beliefs from indigenous peoples by using drugs, potions, prayers, incantations through the services of someone who is believed to have certain powers to treat sick people (Yuan et al., 2016).

In Indonesia, there are still many areas with long distances from home to health facilities, which is also the reason why people still choose traditional medicine because it is close to home, affordable costs, do not have to queue, do not take much care of administration, and operating

hours are not limited. This causes many people to still believe in traditional health services and negatively perceive the health services provided by physician in health centers and hospitals (Togobu, 2018).

Universal Health Coverage (UHC) has emerged since the last thirteen years, triggered by the growing understanding of the link between barriers to population access to essential and quality health services and family poverty due to spending on health services. In this study, national health insurance coverage has a positive and significant impact on life expectancy. The results of this study confirm the results of previous studies by Borges et al. (2016); Erlangga et al. (2019); Fan et al. (2019) that health insurance can improve physical and mental health status of beneficiary families. Access to health insurance coverage is an essential program in assessing equity and health care delivery. In Indonesia, UHC was translated by the Ministry of Health in the 2015-2019 Ministry of Health Strategic Plan into Universal Health Insurance (JKS) and has been implemented in Indonesia since the implementation of the National Health Insurance (JKN) on January 1, 2014 (Agustina et al., 2019). Increasing the coverage of national health insurance coverage generally increases people's access to health facilities, increases financial protection, and improves health status.

The political regime variable, which is proxied using the Indonesian democracy index from political rights aspects and institutions of democracy aspects, shows a significant adverse effect on life expectancy. The results of this study contradict those of Lake and Baum (2001); Lin et al. (2012); McMichael et al. (2004); Selck and Deckarm (2015); Wigley and Akkoyunlu-Wigley (2011) that political regimes offer benefits to public health. This study indicates that clientelism is still inherent as corrupt behavior and banal democracy, which is specifically closely related to the electoral and regional context. As a country that has just entered the democratic period, Indonesia certainly implies a different patron-client relationship, depending on the context of the underlying political situation. Before the reformation period, the pattern of clientelism in Indonesia was divided into two periods, namely pillared

clientelism in the 1950s-1960s and centralized clientelism during the New Order (Aspinall, 2013).

The non-fulfillment of citizenship rights has resulted in consequences in the form and mechanism of control and prosecution. This is a problem that keeps the dynamics of clientelist transactions ongoing. There is a disconnection between the represented and the represented. The failure of the control mechanism as the essence of the two functions is a sign of citizens' inability or lack of ability to ensure that their welfare is part of the public agenda and political decisions.

In the culture of money politics, Indonesian citizens ultimately focus on the only concrete thing that is more certain, namely direct material rewards. This is done to the exclusion of things like track records and campaign promises. Voters have learned that the vision and mission of candidates for public officials are often just bland and empty words that are not carried out much for the benefit of the community, such as improving the quality of health services.

The socioeconomic status proxied by the percentage of poor people, Gini index, and dependency ratio, shows a significant adverse effect on life expectancy. The results of this study confirm from previous studies Kristanto et al. (2019) that socioeconomic status variables such as poverty, Gini index, and dependency ratio have a negative and significant effect on life expectancy. Poverty is a global issue faced by many countries in the world, including Indonesia. *Poverty reduction* is an issue that gets serious attention because poverty is a multidimensional problem—in the SDGs, reducing poverty and hunger as the first and second goals and building a commitment to end poverty in any form.

The Central Bureau of Statistics recorded that the number of people with monthly per capita expenditure below the poverty line in Indonesia as of March 2018 reached 29.95 million people (9.82%), a decrease of 633.2 million people compared to the condition in September 2017 of 26.58 million people (10.12%). The lowest since the 1997/1998 Asian crisis experienced by Indonesia. The first time that Indonesia has had a single-digit poverty rate, the lowest since 1998. However, the population

decline is not the highest. During the period September 2017 - March 2018, the number of poor people in urban areas fell by 128.2 thousand people (from 10.27 million people in September 2017 to 10.14 million people in March 2018), while in rural areas, it fell by 505,000 people (from 16.13 million people). In September 2017 to 15.81 million people in March 2018).

The reduction in the poverty rate is clear evidence of the effectiveness of the social protection programs distributed by the government. Practical social assistance is an important program to help people move out of poverty and keep them from falling into poverty. Several factors reduce poverty due to social assistance in the form of Conditional Cash Transfer (CCT)–*Program Keluarga Harapan (PKH)* and *Bantuan Pangan Non Tunai (BPNT)*. First, PKH and BPNT provide targeted assistance based on an integrated database that is regularly updated and in coordination with various regions.

Second, PKH and BPNT have succeeded in realizing financial inclusion. PKH and BPNT have encouraged changes in the behavior of beneficiary households to recognize non-cash transactions. Third, PKH and BPNT actively involve the community in social work. The more people who move out of the status of low-income families, the more families whose welfare, including their health conditions, will improve because they get social protection, essential services, and sustainable livelihoods provided by the government.

The social protection program provided by the government for low-income families has a lower impact on poverty, but the impact on reducing inequality is slow (Suryahadi et al., 2018). Inequality is one of the biggest challenges facing Indonesia and the biggest threat to social stability and economic growth. Given Indonesia's diverse ethnicity and religion, socioeconomic levels, and the unequal distribution of population and natural resources, measures to reduce inequality continue to be part of the broader economic and social policy framework.

Reducing inequality requires support from development actors. The government needs to work with other development actors, such as the

private sector, the community, and international development partners, to ensure that policies and programs can reduce inequality with maximum impact. On the other hand, an increase in the number of people absorbed by the labor market contributes to improving the quality of health. They can allocate their income effectively, especially in meeting their daily basic needs that are good and healthy, occupy decent housing, and can reach health facilities through insurance so that it leads to the achievement of a longer life expectancy. From the explanation above, the results of this study are in line with studies conducted Cournane et al. (2015) that a decrease in the dependency ratio can increase life expectancy.

GRDP per capita has a positive and significant effect on the life expectancy of 1.55. Every time there is a 1% change in GRDP per capita, it raises the life expectancy of 1.55 years, ceteris paribus. The results of this study show that people who have high per capita income will produce a higher standard of living (Miladinov, 2020; Shkolnikov et al., 2019). Increased per capita income, high standard of living, and excellent health conditions are relevant factors for increasing life expectancy and longevity (Novak et al., 2014; Selck and Deckarm, 2015).

Socioeconomic status provides explanatory power and its influence on the community's economic condition; in this case, the life expectancy cannot be ignored. The findings of this study confirm the results of previous studies that GRDP per capita has a strong relationship with increasing life expectancy (Andreev et al., 1994; Becker et al., 2005; Cutler et al., 2006; Sickles and Taubman, 1997; Soares, 2007).

Access to water, sanitation, and hygiene (WASH) deserve to be a critical problem in various parts of the world (Ginja et al., 2019). WASH sustainability of every citizen is a formidable task for governments and international development partners (Sabogal et al., 2014). Good WASH conditions are crucial to community livelihoods and economic growth. Access to WASH is closely related to life expectancy and longevity, which leads to an increase in HDI. This study indicates that the availability of clean water and proper drinking water has a negative and

insignificant relationship with life expectancy. Meanwhile, access to proper sanitation and hygiene has a positive and insignificant relationship with life expectancy.

Water pollution has a broad impact: poisoning drinking water sources, poisoning animal food, imbalances in river and lake ecosystems, and forest destruction due to acid rain. Yu et al. (2019) mention that in water bodies, rivers, and lakes, nitrogen and phosphate (from agricultural activities) and household waste have led to the growth of aquatic plants out of control (excessive eutrophication). This growth spurt causes oxygen, which should be shared by all aquatic animals/plants, to be depleted. When these aquatic plants die, their decomposition sucks in more oxygen. As a result, water pollution impacts the life of aquatic biota, groundwater quality, environmental aesthetics, and health.

Access to proper sanitation is very relevant as a determinant of life expectancy. *Sanitation* can be defined as the ability to maintain cleanliness and defecation. Sanitation also refers to maintaining clean conditions through trash bins, disposal and management of household waste, and industrial waste management. Sanitation reform has made many changes in reducing mortality (Harris and Helgertz, 2019). It must be admitted that these changes will take a long time. It is necessary to be consistent in advocating, strengthening social support, and empowering the community so that proper sanitation is widely felt towards improving the quality of life, independence, and welfare.

Public health problems have long been the leading cause of contracting simple diseases, which can be fatal if not treated immediately by a doctor. For example, in many developing countries, the causes of death are diarrhea and respiratory infections. This is caused by inadequate WASH facilities (Foreman et al., 2018). Personal hygiene facilities can be interpreted as the procedures for a person to clean and care for his body. One of these processes is having access to toilet facilities. The existence of toilet facilities at the home, office, and public places is one of the most needed facilities. A proper toilet is physical and from

cleanliness and awareness in using an excellent and comfortable toilet because this can impact increasing life expectancy.

MYS has a positive and significant effect on the life expectancy of 0.22. Every 1% change in MYS will increase the achievement of life expectancy by 0.22 years, *ceteris paribus*. Education occupies a central position in development because the goal is to improve the quality of human resources (Chitescu and Lixandru, 2016), development concerning human resources development. *Development* is material and physical, and human development, which is the primary goal of education. In general, it is proven that the higher the education, the better the income level (Kaplan et al., 2014). This is possible because educated people are more productive than uneducated people. A person's productivity is due to having technical skills obtained from education.

Adherents of the human capital theory argue that education is an investment in human resources that provides monetary or non-monetary benefits (Becker, 1962). The non-monetary benefits of education are obtaining better working conditions, job satisfaction, consumption efficiency, satisfaction in enjoying retirement, and the benefits of a longer life due to improved nutrition and health (Dziechciarz-duda and Król, 2011; Vila, 2014). Monetary benefits are economic benefits in the form of additional income for someone who has completed a certain level of education compared to the income of graduates below (Tamborini et al., 2015).

Besides MYS, another aspect to measure the level of high and low quality of human resources is seen from the population's literacy level. Indonesia is a country with 34 provinces that still face literacy problems. Based on data from the National Socio-Economic Household Survey *(Susenas)*, literacy in Indonesia which is still illiterate, is 1.78%. Provinces with the highest illiteracy rates are Papua at 21.9%, West Nusa Tenggara at 7.46%, East Nusa Tenggara at 4.24%, South Sulawesi at 4.22%, West Sulawesi at 3.98%, and West Kalimantan at 3.81%.

The decline in the illiteracy rate of a country dramatically determines human development which affects the HDI indicator. Literacy education

is not only for literacy itself. However, it is more about impact and meaning for people's lives continuously throughout life. The norm is that after participating in the literacy education process, the learning community will experience an increase in social, cultural, economic life, for example, an increase in health, which can impact life expectancy and longevity.

Maternal and child health is an effort in the health sector that involves the service and maintenance of pregnant women, mothers in labor, breastfeeding mothers, infants, toddlers, and preschool children. In this study, maternal and child health on life expectancy is proxied into three variables: coverage of infants receiving exclusive breastfeeding, coverage of neonatal visits, and coverage of complete immunization of infants. The findings of this study show mixed results from the three variables, and breastfeeding has a negative and significant effect on life expectancy. Neonatal has a positive and insignificant effect on life expectancy. Furthermore, immunization in infants has a positive and significant effect on life expectancy.

During the first six months of the child's birth, breastfeeding is the best time to fulfill children's nutrition. Moreover, breastfeeding is continued with complementary feeding until two years (Antonio et al., 2018). However, the results of this study contradict previous empirical studies (Berkat and Sutan, 2014) that breastfeeding can reduce infant mortality and infant health status tends to improve and affect infant life expectancy.

The coverage of exclusive breastfeeding for the first six months after birth has generally increased in recent years. However, this coverage is only a pseudo-achievement. Data from the 2017 Demographic and Health Surveys (SDKI) shows that exclusive breastfeeding coverage reaches 52%. In addition to an increase of 11% from the previous achievement in 2012, this achievement met the target of at least 50% set out in the National Medium Term Development Plan (RPJMN). However, the same data source also shows that the percentage of exclusive breastfeeding decreases with the child's age. For children under one month, the

percentage is relatively high, 67%. This figure decreases to 55% in children aged 2-3 months and falls again to only 38% at 4-5 months. This means that 52% is an achievement because it does not describe the percentage of babies who get breast milk for six months of their life without other intakes.

The health status of children tends to improve, as indicated by the lower infant mortality rate. The decrease in infant mortality will lead to an increase in life expectancy. The results of this study indicate that the increased coverage of neonatal visits has a positive and insignificant effect on life expectancy. In the neonatal period (0-28 days), there are substantial changes from life in the womb, and organ maturation occurs in almost all systems. Babies up to the age of less than one month are the age group that has the highest risk of health problems, and various health problems can arise. So, without proper treatment, and can be fatal. Several health efforts were made to control the risk in this group. Such efforts, such as childbirth, can be carried out by health facilities and ensure the availability of standard health services at neonatal visits. Neonatal visits should ideally be carried out three times, namely at the age of 6-8 hours, at the age of 3-7 days, and 8-28 days.

Every year more than 1.4 million children die from various diseases that can be prevented by immunization (Triana, 2017). Immunization has proven to be one of the most critical public health efforts. This study confirms the results of previous studies by Pratiwi & Wibowo (2016) that complete immunization coverage for infants has a positive and significant effect on life expectancy. Complete infant immunization programs have shown tremendous success and are a very cost-effective effort to prevent infectious diseases. Immunization has saved lives compared to any other public health endeavor. This program is the most effective health intervention that has succeeded in increasing life expectancy. Various infectious diseases in children, including poliomyelitis, measles, diphtheria, pertussis or tetanus, and TB, can be prevented by immunizing infants. Giving immunizations to infants is very important to reduce mortality and morbidity from diseases prevented by immunization.

Table 3. The Estimation Result of Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnBeds	0.018470	0.016864	1.095248	0.2767
lnResources	-0.058116	0.047701	-1.218324	0.2267
Insurance	0.000516	0.000301	1.716854	0.0899*
Rights	-0.001054	0.000547	-1.928109	0.0574**
Democracy	-0.001675	0.000800	-2.093480	0.0395**
Poverty	-0.040177	0.008159	-4.924250	0.0000***
Gini	-0.706220	0.210212	-4.359558	0.0012***
Dependency	-0.061301	0.015130	-4.051666	0.0001***
lnGRDP	1.555637	0.194683	7.9990634	0.0000***
Water	-0.000796	0.001131	-0.703826	0.4836
Toilet	0.000474	0.001074	0.441484	0.6601
Sanitation	0.001095	0.000829	1.319734	0.1907
MYS	0.227249	0.084922	2.675955	0.0090***
Illiteracy	-0.049385	0.011450	-4.313027	0.0000***
Breastfeeding	-0.000528	0.000276	-1.912879	0.0593**
Neonatal	0.000363	0.000446	0.812824	0.4187
lnImmunization	0.243912	0.079689	3.060800	0.0030***
Constant	52.20943	2.997452	17.41794	0.0000***
R-squared	0.999708			
Adjusted R-Squared	0.999528			
F-Statistic	5580.597			
Prob(F-Statistic)	0.000000			

Source: Research finding.

Note: The dependent variable is the Life Expectancy. *, **, and *** indicate significance at 10%, 5%, 1%, respectively.

4.4 K-Means Cluster Analysis Results

We generate five clusters of provinces in Indonesia in this study (Table 4; Figures 1, 2). We sort by five clusters, namely best, good, average, poor, and worst. Life expectancy can be used to assess health status. Life expectancy is one of the indicators that is taken into account in assessing HDI. The results of the K-Means cluster analysis in this study indicate that cluster 1 consists of 4 provinces (Jakarta, East Kalimantan, North Kalimantan, Riau Islands). Cluster 2 consists of 4 provinces (Central Java, East Java, West Java, North Sumatra). Cluster 3 consists of 2 provinces (Papua, West Papua). Cluster 4 consists of 15 provinces (Aceh, Bengkulu, Central Kalimantan, Central Sulawesi, East Nusa Tenggara, Gorontalo, Lampung, Moluccas, North Moluccas, Southeast Sulawesi, South Sulawesi, West Kalimantan, West Nusa Tenggara, West Sulawesi, West Sumatra). And finally, cluster 5 consists of 9 provinces (Bali,

Bangka Belitung Islands, Banten, Jambi, North Sulawesi, Riau, South Kalimantan, South Sumatra, Yogyakarta).

Table 4. Cluster Analysis Result

Cluster 1: Best inclusive characteristics	**Cluster 2:** Good inclusive characteristics	**Cluster 3:** Average inclusive characteristics
1. Jakarta	1. Central Java	1. West Papua
2. East Kalimantan	2. East Java	2. Papua
3. North Kalimantan	3. North Sumatra	
4. Riau Islands	4. West Java	
Cluster 4: Poor inclusive characteristics		**Cluster 5:** Worst inclusive characteristics
1. Aceh		1. Bali
2. Bengkulu		2. Bangka Belitung Islands
3. Central Kalimantan		3. Banten
4. Central Sulawesi		4. Jambi
5. East Nusa Tenggara		5. North Sulawesi
6. Gorontalo		6. Riau
7. Lampung		7. South Kalimantan
8. Moluccas		8. South Sumatra
9. North Moluccas		9. Yogyakarta
10. Southeast Sulawesi		
11. South Sulawesi		
12. West Kalimantan		
13. West Nusa Tenggara		
14. West Sulawesi		
15. West Sumatra		

Source: Research finding.

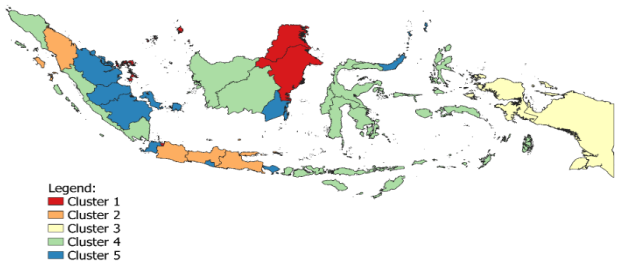
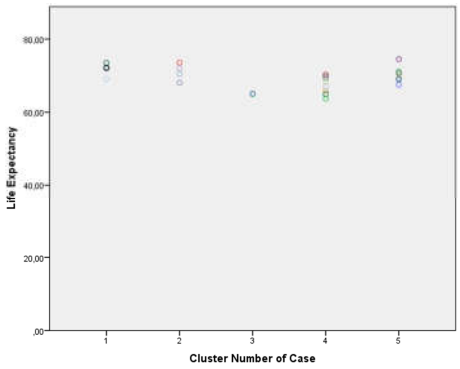


Figure 1. Map of 34 Provinces in Indonesia on Cluster Analysis Result
Source: Research finding.

The results of the K-Means cluster analysis from our study are different from the previous study conducted by Paramita et al. (2020) because, in this study, we used data from various sources, namely Indonesian Health Profile, Welfare Statistics, Indonesia Statistics, and Indonesia Population Projection with a span of 9 years starting from 2010-2018. Meanwhile, the study (Paramita et al., 2020) only used data from the 2019 Indonesian Health Profile. The cluster analysis results of each variable of health infrastructure, political, and socioeconomic status with life expectancy can be seen in Figure 2 (from 2.a to 2.r).



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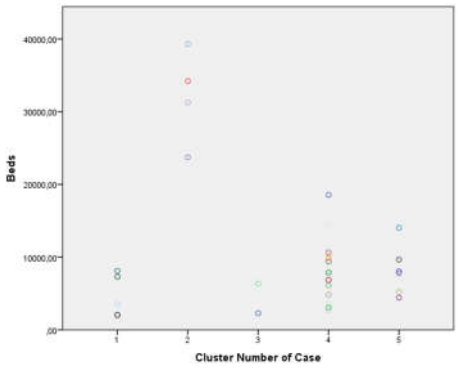
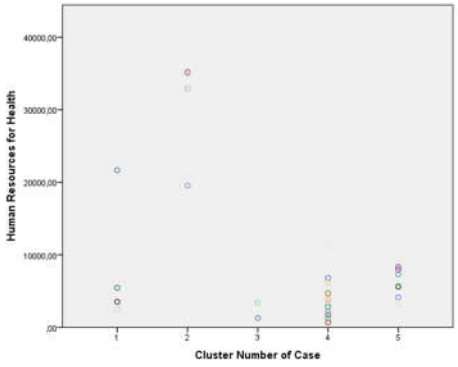
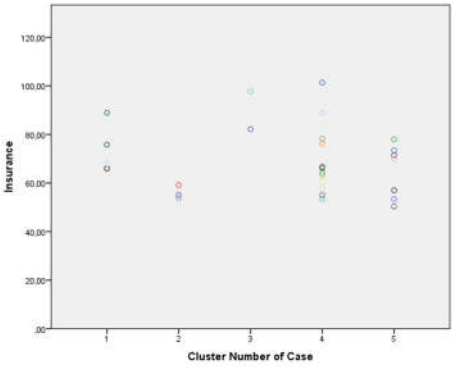


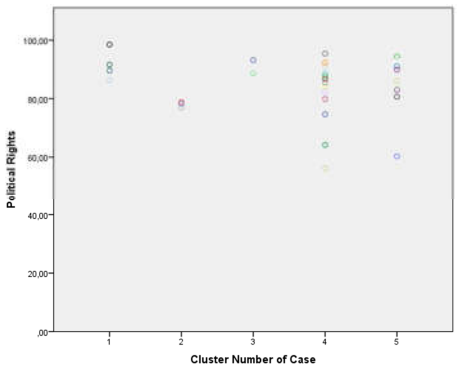
2.b



2.c



2.d



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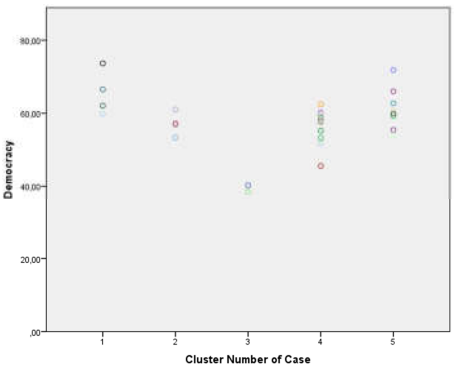
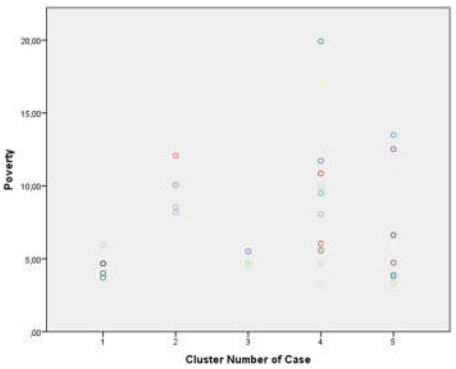


2.f



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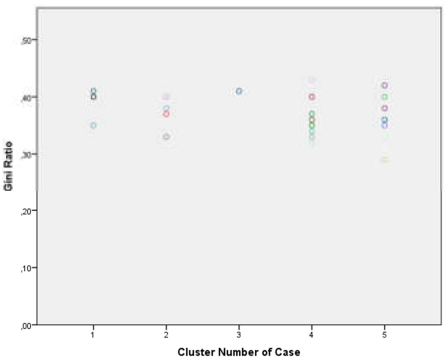
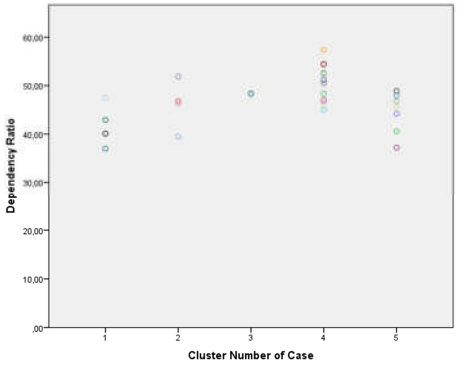
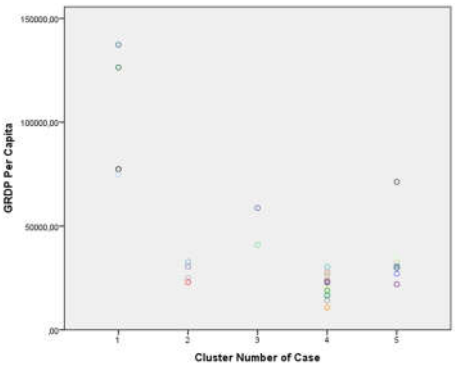


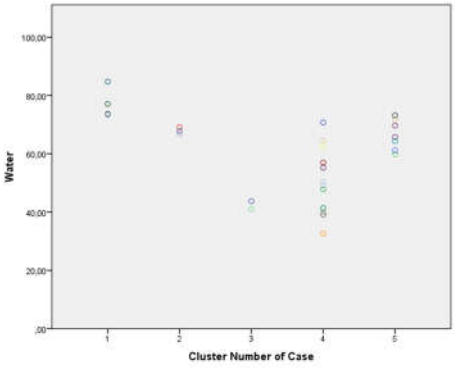
2.h



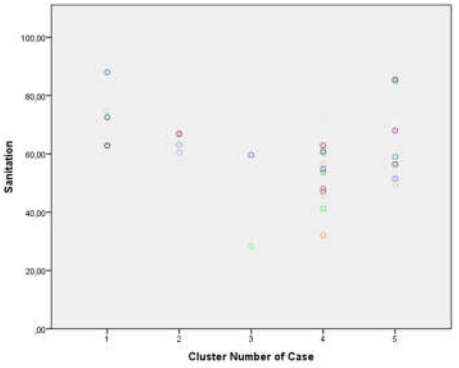
2.i



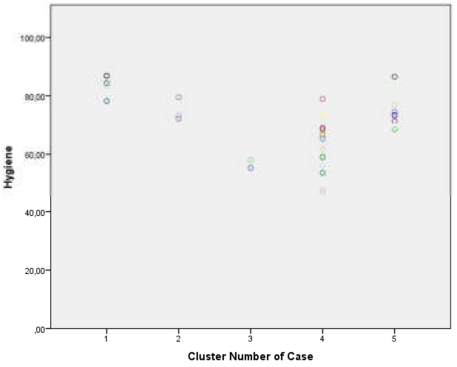
2.j



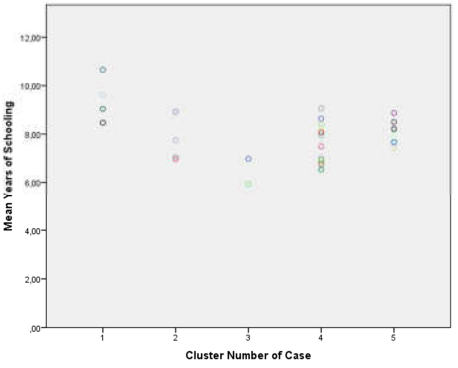
2.k



2.l



2.m



2.n

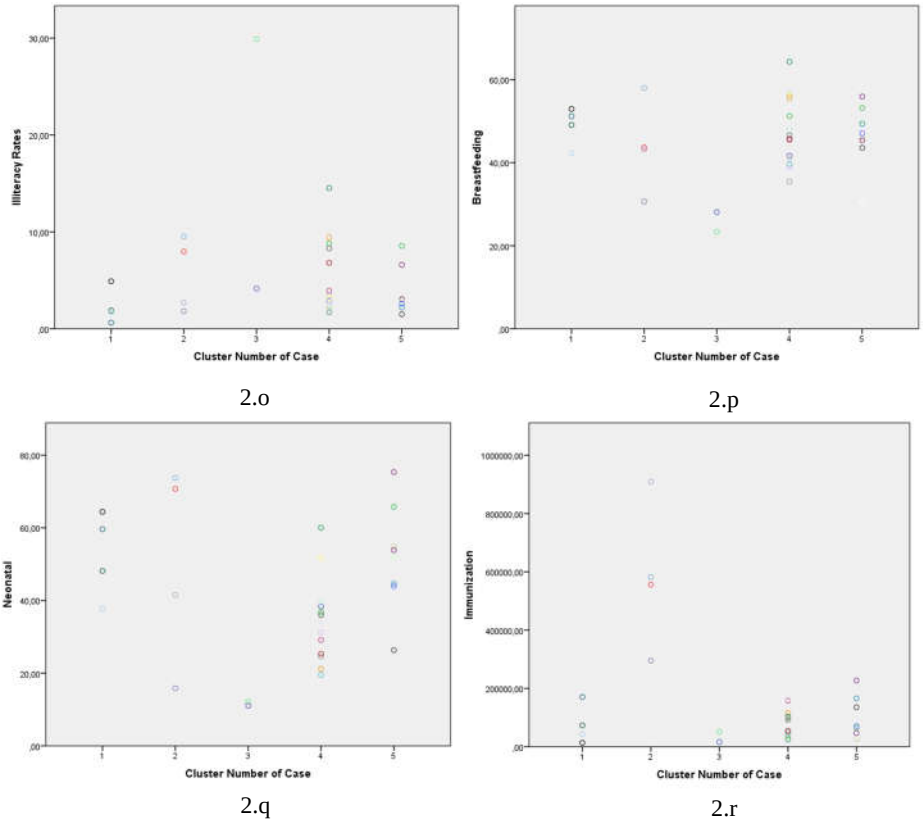


Figure 2. K-Means Cluster Analysis in 34 Provinces in Indonesia
Source: Research finding.

The development of health infrastructure in this study shows that the number of hospital beds can be used to describe the hospital's ability to provide public health services, including as a referral health service facility. The community health center, the spearhead in public health services, is strongly influenced by the availability of human health resources. At a minimum, human health resources in community health centers consist of physicians or primary care physicians, dentists, nurses, midwives, public health workers, environmental health workers, medical laboratory technology experts, and pharmaceutical personnel. Meanwhile, health support personnel must support administrative activities, financial administration, information systems, and other

operational activities. In 2018, Indonesia's implementation of the JKN had entered its fifth year. It must be admitted that the reform of health financing and health services has given many benefits to the various components involved, especially the community as beneficiaries. The purpose of JKN, to bring people's access closer to health services and provide financial protection.

Indonesian democracy and the direction of its development have gone through several phases. Since Indonesia's independence in 1945, democracy has become a collective choice, not only through a very long discourse from the pulpit to pulpit, and has become a state commitment. Eradication of poverty has become the main challenge of development today because the essence of economic development lies not only in the income generated by a region but in improving the population's quality of life.

From socioeconomic factors, it can be seen that Indonesia pays special attention to the issue of inequality. Rising inequality has become a global concern in recent years. Inequality in most developed countries and some large developing countries appear to have increased in the last two decades. Rising inequality is embedded in the capitalist economic system because the return on capital has increased more rapidly than the overall economic growth rate since the mid-10th century. The demographic bonus occurs when the state of the productive age population is more than the non-productive age population, or the dependency ratio is below 50%.

The explanation behind the relationship of GRDP per capita to life expectancy is food supply to mortality. Historically, there are statistically apparent similarities between food prices and mortality. High per capita income implies better access to decent housing, education, health, and other goods, leading to better health, lower mortality rates, and high life expectancy. Furthermore, socioeconomic factors such as the percentage of households with access to clean water and proper drinking water, proper sanitation, and proper toilets in Indonesia are still below 100%.

4.5 Discussion

The results of this study can help understand the relationship between variables, setting priorities for direction and government policies, and help design an organized cooperation strategy between provincial governments. The results of this study show that per capita GRDP is the most effective in increasing life expectancy. The Central Bureau of Statistics noted that Indonesia's GRDP per capita increased to USD 3,927 or around IDR56 million per capita per year in 2018. This figure increased compared to 2017's IDR51.9 million and 2016's IDR47.9 million.

GRDP per capita is one of the essential indicators to determine the economic condition in a certain period. The Central Bureau of Statistics recorded Indonesia's economic growth in 2018 of 5.17%. The consumption sector is still the main engine driving the Indonesian economy, with 56.01%. Poverty rates in rural and urban areas continue to decline, coupled with gradual improvements in social indicators. Poverty rates in rural and urban areas continue to decline, coupled with gradual improvements in social indicators. However, data shows that around 31 million people live below the poverty line (2011), and 40% of the total households live just above the national poverty line of $21 per month (Mahendradhata et al., 2017). As a result, these households are vulnerable to falling into poverty.

The number of the urban poor is increasing, mainly due to urbanization. The number of people living in cities has been projected to surpass rural poverty by 2020. The Indonesia Health Profile from the Ministry of Health for 2010-2018 consistently shows an unequal distribution of health workers. This was also validated by the study of (Paramita et al., 2018). Inequality has undermined poverty reduction. If inequality continues and is not immediately addressed, it will lead to potential problems such as higher poverty and lower welfare levels. With high inequality between people, it will be more difficult to overcome poverty with a high Gini ratio.

Complete immunization program is a determinant of life expectancy. Immunization can be seen from the number of children under five who die from diseases prevented by immunization. Immunization programs are critical in helping the development and growth of children. The coverage of immunization targets that can be achieved must be supported by the mother's knowledge, the mother's attitude, services of health workers at the community health center, and family support. *Immunization* is a basic need that can be met if these supporting factors are continuously encouraged to match the government's target achievement. In addition, MYS is a determinant of life expectancy. Residents who take the primary education path even to college will have better knowledge and income.

Another concern is that the percentage of the population who has access to WASH in Indonesia is not yet 100%. WASH cannot be separated from welfare. However, Indonesia's efforts to create a prosperous society through WASH indicators have challenges, considering that many households still have inadequate WASH. In 2017, WHO said Indonesia was ranked as the third-lowest in access to inadequate sanitation, after India and China (Damashinta, 2018). Based on data from the United States Agency for International Development (USAID) and Indonesia Urban Water Sanitation and Hygiene (IUWASH), Indonesia is ranked last among ASEAN countries in terms of access to water and urban sanitation (Suryani, 2020).

The total population in urban areas is 137.4 million people, who are served by sanitation through urban piped water in Indonesia, only reaching 33% (Central Bureau of Statistics, 2018 in Alaydrus, 2019). Therefore, WASH facilities are needed to improve public health and life expectancy, because people who have access to proper WASH directly affect life expectancy, but to increase life expectancy it is necessary to develop public health through a healthy lifestyle (Hassan et al., 2016; Kabir, 2008; Lin et al., 2012; Wardhana and Kharisma, 2020).

This study provides a brief overview of the conditions and institutional conditions in Indonesia. The indicators used are part of the Indonesian

democracy index, namely political rights and aspects of democratic institutions. The results of this study indicate a shift in the pattern of Indonesian democracy which was originally an electoral democracy to a "defective democracy". The basic understanding of this shift is that elections do not guarantee to produce leaders who are able to prosper the people.

Based on data from the Central Bureau of Statistics in 2018, the aspect of political rights in the Indonesian Democracy Index decreased due to a decrease in political participation in decision-making and government supervision by 1.88 points, namely 56.16 in 2017 to 54.2 in 2018. This indicates that the achievement of the Democracy Index indicator Indonesia is still in the category of bad democracy. Coordination is needed in government programs so that the achievement of the Indonesian Democracy Index leads to the good category. And every provincial government should continue to support the strengthening of the Indonesian Democracy Index Working Groups in the regions so that the measurement of the Indonesian Democracy Index in the regions can be carried out more optimally.

5. Conclusion

This study provides mixed evidence of the impact of health infrastructure development, political regime, and socioeconomic status on life expectancy in Indonesia. GRDP per capita is a core factor in increasing life expectancy, as are complete immunizations, MYS, and health insurance participation. Public health support facilities and infrastructure are also needed for survival. The government and the private sector are expected to continue to build health infrastructure that is evenly distributed throughout Indonesia. Although human health resources did not significantly impact this study due to several problems, their role must continue to be increased evenly across all regions in Indonesia. In addition, the competence of human health resources is also continuously improved through a series of courses, comparative study training so that they can carry out health service tasks adequately, applicable, and systematically by technological developments in the world of health.

Socioeconomic status has a vital role in influencing people's consumption patterns. The decline in inequality, dependency ratio, and poverty are signs of strengthening the socioeconomic status of the community. In addition, another concern from this study is that household access to proper WASH has not yet reached 100%. The development of proper WASH in Indonesia always faces obstacles in the lack of community income, which impacts the low awareness of proper WASH facilities. The community's low income will encourage them to prioritize basic needs over proper WASH facilities because they are not considered too important.

The results of this study also prove that political factors from the Indonesian democracy index negatively correlate with life expectancy. This index can be used as a reference for the central government and local governments in formulating development plans in the political field. This is important, especially in giving priority to indicators with a low index score (<60) and maintaining a high index. On the other hand, socioeconomic status from coverage of neonatal visits and complete immunization of infants has a positive and significant effect on life expectancy.

More in-depth research is needed further to explore the determinants of life expectancy in Indonesia. Further research can use a qualitative approach to provide an overview and context for understanding the relationship between health infrastructure development, political regimes, and socioeconomic status on life expectancy in Indonesia that the importance of using mixed methods in demographic health research in Indonesia.

Finally, the limitation of this study is that the period of the study was conducted before the COVID-19 pandemic. Thus, it is hoped that further studies can consider the conditions of the COVID-19 pandemic. This needs to be done, considering the condition of the political regime's health infrastructure and the different socioeconomic status in Indonesia before and after the COVID-19 pandemic.

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References

Adioetomo, S. M., & Mujahid, G. (2014). *UNFPA Indonesia Monograph Series No. 1: Indonesia on the Threshold of Population Ageing*. New York: UNFPA-United Nations Population Fund.

Alaydrus, H. (2019). Indonesia Targetkan Akses Air Minum Layak 100 Persen Pada 2030. Retrieved October 29, 2020, from https://bit.ly/2Z90xYw

Allin, S., Grignon, M., & Le, J. (2010). Social Science & Medicine Subjective unmet Need and Utilization of Health Care Services in Canada: What are the Equity Implications? *Social Science & Medicine*, *70*(3), 465-472.

Amaghionyeodiwe, L. A. (2004). Government Health Care Spending and The Poor: Evidence from Nigeria. *International Journal of Social Economics*, *36*(3), 220-236.

Andreev, E. M., Biryukov, V. A., & Shaburov, K. J. (1994). Life Expectancy in The Former USSR and Mortality Dynamics by Cause of Death: Regional Aspects. *European Journal of Population*, *10*(3), 275-285.

Antonio, L., Ciampo, D., & Lopes, I. R. (2018). Breastfeeding and the Benefits of Lactation for Women's Health. *Rev Bras Ginecol Obstet*, *40*, 354-359.

Aspinall, E. (2013). A Nation in Fragments: Patronage and Neoliberalism in Contemporary Indonesia. *Critical Asian Studies*, *45*(1), 27-54.

Baltagi, B. H. (2015). *Econometric Analysis of Panel Data* (5th Ed.). Chichester: John Wiley & Sons Ltd.

Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, *70*(5), 9-49.

Becker, G. S., Philipson, T. J., & Soares, R. R. (2005). The Quantity and Quality of Life and the Evolution of World Inequality. *American Economic Review*, *95*(1), 277-291.

Berkat, S., & Sutan, R. (2014). The Effect of Early Initiation of Breastfeeding on Neonatal Mortality among Low Birth Weight in Aceh Province, Indonesia: An Unmatched Case Control Study. *Advances in Epidemiology*, *2014*, 1-7.

Borges, A. P., Reis, A., & Anjos, J. (2016). Willingness to Pay for Other Individuals' Healthcare Expenditures. *Public Health*, *144*, 64-69.

Central Bureau of Statistics. (2020). *Population Distribution by Province*. Jakarta: Badan Pusat Statistik.

---------- (2015). *Profil Penduduk Hasil SUPAS 2015*. Jakarta: Badan Pusat Statistik.

---------- (2013). *Proyeksi Penduduk Indonesia 2010-2035*. Jakarta: Badan Pusat Statistik.

Chaabouni, S., & Zghidi, N. (2016). On the Causal Dynamics between CO2 Emissions, Health Expenditure and Economic Growth. *Sustainable Cities and Society*, *22*, 184-191.

Chitescu, R. I., & Lixandru, M. (2016). The Influence of the Social, Political and Economic Impact on Human Resources, as a Determinant Factor of Sustainable Development. *Procedia Economics and Finance*, *39*, 820-826.

Chokkanathan, S., & Mohanty, J. (2017). Health, Family Strains, Dependency, and Life Satisfaction of Older Adults. *Archives of Gerontology and Geriatrics*, *71*, 129-135.

Cournane, S., Dalton, A., Byrne, D., Conway, R., Riordan, D. O., Coveney, S., & Silke, B. (2015). European Journal of Internal Medicine Social Deprivation, Population Dependency Ratio and an Extended Hospital Episode - Insights from Acute Medicine. *European Journal of Internal Medicine*, *26*(9), 714-719.

Craigwell, R., Bynoe, D., & Lowe, S. (2007). The Effectiveness of Government Expenditure on Education and Health Care in the Caribbean. *International Journal of Development Issue*, *11*(1), 4-18.

Cutler, D., Deaton, A., & Lleras-Muney, A. (2006). The Determinants of Mortality. *Journal of Economic Perspectives*, *20*(3), 97-120.

Damashinta, C. I. (2018). Sanitasi Indonesia Terburuk Ketiga. Retrieved October 29, 2020, from https://bit.ly/3CbfibW

Dziechciarz-duda, M., & Król, A. (2011). On The Non-Monetary Benefits of Tertiary Education. *Econometrics*, *3*(41), 1-15.

Engineer, M., King, I., & Roy, N. (2008). The Human Development Index as a Criterion for Optimal Planning. *Indian Growth and Development Review*, *1*(2), 172-192.

Erlangga, D., Suhrcke, M., Ali, S., & Bloor, K. (2019). The Impact of Public Health Insurance on Health Care Utilisation, Financial Protection

and Health Status in Low: The Middle-Income Countries: a Systematic Review. *PloS ONE*, *14*(8), e0225237- e0225246.

Fan, H., Yan, Q., Coyte, P. C., & Yu, W. (2019). Does Public Health Insurance Coverage Lead to Better Health Outcomes? Evidence From Chinese Adults. *Inquiry: The Journal of Health Care Organization, Provision and Financing*, *56*, 1-10.

Foreman, K. J., Marquez, N., Dolgert, A., Fukutaki, K., Fullman, N., McGaughey, M., ... & Murray, C. J. (2018). Forecasting Life Expectancy, Years of Life Lost, and All-Cause and Cause-Specific Mortality for 250 Causes of Death: Reference and Alternative Scenarios for 2016-40 for 195 Countries and Territories. *The Lancet*, *392*(10159), 2052-2090.

Franco, Á., Álvarez-dardet, C., & Ruiz, M. T. (2004). Effect of Democracy on Health : Ecological Study. *BMJ*, *329*, 1421-1423.

Gerring, J., Bond, P., Barndt, W. T., Moreno, C., Gerring, B. J., Bond, P., Barndt, W. T., & Moreno, C. (2011). Politics: Democracy and Economic Growth: A Historical Perspective How to cite this article: A Historical Perspective. *World Politics*, *54*(3), 323-364.

Gilmour, T., Wiesel, I., Pinnegar, S., & Loosemore, M. (2010). Social Infrastructure Partnerships: a Firm Rock in a Storm? *Journal of Financial Management of Property and Construction*, *15*(3), 247-259.

Ginja, S., Gallagher, S., & Keenan, M. (2019). Water, Sanitation and Hygiene (WASH) Behaviour Change Research: Why an Analysis of Contingencies of Reinforcement is Needed. *International Journal of Environmental Health Research*, *3*(2021), 715-728.

Grzywacz, J. G. (2000). Socioeconomic Status and Health Behaviors among Californians (121-149). In J. J. Kronenfeld (Ed.), *Health, Illness, and Use of Care: The Impact of Social Factors*. West Yorkshire: Emerald

Group Publishing.

Harris, B., & Helgertz, J. (2019). Urban Sanitation and the Decline of Mortality. *History of the Family*, *24*(2), 207-226.

Hassan, F. A., Minato, N., Ishida, S., & Nor, N. M. (2016). Social Environment Determinants of Life Expectancy in Developing Countries: A Panel Data Analysis. *Global Journal of Health Science*, *9*(5), 105-117.

Hum, R. J., Verguet, S., Cheng, Y. L., McGahan, A. M., & Jha, P. (2015). Are Global and Regional Improvements in Life Expectancy and in Child, Adult and Senior Survival Slowing? *PLoS ONE*, *10*(5), 1-14.

Jain, A. K. (2010). Data Clustering: 50 Years Beyond K-Means. *Pattern Recognition Letters*, *31*(8), 651-666.

Jamison, D. T., Jha, P., Malhotra, V., & Verguet, S. (2013). *H*uman Health: The Twentieth Century Transformation of Human Health—its Magnitude And Value. In *How Much Have Global Problems Cost The World.* Cambridge: Cambridge University Press.

Jones, C. A., Parker, T. S., Ahearn, M., Mishra, A. K., & Variyam, J. N. (2009). *Health Status and Health Care Access of Farm and Rural Populations* (57). Pennsylvania: DIANE Publishing.

Kabir, M. (2008). Determinants of Life Expectancy in Developing Countries. *Journal of Developing Areas*, *41*(2), 185-204.

Kaplan, R. M., Spittel, M. L., & Zeno, T. L. (2014). Educational Attainment and Life Expectancy. *Policy Insights from the Behavioral and Brain Sciences*, *1*(1), 189-194.

Kim, T. J., Vonneilich, N., Lüdecke, D., & Knesebeck, O. Von. (2017). Income, Financial Barriers to Health Care and Public Health

Expenditure: A Multilevel Analysis of 28 Countries. *Social Science & Medicine, 176*, 158-165.

Kristanto, E., Daerobi, A., & Samudro, B. R. (2019). Indonesian Life Expectancy: Role of Health Infrastructure and Socio-Economic Status. *Signifikan: Jurnal Ilmu Ekonomi*, *8*(2), 159-178.

Kustanto, A. (2020). Pertumbuhan Ekonomi Regional di Indonesia: Peran Infrastruktur, Modal Manusia dan Keterbukaan Perdagangan. *Buletin Studi Ekonomi*, *25*(1), 80-98.

Lake, D. A., & Baum, M. A. (2001). The Invisible Hand of Democracy: Political Control and the Provision of Public Services. *Comparative Political Studies*, *34*(6), 587-621.

Lakshmi, T. S., & Sahoo, D. (2013). Health Infrastructure and Health Indicators: The Case of Andhra Pradesh, India. *IOSR Journal of Humanities and Social Science*, *6*(6), 22-29.

Legido-Quigley, H., Naheed, A., Asita De Silva, H., Jehan, I., Haldane, V., Cobb, B., Tavajoh, S., Chakma, N., Kasturiratne, A., Siddiqui, S., Jafar, T. H. (2019). Patients' Experiences on Accessing Health Care Services for Management of Hypertension in Rural Bangladesh, Pakistan and Sri Lanka: A Qualitative Study. *PLoS ONE*, *14*(1), 1-23.

Leonti, M., & Casu, L. (2013). Traditional Medicines and Globalization: Current and Future Perspectives in Ethnopharmacology. *Frontiers in Pharmacology*, *4*(Article 92), 1-13.

Lin, R., Chen, Y., Chien, L., & Chan, C. (2012). Political and Social Determinants of Life Expectancy in Less Developed Countries: A Longitudinal Study. *BMC Public Health*, *12*(1), 85-98.

Mahendradhata, Y., Trisnantoro, L., Listyadewi, S., Soewondo, P.,

Marthias, T., Harimurti, P., & Prawira, J. (2017). *The Republic of Indonesia Health System Review*. Delhi: World Health Organization.

Martínez, M. del C. V., & Oller, I. M. P. (2019). Health Investment Management Based on Patient Satisfaction With the Primary Care Doctor in the Spanish National Health Service Context. A Gender Perspective. *MOJ Gerontology & Geriatrics*, *4*(5), 204-211.

McMichael, A. J., McKee, M., Shkolnikov, V., & Valkonen, T. (2004). Mortality Trends And Setbacks: Global Convergence or Divergence? *Lancet*, *363*(9415), 1155-1159.

Mello, L., & Pisu, M. (2009). The Effectiveness of Education and Health Spending among Brazilian Municipalities. *OECD Economics Department Working Papers*, *53*(712), 1-22.

Miladinov, G. (2020). Socioeconomic Development and Life Expectancy Relationship: Evidence from The EU Accession Candidate Countries. *Genus*, *76*(1), 1-20.

Ministry of Home Affairs. (2015). The Book of Administrative Code and Regions of Indonesia. Retrieved October 29, 2020, from https://bit.ly/3Ge9DEK

Monteiro, G., & Turnovsky, S. J. (2008). The Composition of Productive Government of Expenditure: Consequences for Economic Growth and Welfare. *Indian Growth and Development Review*, *1*(1), 57-83.

Mooi, E., & Sarstedt, M. (2011). *A Concise Guide to Market Research: The Process, Data, and Methods Using IBM SPSS Statistics*. Berlin: Springer.

Muntaner, C., Borrell, C., Ng, E., Chung, H., Espelt, A., Rodriguez-Sanz, M., Benach, J., & O'Campo, P. (2011). Politics, Welfare Regimes, and

Population Health: Controversies and Evidence. *Sociology of Health and Illness, 33*(6), 946-964.

Navarro, V., Muntaner, C., Borrell, C., Benach, J., Quiroga, Á., Rodríguez-sanz, M., Vergés, N., & Pasarín, M. I. (2006). Politics and Health Outcomes. *Lancet*, *368*(September 26), 1033-1037.

Negara, S. D. (2016). Indonesia's Infrastructure Development Under The Jokowi Administration (145-165). In D. Singh and M. Cook (Eds.), *Southeast Asian Affairs 2016*. Heng Mui Keng Terrace: ISEAS Publishing.

Nomura, S., Sakamoto, H., Glenn, S., Tsugawa, Y., Abe, S. K., Rahman, M., Brown, J. C., Ezoe, S., Maruyama, S., Miyata, H., Mooney, M. D., Naghavi, M., Onoda, T., Ota, E., Otake, Y., Roth, G. A., Murray, C. J. L., & Shibuya, K. (2017). Population Health and Regional Variations of Disease Burden in Japan, 1990-2015: a Systematic Subnational Analysis for the Global Burden of Disease Study 2015. *The Lancet*, *390*(10101), 1521-1538.

Novak, Anica, Žiga Čepar, A. T. (2014). Expected Years of Schooling and Longer Life Expectancy As an Aging Population Factor. *Proceedings of the Management, Knowledge and Learning International Conference 2014*, Rerieved from https://d1wqtxts1xzle7.cloudfront.net/

Paramita, S. A., Yamazaki, C., & Koyama, H. (2020). Determinants of Life Expectancy and Clustering of Provinces to Improve Life Expectancy: an Ecological Study in Indonesia. *BMC Public Health*, *20*(1), 1-8.

Paramita, S. A., Yamazaki, C., Setiawati, E. P., & Koyama, H. (2018). Distribution Trends of Indonesia's Health Care Resources in The Decentralization Era. *The International Journal of Health Planning and Management*, *33*(2), 1-11.

Pratiwi, R. D. A., & Wibowo, W. (2016). Pengaruh Karakteristik Sosial Ekonomi Jawa Timur Menggunakan Analisis Regresi Multivariat. *Jurnal Sains Dan Seni ITS*, *5*(2), 199-204.

Qureshi, M. A. (2009). Human Development, Public Expenditure and Economic Growth: a System Dynamics Approach. *International Journal of Social Economics, 36*, 93-104.

Ray, D., & Ing, L. Y. (2016). Addressing Indonesia's Infrastructure Deficit. *Bulletin of Indonesian Economic Studies*, *52*(1), 1-25.

Robson, L. S., Clarke, J. A., Cullen, K., Bielecky, A., Severin, C., Bigelow, P. L., Irvin, E., Culyer, A., & Mahood, Q. (2007). The Effectiveness of Occupational Health and Safety Management System Interventions: A Systematic Review. *Safety Science*, *45*(3), 329-353.

Sabogal, R. I., Medlin, E., Aquino, G., & Gelting, R. J. (2014). Sustainability of water, sanitation and hygiene interventions in Central America. *Journal of Water, Sanitation and Hygiene for Development*, *4*(1), 89–99.

Salim, W., & Negara, S. D. (2018). Infrastructure Development Under The Jokowi Administration: Progress, Challenges and Policies (239-264). In H. Hill and S. D. Negara (Eds.), *The Indonesian Economy in Transition*. Heng Mui Keng Terrace: ISEAS Publishing.

Selck, T. J., & Deckarm, R. (2015). Income, Democracy, and Public Policy: the Effects of Improved Sanitation on Life Expectancy. *Journal of Water Sanitation and Hygiene for Development*, *5*(3), 525-529.

Shen, C. E., & Williamson, J. B. (1997). Child Mortality, Women's Status, Economic Dependency, and State Strength: A Cross-National Study of Less Developed Countries. *Social Forces*, *76*(2), 667-700.

Shkolnikov, V. M., Andreev, E. M., Tursun-zade, R., & Leon, D. A. (2019). Patterns in the Relationship between Life Expectancy and Gross Domestic Product in Russia in 2005-15: a Cross-Sectional Analysis. *The Lancet Public Health, 4*, e181–e188.

Sickles, R. C., & Taubman, P. (1997). Mortality and Morbidity among Adults and the Elderly (561-627). In M. R. Rosenzweig & O. Stark (Eds.), *Hanbook of Population and Family Economics*. Amsterdam: Elsevier Science B.V.

Soares, R. R. (2007). Health and the Evolution of Welfare across Brazilian Municipalities. *Journal of Development Economics*, *84*(2), 590-608.

Sudhinaraset, M., Ingram, M., Lofthouse, H. K., & Montagu, D. (2013). What is the Role of Informal Healthcare Providers in Developing Countries? A Systematic Review. *PLoS ONE*, *8*(2), 1-12.

Suryahadi, A., Kusumawardhani, N., & Izzati, R. A. (2018). The Effectiveness of Social Assistance Programs in Reducing Poverty and Inequality. Retrieved from SMERU Research Institute (In Indonesian).

Tamborini, C. R., Kim, C. H., & Sakamoto, A. (2015). Education and Lifetime Earnings in the United States. *Demography*, *52*(4), 1383-1407.

Taylor, M. (2016). *From Conflict to Cooperation? Sudan, South Sudan and Uganda*. Retrieved October 29, 2020, from https://bit.ly/3AYfVV7

The Lancet. (2019). Successes and Challenges for Health in Indonesia. *The Lancet*, *393*(10166), 2-20.

The World Bank. (2020). *World Development Indicators*. Washington, DC: The World Bank.

Todaro, M. P., & Smith, S. C. (2012). *Economic Development*. London: Pearson Education.

Togobu, D. M. (2018). Gambaran Perilaku Masyarakat Adat Karampuang Dalam Mencapai Pengobatan Dukun (Ma'sanro). *Jurnal Kesehatan Masyarakat*, *4*(1), 16-32.

Triana, V. (2017). Faktor Yang Berhubungan Dengan Pemberian Imunisasi Dasar Lengkap Pada Bayi Tahun 2015. *Jurnal Kesehatan Masyarakat Andalas*, *10*(2), 123-130.

UNDP. (2019). *Human Development Report 2019 Inequalities in Human Development in the 21st Century*. New York: United Nations Developmet Programme.

Vallin, J., & Meslé, F. (2009). The segmented Trend Line of Highest Life Expectancies. *Population and Development Review*, *35*(1), 159-187.

Vila, L. E. (2014). The Non-Monetary Benefits of Education. *European Journal of Education*, *35*(1), 21-32.

Warburton, E. (2016). Jokowi and the New Developmentalism. *Bulletin of Indonesian Economic Studies*, *52*(3), 297-320.

Wardhana, A., & Kharisma, B. (2020). Angka Harapan Hidup Di Era Desentralisasi (Kabupaten/Kota Jawa Barat). *E-Jurnal Ekonomi Dan Bisnis Universitas Udayana*, *5*, 405-422.

WHO. (2014). Countries Helping Countries. Jenewa: World Health Organization.

Wigley, S., & Akkoyunlu-Wigley, A. (2011). The Impact of Regime Type on Health: Does Redistribution Explain Everything. *World Politics*, *63*(4), 647-677.

Wulandari, R. D., & Laksono, A. D. (2019). Urban-Rural Disparity: the Utilization of Primary Healthcare Centers Among Elderly in East Java, Indonesia. *Jurnal Administrasi Kesehatan Indonesia*, *7*(2), 147-154.

Yu, J., Zhou, J., Long, A., He, X., Deng, X., & Chen, Y. (2019). A Comparative Study of Water Quality and Human Health Risk Assessment in Longevity Area and Adjacent Non-Longevity Area. *International Journal of Environmental Research and Public Health*, *16*(19), 1-19.

Yuan, H., Ma, Q., Ye, L., & Piao, G. (2016). The Traditional Medicine and Modern Medicine from Natural Products. *Molecules*, *21*(5), 1-18.

Zank, S., & Hanazaki, N. (2017). The Coexistence of Traditional Medicine and Biomedicine: a Study with Local Health Experts in Two Brazilian Regions. *PLoS ONE*, *12*(4), 1-17.