

DOES QUALITY OF LIFE MATTER FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS IN INDONESIA?

Ery JAYANTI

Ph.D. Scholar in Economics, Faculty of Economics and Business, Universitas Syiah Kuala
Senior Lecturer, Universitas Jabal Ghafur, Sigli, Aceh, Indonesia
ery_jayanti@yahoo.com

Said MUHAMMAD

Professor, Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
said@unsyiah.ac.id

B.S NAZAMUDDIN

Senior Lecturer, Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
abdjamal@unsyiah.ac.id nazamuddin@unsyiah.ac.id

T. ZULHAM

Senior Lecturer, Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
teukuzulham@unsyiah.ac.id

M. Shabri Abd. MAJID*

Senior Lecturer, Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
mshabri@unsyiah.ac.id
*Corresponding author

Abstract

To ensure its sustainable development, although it is not legally binding, Indonesia have strongly committed to support the Sustainable Development Goals (SDGs) that have been initiated by the General Assembly of the United Nations since 2015 with the main targets to end poverty, safeguard the planet, and guarantee the peaceful and prosperous lives of all citizens on the globe in 2030. Amidst the strong commitment of the Indonesian government to include the SDGs' framework in its development agenda, this study empirically examines the extent to which the quality of life has contributed towards achieving the SDGs in Indonesia. Specifically, this study attempts to explore the effect of quality of life on the reduction of poverty and hunger and the increase of access to clean water of the Indonesian across 33 provinces in the country over the period 2010-2017. Using the panel multiple regression approach, the study documented significant positive effects of the income level, tertiary education level, and formal employment status on the reduction on the poverty and hunger index. Additionally, both the tertiary level of education and income positively contributed to the increase in clean water access. These findings shed some lights for the policy-makers to design proper policies for achieving the SDGs agenda through enhancing the citizens' quality of life so that the target of realizing "Zero Goals" where all Indonesian living without poverty and having sufficient access to clean water could be materialized.

Keywords: Sustainable development goals, Poverty, Hunger index, Clean water access.

JEL classification: I31, I39, O18

1. Introduction

There have been many studies discussed the development orientation of "Growth" versus "Development". Growth is identical with traditional development, focusing on increasing a national Gross Domestic Product (GDP), whereas "development" is a more modern concept emphasizing on the increase of per capita income. Thus, the development focuses more on social indicators and highlights the development as a multi-dimensional process. Brinkman (2016) sees growth often not related to development, thus a modern economic development does not compatible with illiteracy and destitution (Kuznets, 1989). Growth by itself is often a forced achievement of numbers, not a result of development towards equity. Growth without development is an experience that often occurs in underdeveloped and developing countries.

Since 2015, the General Assembly of the United Nations has initiated the sustainable development agenda that linked the economic growth and economic development for the purposes of ensuring human welfare and equitable distribution of economic resources both for present and future generations. The sustainable development agenda has been designed based on a comprehensive and integrated response to many social, economic, and environmental challenges, by creating effective and cross-sectoral partnerships (Hoelman et al., 2015). The main targets of the SDGs are to end the poverty, safeguard the planet, and guarantee the peaceful and prosperous lives of all citizens on the globe in 2030.

The SDGs comprise 17 goals and 169 indicators, covering a range of issues that affect both developed and developing countries across the globe, including Indonesia. Since its inception in 2015, the SDGs have been strongly supported by the government of Indonesia by including the SDGs' framework in its national economic development agenda. Of 17 goals and 169 indicators of the SDG agenda, this study only focuses on achieving two-main important indicator of the SDGs, namely environmental problem (i.e., increasing the access to clean water suitable for consumption) and socio-economic problems (i.e., reducing the depth index of poverty, reducing the proportion of people living below the poverty line, and ensuring the adequacy of nutritional consumption of at least <14.000 kcal per capita). To measure the three socio-economic indicators, Gentilini and Webb (2008) has combined it into an index, so-called the Poverty and Hunger Index (PHI). The PHI index offers a better measurement of poverty as it combines several indicators into a single index. Measuring the indicators of poverty separately might provide partial and contradicting information on the existing real poverty problem.

Table 1 illustrates the targets and achievements of the two SDG agenda in Indonesia, namely the PHI and the household access to clean water over the period 2010-2017.

Table 1. Targets and achievement of indicators sustainability development in Indonesia

Indicator	Target				Achievement				Status
	2010	2015	2016	2017	2010	2015	2016	2017	
Poverty and Hunger Index (PHI)	0.45	0.36	0.30	0.20	0.51	0.45	0.48	0.30	Not achieved
Household access to clean water (%)	46.73	69.80	80.00	86.00	42.76	66.5	72.62	78.05	Not achieved

Source: Millennium Development Goals Report (2015) and National Socio-Economic Survey (2017).

As observed from Table 1, the realization of the PHI reduction and the increase in access to clean water consumption were lower than their targets, meaning that the reduction in PHI and the increases in household access to clean water have not been achieved. For example, in 2017, the government of Indonesia targeted to reduced its PHI to 0.20, but its achievement was only 0.30. Similarly, the Indonesian government was only able to increase household access to clean water by 78.05% than its 86% target in 2017. By the year 2019, the government expected 100% Indonesian will have full access to clean water (Central Agency of Statistics of Indonesia, 2016). These stylized facts indicate that the Indonesian government has failed to solve the environmental and socio-economic problems as part of the SDGs.

Although Indonesia recorded the third highest average annual economic growth by 4% after China (9%) and India (5.5%) in the last two decades, over the period 2000-2017 (Tjoe, 2018), but the country failed to reduce the poverty level and increase the household access to clean water, as targeted (See Table 1). The failure of Indonesia's economic growth to provide sustainable development for its citizens further confirms that support economic growth is connected to the decline in illiteracy and destitution (Kuznets, 1989), thus economic development as stated by Brinkman (2016). To reduce and even end the poverty and provide the peaceful and prosperous lives of all Indonesian, the government efforts to enhance economic growth should focus on promoting citizen's welfare in line with the sustainable development agenda. Otherwise, Indonesia will fail to achieve the targeted SDGs by 2030.

There have been many previous measured indicators of sustainable development and investigated their determinants using both time series data (Kader and Parera, 2014; and Haziq, 2017) and cross-sectional data (Basu et al., 2017). For example, Abdalla (2014) assess the adequacy of calories and protein intake in Sudan and Dominguez-Salas et al. (2016) explore the socio-economic predictors of malnutrition among the low-income groups in

Nairobi. There have also been studies investigated the correlation between income levels and food insecurity of rural communities in the US (Annestrand et al., 2017), the influence of education on household food security in rural area in Pakistan (Abdullah et al., 2017), and the effect of educational levels on both income and food security in South Africa (Nwokolo, 2015). However, these studies could not provide comprehensive empirical evidence on the measurement of sustainable development and its determinants since the studies only measure the sustainable development partially, focusing only on selected indicators of single goal of sustainable development of good health and well-being (i.e., nutrition intake and food security) either using time series or cross-section data at the household level. Additionally, these studies only explored selected determinants of sustainable development indicators, namely income and education levels for the cases of the US, African countries, and Pakistan.

Motivated to fill the existing gaps in the previous studies and to provide a more reliable evidence on the sustainable development issue in Indonesia, this study measure the sustainable development more comprehensively using the PHI [i.e., the combination of poverty and hunger indicators (UNDP, 2007)] and the access to clean water of the 33 provinces nationwide in Indonesia. Additionally, the study explores more determinants of sustainable development, comprising levels of income and education as well as the type of decent employment. Specifically, the study aims to determine the effect of the quality of life of the population with indicators of income level, education level and decent work status on the reduction in the PHI and the increase in access to clean water as part of SDGs' realization.

The findings of this study are expected to provide and enrich existing literature on sustainable development, especially for Indonesia. The findings of the study are also hoped to some lights for the government in designing comprehensive policies and providing strategic solutions on achieving sustainable development agenda of "Zero Goals" in Indonesia by 2030.

The rest of the study is structured in the following sequences. Section 2 reviews selected relevant previous studies. Section 3 provides the empirical framework and data, followed by a discussion of the main findings and their implication in Section 4. Finally, Section 5 concludes the paper.

2. Literature Review

The 17 SDGs are the continuation of the eight Millennium Development Goals (MDGs) that stimulated a worldwide campaign from 2000-2015 to end various dimensions of poverty. Unlike the MDGs that only applied to the developing countries, the SDGs apply to all countries on the globe. The MDGs only focused on poverty reduction, while the SDGs focuses on a universal development with-and-for sustainability, comprising new themes of the environment, economy, and society as embedded systems where the pillars of urban areas, water and sanitation, energy, and climate change are prominently featured (Fukuda-Parr, 2016).

To measure the sustainable development, various indices have been introduced such as the well-being Index that are constructed from socio-economic indicators comprises poverty, hunger, education, and health, the environmental sustainability index that comprises indicators of clean water access, proper sanitation, reforestation and waste management, and ecological index that covers the CO₂ emission, climate, natural resources, and renewable energy indicators (Kates et al., 2005; and Novita et al., 2015). These approaches to measuring effective sustainable development have considered basic human social needs in the long-term perspective or intergenerational concentrations (Amekudzi et al., 2015).

Based on the Haq's (1995) writing on the reflections on human development, Sen (2000) viewed that promoting global human life could not be simply done through the improvement of the economy of a country, but it should be done through holistic human sustainable development agenda since the enhancement of living standard by reducing poverty and hunger would have more impact on prosperity than just increasing economic capacity and economic growth. Thus, the SDGs are targeted to fulfil the basic needs of all population, thus improve their quality of life (Streeten, 2008). Quality of life is a process of expanding choices for residents to build their lives that are considered valuable and essentials for human development. Living with a quality of life, people can feel a long and healthy life,

knowledgeable and have access to the resources needed for enjoying a decent and normal life. UNDP (2007) has measured the quality of life using indicators of education, health, income, and decent work levels, while OECD (1982) has measured it using indicators of income, housing, environment, social stability, health, education, and decent work.

Based on the above delineation, it is clear that the SDGs of reducing poverty and hunger as measured by the PHI and enhance good health as measured by the access to clean water are determined by many factors, including quality of life indicators, namely: education, health, income, decent work, housing, environment, and social stability. Thus, the next section discusses the relationship between quality of life and the PHI and clean water access.

2.1. The PHI and quality of life

There have many previous studies investigated the effect of quality of life dimension on the levels of poverty and hunger among the citizens worldwide. For example, Faharuddin (2012) explores the effect of income on the decreases in the PHI and documented that per capita income has a strong connection to the reduction in the PHI. More specifically, Wang et al. (2016) reveal that 69% decline in the PHI that is with multidimensional poverty is caused by an increase in a percentage of income. Income reflects the quality of life and poverty level as it measures the level of per capita consumption expenditure. The low level of socio-economic households tends to be poor and very vulnerable to food insecurity, limited water access, unhealthy life, and malnutrition among the pregnant women and children aged 1 to 3 years (van Wesenbeeck et al., 2009). Similarly, income is associated with sufficient nutritional food consumption, thus a healthy life (Dominguez, 2016).

The other quality of life indicators that are related to the PHI are the levels of education, secondary or tertiary level. The levels of education reflect differences in people's behaviour, rationality, and the way of how they make a decision to fulfil their living necessity affect their sustainable development levels of the PHI. In their study, Mom Hogan and Berning (2012), Njong (2010), and Ahmad et al. (2016) found that, on the average, disposable income per household member with the primary education level was lower and tend to be relatively poor than those with the secondary and university education levels. The years of schooling is negatively related to poverty and food insecurity (Abdullah, 2017). Mutisya et al. (2015) revealed that those with a low level of education experienced a higher level of food insecurity and malnutrition problem as they prioritize consuming only staple foods than fruits and vegetables. An increase in the population attending school causes a reduction in food insecurity and increase in nutritional intake. In the study on 12,000 citizens in Cape South Africa, Nwokolo (2015) documented that the levels of education and income positively related to household food security. The low level of income and limited access of household to meet their basic necessities (Annestrand et al., 2017) that is caused by difficulty in finding a decent job due to the low level of education, subsequently causes hunger and food insecurity.

Finally, the next indicator that influences poverty and hunger is the working status. Decent work is a job that provides sufficient income, finances a decent and dignified life, guaranteed physical, psychological security, and safety (Shanto, 2017). Self-employed workers have been a solution in severe poverty although this type of job only provides little economic benefits and welfare for individuals and locales (Goetz et al., 2012). Meanwhile, non-agricultural freelance works are a sustainable job that stabilizes income and reduces poverty (Field, 2014; and Rajapaksha, 2015). Hermawan (2012) found that the development non-agricultural sectors have an important essence to reduce poverty and hunger, as a one percent increase in per capita income in the non-agricultural sector has reduced the poverty rate by 15 percent. Finally, Abreu et al. (2018) found that by switching to employment as an entrepreneur, a worker would gain higher job satisfaction and welfare.

2.2. Access to clean water and quality of life

Clean water is one of the basic needs everybody should have full access used for drinking, cooking, bathing, and other hygienic life purposes (Ministry of Health, the Republic of Indonesia, 2014). Although the government of Indonesia targets a 100% access to clean water by 2019, but over the period 2016-2017, less than 50% of the citizens had access to decent

drinking water or protected piping water (National Socio-Economic Survey, 2017). Having full access to clean water becomes an obstacle when the living standard of the population is low. The knowledge about the importance of health influences the level of clean water consumption. Fan et al. (2013) and Fan et al. (2017) documented that water consumption and water use are highly dependent on the knowledge, attitudes, and behaviour of the citizens. In China, the consumption of water per capita per day from 130 cities significantly increased by 65% over the period 2000 – 2015, which are strongly influenced by meteorological, socio-economic, and income factors. Similarly, Rachmaningtyas et al. (2013) found that education level has a positive and significant influence on clean water access in Indonesia. People with a higher level of education are more oriented to preventive measures for their health by consuming clean water, while people who consumption low quality of water has been at risk of being contaminated.

Apart from the education level, Basu et al. (2017) found that income is also one of the important factors affecting household access to clean water. Similarly, Ahmad et al. (2016) found that the education level has a positive relationship with the consumption of clean water. The higher the level of education, the higher the knowledge of the health of the household, thus they become to be more selective in choosing suitable water for consumption that is bacteria-free. However, the findings of Rachmaningtyas et al. (2013) and Basu et al. (2017) were contradicted to those of Cronin et al. (2017) who found that the level of education and income have no significant effect on the consumption of clean water.

3. Research Method

3.1. Empirical framework

This study investigates the influences of the quality of life on the sustainable development goals of poverty and hunger reduction and increased in clean water access across 33 provinces in Indonesia over the period 2010-2017. Thus, two dependent variables of the Poverty and Hunger Index (PHI) and Access to Clean Water (ACW) are regressed against three-dependent variables of quality of life, namely the level of per capita income (PINC); the level of education, comprising the secondary education (SEDUC) and tertiary education (TEDUC) levels; and the decent employment status, including the numbers of self-employed (SEMP), formal workers (FEMP), and the number of non-agricultural freelance workers (FREMP). With the exception of all other variables, only income per capita variable is transformed into the natural logarithm. A panel data model approach based on Asteriou and Hall (2009) is employed. The data panel modelling is the most efficient and suitable model (Berk, 2010; and Cronin et al., 2017) to be utilized in the study as it investigates the relationship between quality of life and sustainable development goals across 33 provinces in Indonesia over period 2010-2017. The first following estimated panel regression model is used to explore the effects of three qualities of life (i.e., income, education, and employment status) on the PHI:

$$PHI_{it} = \beta_1PINC_{it} + \beta_2SEDUC_{it} + \beta_3TEDUC_{it} + \beta_4SEMP_{it} + \beta_5FEMP_{it} + \beta_6FREMP_{it} + \varepsilon_{it} \quad (3.1)$$

Meanwhile, the second following estimated panel regression model is used to explore the effects of two-quality of life variables (i.e., income and education) on the access to clean water. In this model, we exclude the employment status as the determinant of clean water access due to non-availability of earlier studies suggested this variable as one of the determinants of clean water access. Thus, the model is as the following:

$$ACW_{it} = \gamma_1LNPNINC_{it} + \gamma_2SEDUC_{it} + \gamma_3TEDUC_{it} + \varepsilon_{it} \quad (3.2)$$

where *PHI* is the Poverty and Hunger Index, *ACW* is the access to clean water, *PINC* is the per capita income, *SEDUC* is the secondary level of education, *TEDUC* is the tertiary level of education, *SEMP* is the self-employment, *FEMP* is the formal employment, *FREMP* is the freelance employee, *ev* and *ev* are the error terms, and *it* is the province *i* of the year *t*.

In estimating the panel data, two prominent generalized least square (GLS) models were usually used, namely the Fixed Effects Model (FEM) and the Random Effects Model (REM) or Error Components Model (ECM) (Gujarati, 2009). The Hausman, Redundant, and Lagrange Multiplier (LM) test would be first conducted to ensure the best suitable model to estimate the data in this study. If p -values of the tests are found to be insignificant, it suggests using the REM as the most suitable panel regression model. On the contrary, if the tests are significant, then the FEM model would be adopted.

Prior to the estimation of selected panel model, batteries of classical assumption tests of multicollinearity, and autocorrelation would be conducted. As for the multicollinearity test, the Variance Inflation Factor (VIF) is adopted. If the VIF is smaller than 10, the data are free from the multicollinearity. Finally, the Durbin-Watson (D-W) test is used to check for the autocorrelation, where if the D-W value is around 2, then the data is said to be non-autocorrelation, while heteroscedasticity has been approved by weighting the cross-section weight in panel model (Gujarati 2009).

3.2. Data

This study investigates the influences of the quality of life on the sustainable development goals of poverty and hunger reduction and increased in clean water access across 33 provinces in Indonesia over the period 2010-2017. Thus a balanced panel data, comprising 264 observations are investigated. Data of this study is obtained from the SDGs report, the Indonesian Central Bureau of Statistics, and the National Socio-Economic Survey of the Republic of Indonesia. These data include a number of population, income, labour statistics, and expenditure. The Poverty and Hunger Index (PHI) is calculated based on the formula of the UNDP (2007), comprising the poverty depth index, the proportion of the population consuming below the minimum calorie intake (<1,400 kcal/mg), and the proportion of the population living below the poverty line. These entire PHI indicators are then formulated into a composite measure of the PHI based on Gentilini and Webb (2008), as follows:

$$PHI = \frac{1}{3} \sum_{i=1}^3 [(x_i - \min) / (\max_i - \min_i)] \quad (3.3)$$

where x is the actual value of the i indicator, \max and \min are the maximum and minimum values of each indicator, respectively. The minimum value is 0 applies for all provinces in accordance with government targets.

In more detail, the data or variables, measurements, and the sources are illustrated in Table 2.

Table 2. Data description

Variable	Description	Scale	Source of Data
1. SDGs:			
a. PHI	Poverty and Hunger Index	Percentage	The SDGs Report (2018).
b. ACW	Access to clean water	Percentage	
2. Quality of Life:			
a. PINC	Income per capita	IDR	Central Bureau of Statistics, Indonesia (2018)
b. Education level:			
i. SEDUC	Secondary Level of Education	Percentage	Central Bureau of Statistics, Indonesia (2018) and the SDGs Report (2018).
ii. TEDUC	Tertiary Level of Education	Percentage	
c. Employment Status:			
i. SEMP	Number of Self-employed	Percentage	National Socio-Economic Survey, Indonesia (2018).
ii. FEMP	Number of Formal Worker	Percentage	
iii. FREMP	Number of Freelance Worker	Percentage	

4. Results and Discussion

4.1. A brief overview of the SDGs and quality of life in Indonesia

Prior to the discussion of the main finding, this section describes the condition of poverty and hunger of population, access to clean water, and quality of life across 33 provinces in Indonesia. As observed from Table 3, on the average, the levels of national PHI, clean water access (ACW), income per capita (PINC), secondary education (SEDUC), tertiary education (TEDUC), self-employment (SEMP), formal employment (FEMP), and non-agricultural freelance employment (FREMP) across 33 provinces in Indonesia for the period 2010-2017 was 25%, 23%, IDR702.69 thousand, 25.77%, 7.26%, 33.28%, 35.06%, and 4.46%, respectively. The province of Bali is found as the province with the lowest value of the PHI by 10%, while the province of Papua is recorded as the highest level of the PHI by 46%. North Maluku is found as the province with the highest level of clean water access by 35%, while Bali is found as the province with the lowest clean water access by 11%. In term of income per capita, the province of Jakarta recorded the highest level of income (IDR1.527.90 thousand), while the province of East Nusa Tenggara recorded the lowest income per capita (USD437.32 thousand).

Next, in the view of education level, the largest population of the province of Jakarta, the capital city of Indonesia was graduated the secondary education (38.41%) and tertiary education (15.59%) levels, while the smallest number of population with the secondary and tertiary education levels were found for the provinces of East Nusa Tenggara (18.41%) and West Kalimantan (4.27%), respectively. Finally, in term of employment status, the largest number of population of the provinces of Maluku, Jakarta, and Central Java are found to work as self-employed (42.80%), formal employment (66.17%), and freelance employment (8.16%), respectively. On the other hand, the least number of self-employed was found in the Province of Riau Island (21.98%), while the least number of populations who worked as the formal employment (17.92%) and freelance employment (0.89%) were both found in the province of Papua.

Referring to Table 3, it shows that the decline in the PHI and increased access to clean water in all provinces in Indonesia have not been achieved as targeted in sustainable development goals. Nationally, on the average, the achievement of the PHI and increase in access to clean water were 25% and 23%, respectively, which are still far from the 0% and 100% targets. In addition, Table 2 also shows a different level of income, education, and employment status of the population across 33 provinces nationwide. Does different achievement of the PHI and clean water access relate to the different level of income, education, and employment status across the provinces in Indonesia? In the next section, this question is answered.

Table 3. Mean values of the SDGs and indicators of quality of life in Indonesia by provinces

Province	PHI (Index)	ACW (Index)	PINC (IDR 000)	SEDUC (%)	TEDUC (%)	SEMP (%)	FEMP (%)	FREMP (%)
Aceh	0.29	0.27	717.42	29.69	7.86	35.49	34.04	4.43
North Sumatera	0.23	0.23	636.88	31.67	6.90	29.10	34.81	4.54
West Sumatera	0.17	0.18	734.27	26.74	8.08	39.83	30.56	5.11
Riau	0.23	0.19	829.24	28.61	6.35	32.43	37.05	3.43
Jambi	0.24	0.25	668.46	34.71	7.58	35.00	37.56	4.30
South Sumatera	0.28	0.28	623.39	23.54	5.52	34.03	29.60	2.32
Bengkulu	0.29	0.31	644.47	24.50	6.62	35.37	26.06	3.80
Lampung	0.28	0.24	573.74	21.95	4.55	33.59	26.67	5.87
Bangka Belitung	0.18	0.21	876.49	23.77	6.36	29.15	39.18	4.52
Riau Island	0.21	0.26	1,081.21	31.12	5.85	21.98	65.60	3.38
Jakarta	0.18	0.19	1,527.90	38.41	15.59	22.27	66.17	2.81
West Java	0.21	0.21	720.56	21.90	5.87	29.49	41.75	8.07
Central Java	0.27	0.27	468.87	22.53	6.40	31.32	31.82	8.16
Yogyakarta	0.23	0.29	644.35	23.95	7.69	29.62	37.53	6.70
East Java	0.22	0.22	607.03	26.71	9.43	30.84	31.96	6.96
Banten	0.14	0.12	816.76	23.06	6.16	23.36	55.24	5.82
Bali	0.10	0.11	911.83	29.19	8.15	29.71	39.88	6.56
West Nusa Tenggara	0.28	0.32	545.45	20.19	5.98	34.91	26.50	7.87
East Nusa Tenggara	0.36	0.33	437.32	18.41	6.54	39.08	22.63	2.05
West Kalimantan	0.22	0.18	635.53	19.53	4.27	28.84	30.60	3.01

Province	PHI (Index)	ACW (Index)	PINC (IDR 000)	SEDUC (%)	TEDUC (%)	SEMP (%)	FEMP (%)	FREM (%)
Central Kalimantan	0.18	0.17	682.25	22.11	5.58	31.32	38.57	2.83
South Kalimantan	0.14	0.12	788.41	21.48	5.91	33.85	33.99	4.80
East Kalimantan	0.27	0.27	996.44	32.45	8.10	29.20	51.94	3.05
North Sulawesi	0.22	0.20	717.45	30.57	7.37	39.49	36.88	6.44
Central Sulawesi	0.26	0.24	624.29	21.79	6.86	34.90	27.15	5.04
South Sulawesi	0.19	0.14	604.75	22.89	8.09	35.07	31.44	2.95
Southeast Sulawesi	0.23	0.19	468.08	27.37	9.55	39.49	29.98	3.37
Gorontalo	0.27	0.23	577.93	18.99	5.71	37.20	28.26	6.46
West Sulawesi	0.23	0.24	477.29	21.60	8.51	37.11	24.11	3.83
Maluku	0.39	0.34	536.43	32.94	8.46	42.80	29.89	2.66
North Maluku	0.35	0.35	551.25	26.46	6.85	37.45	28.12	2.61
West Papua	0.43	0.23	790.26	25.66	7.98	34.69	33.56	2.45
Papua	0.46	0.14	672.70	25.88	8.73	36.12	17.92	0.89
Mean	0.25	0.23	702.69	25.77	7.26	33.28	35.06	4.46

Source: Central Bureau of Statistics, Indonesia (2018), National Socio-Economic Survey, Indonesia (2018), and the SDGs. Report (2018)

4.2. Main findings and their discussion

In this section, the findings from the GLS model on the influences of income, education level, and types of employment on the PHI and access to clean water are reported. However, prior to this, the first step of the study is to identify the most suitable GLS model to estimate the panel data. In selecting the most suitable three-panel models among the common effect model (CEM), random effect model (REM), and fixed effect model (FEM), both the Redundant and Hausman tests are conducted.

As reported in Table 4, based on these tests, the fixed effect model (FEM) is found to be a better model than those of CEM and REM to analyze our data, as indicated by the p-value of the tests which were smaller than its 5% level of significance. In other words, the fixed effect model (FEM) model is found to be the most appropriate model to be adopted in the study to estimate the influences of quality of life factors on the PHI.

4.2.1. Effect of quality of life on the PHI

The findings of the effects of quality life factors of income, education level, and types of employment on the sustainable development goal from the perspective of the PHI are reported in Table 4.

Table 4. The effect of quality of life on the PHI in Indonesia

Variable	Common effect model	Fixed effect model	Random effect model
Constant	0.3410 (10.438)***	0.2640 (12.514)***	0.2750 (9.170)***
PINC	-6.0059 (-0.678)	-2.0087 (-4.189)***	-1.0540 (-2.516)**
SEDUC	-0.0022 (2.589)**	-0.0010 (1.896)*	-0.0015 (-2.349)**
TEDUC	-0.0023 (-1.341)	-0.0030 (-4.046)***	-0.0043 (-3.437)***
SEMP	-0.0007 (1.470)	-0.0050 (-2.358)**	-0.0005 (1.661)
FEMP	-0.0030 (-6.416)***	-0.0020 (-0.502)	-0.0010 (-2.175)**
FREMP	-0.0107 (-5.155)***	-0.0087 (-4.189)***	-0.0014 (-0.715)
R ²	0.2779	0.7602	0.1891
Adj-R ²	0.2610	0.7478	0.8699
F-Statistics	16.4270 [0.000]***	39.4179 [0.000]***	6.3762 [0.000]***
Jarque Berra	0.5300 [0.125]	3.2600 [0.651]	0.7100 [0.133]
Durbin Watson	0.58	2.82	1.41
Model selection test	Panel model	Chi-statistics	Remark
Redundant test	FEM	31.4950 (0.000)***	FEM (Ha)
Hausman test	REM	15.2062 (0.018)	FEM (Ha)
Lm test	-	-	-

Note: Figures in (.) and [.] indicate t-statistics and probability value, while the ***, **, and * indicate significance at the 10%, 5%, and 1% levels, respectively.

As the study identified the FEM is the best model to be adopted in this study, thus the discussion only focused on the findings of FEM. As observed from Table 4, the study documented a negative relationship between all quality of life factors of income, education level, and types of employment on the PHI at least at the 5% significance level. Overall, these qualities of life factors explained the variations in the PHI by 86.99% as indicated by the adjusted R-square value of 0.8699. This finding indicates that the achievement of PHI target is found to be most affected the quality of life factors, whilst other factors which are not investigated in the model explained variations in the PHI only by 14.01%. This finding is in

line with the study by Goetz et al. (2012) and Rajapaksha (2016) who found that the quality of life was negatively related to the PHI. This further confirms that if the government intends to achieve the sustainable development of the PHI reduction, the focus should be given on improving income, promoting education, and providing more job opportunities to its citizens

Comparing to all quality of life factors, income was found to be the most dominant factor affecting the realization of achieving the SDGs' target of reducing poverty and hunger index. Particularly, if the per capita income increased by 1%, thus the PHI index could be reduced by 10.54%, while other variables of education level and employment only contributed 0.1% - 0.4% reduction in the PHI. However, the tertiary education level has contributed more to the reduction in the PHI by 0.43% than the secondary level of education which only contributed to the reduction in the PHI by only 0.15%. This further indicated that the higher level of education is necessarily needed to accelerate poverty and hunger reduction as the employment with a higher level of education status would get a better payment. Finally, in the view of the employment status, only the formal employment, such as labour in across the economic sectors in Indonesia has contributed towards the reduction in the PHI by 0.10%, while other types of employment, i.e., self-employed and freelance employment have no significant effect on the reduction of the PHI as these types of employment commonly paid with the lower level of salary. The salaries received by these employed workers were usually below the level of provincial minimum wage and were insufficient to fulfil their basic needs and thus reduced their poverty and hunger problem. This finding suggests the importance for the government to ensure the employers to pay their workers at least in accordance with the set minimum wage levels across the provinces nationwide. Those employers who fail to provide an appropriate level of salary to their workers, the government should impose a just penalty.

Overall, our findings are supported by the previous studies such as Wang et al. (2016) who recorded that an increased in income has significantly reduced multidimensional poverty problem. The significance of education levels both secondary and tertiary in reducing the PHI is in line with the studies by Thapa (2013), Nwokolo (2015), and Saad et al. (2011). According to them, the education level, especially the tertiary education level has significantly contributed to poverty and hunger reduction. Finally, the finding of the negative significance of formal employment on the PHI is also supported by those of VanWey and Vithayathil (2014) who documented that formal employment has positively influenced the PHI reduction. However, our findings of the insignificant influence of self-employment and freelance employment on the reduction in the PHIs contradicted to the finding by Pavithra and Vatta (2013). In their study, Pavithra and Vatta (2013) found that the non-agricultural freelance employees were found to be the most important workers in the rural economy to support the livelihoods and eliminate poverty and hunger of rural residents, while Abreu et al (2018) found that self-employment, particularly the entrepreneurs enjoyed higher level of income and welfare.

Furthermore, Dominguez-Salas et al. (2016) also documented that the socio-economic status such as income and education level affected the malnutrition problem in Nairobi, where the low level of socio-economic status caused consumption of calorie inadequacy, which finally increased the number of children who are malnourished and growth stunted. Finally, chronic food insecurity has been caused by the lack of income and limited access of the household to meet their minimum standards of food needs (Annstrand et al., 2017).

Our findings further suggest the importance of the government to prioritize the poverty reduction agenda on promoting the socio-economic status of the citizens as it positively contributes towards the reduction of the poverty and hunger in Indonesia, and consequently would realize the aspiration of SDGs' target in the country. The Indonesian government suggested providing free education by offering more scholarships for poor-smart students. The education institutions should pay more attention to the quality of higher education that is oriented to learning-by-doing, so that the graduates produced would not only academically intelligent but they also would both affectively and psychometrically intelligent. In addition, the government should offer more job opportunities through the inclusive sustainable development agenda. The government should provide more business space for independent entrepreneurs administratively and bureaucratically. Creating more jobs through small-medium enterprises (SMEs) financial supports would enhance the per capita income of the

population and in turns would realize the aspiration of the country achieving the SDGs' target by 2030.

4.2.2. Effect of quality of life on the clean water access

Next, the findings of the effects of life quality factors on the achievement of the SDGs' target from the perspective of clean water access water across 33 provinces in Indonesia over the period 2010-2017 are reported in Table 5. As observed from Table 5, based on the Redundant, Hausman and Lagrange Multiplier (LM) tests, the study found that the p-value of the test is smaller than its 5% level of significance, indicating the rejection of the null hypothesis of the FEM. In other words, the REM model is found to be the most appropriate model to be adopted in the study to estimate the influences of quality of life factors on the access to clean water. Thus, the next discussion is only focused on the findings of REM.

Referring to the random effect model (REM) in Table 5, the overall variation in the access to clean water is explained by 22.71% changes in the quality life factors of income per capita and education levels, as indicated by the R²-adj value of 0.2271. This indicates that there are many other factors might have an effect on clean water access among the population in Indonesia. These factors include the water infrastructures, the level of rainfall, level of population awareness on the healthy life, forest damage rates, number of population, quality and quantity of raw water supply, and so on.

Table 5. Effect of quality of life on clean water access in Indonesia

Variable	Common effect model	Fixed effect model	Random effect model
Constant	37.9960 (8.449)***	34.2670 (6.463)***	37.9960 (8.449)***
PINC	13.9780 (6.990)***	0.0006 (3.641)***	0.0083 (3.658)***
SEDUC	-0.0052 (-0.317)	0.0830 (0.431)	-0.0310 (6.509)***
TEDUC	2.0037 (6.509)***	2.1840 (6.637)***	2.0037 (8.449)***
R ²	0.2359	0.43036	0.2359
Adj -R ²	0.3635	0.34209	0.2271
F-Statistics	0.0889 [4.000]	4.92195 [0.000]***	26.7587 [0.000]
Jarque Berra	0.7303 [0.113]	3.2301 [0.640]	0.6102 [0.122]
Durbin Watson	0.79	2.34	1.98
Model selection test	Panel model	Chi-statistics	Remark
Redundant test	CEM	32.287 [0.000]*	FEM (Ha)
Hausman test	REM	3.350 [0.340]*	REM (Ho)
Lm test	CEM	26.576 [0.000]*	REM (Ho)

Note: Figures in (.) and [.] indicate t-statistics and probability value, while the *** indicates significance at the 10% level.

Comparing to the quality of life factors of education and income levels, the study recorded that the tertiary education level played a dominant role in increasing the level of clean water access. Specifically, a 1% increase in the population in tertiary education level caused an increased in the access to clean water by 200.37%. However, a 1% increase in the population in the secondary education level contributed to the decline in clean water consumption by 3.10%. Finally, an increase of 1% of per capita income only contributed to the increase in clean water access by Indonesian population by only 0.83%.

Our finding of the greatest role of the tertiary level of education and the negative influence of secondary level of education on the increase in clean water access further indicate the higher level of education of the population, the higher would be their awareness and knowledge of important to live healthy by consuming hygienic water. Our findings are in line with the research conducted by Team Water Wise from Charles Darwin University, supported by the research grant from the Australian Aid (Hobgen et al., 2016), who found that level of education contributed towards a higher level of daily clean water consumption.

Our study also found a positive effect of income on clean water access, as the availability of sufficient income to pay water bill ensures the fulfilment of clear water access by the population. This finding is supported by Zeneli (2016), Haziq and Panezai (2017) and Fan et al. (2013) for the cases of Albania, Afghanistan, and China, respectively. Apart from the meteorological factors and socio-economic status, level of income was found to be the most influential factor affecting the daily consumption of clean water in Albania, Afghanistan, and China. These findings further implied that the government's efforts to increase the access to clean water should be focused on enhancing the population's income and education level. Offering more job opportunities through the creation of more financially supported SMEs and providing more scholarships for the lower-income group's citizens would enhance the

education level of the population and consequently increase their per capita income that finally contributes toward the realization of the SDGs' aspiration nationally by 2030 where all population has full clean water access. If the government could provide a gradual clean water access subsidy or granting free access by the poor to the clean water on the gradual basis continuously, it would finally realize the 100% target of the SDGs for the Indonesian to have fully clean water consumption by 2030.

Finally, all variables used in our estimated GLS models have been checked their classical assumptions problem. All variables investigated in the study were normally distributed based the Jarque-Bera test, no multicollinearity problem as indicated by the Variance Inflation Factor (VIF) with the value between 1.054-1.3213; homoscedastic as indicated by the Breusch-Pagan (BP) p-value, and non-autocorrelated as indicated by the Durbin-Watson (DW) values of 0.164 – 2.032. These findings indicated that the estimated variables in our models have fulfilled all classical assumption, thus produce reliable and robust findings that could be inferred for policy formulation.

5. Conclusion

The indicators of sustainable development from the perspectives of poverty and hunger reduction and increase in clean water access in Indonesia have not yet reached the target. The achievement of SDGs is very much related to the level of quality of life such as levels of income, education, and employment status. This study investigated empirically the effect of quality of life on the reduction in the poverty and hunger index (PHI) and the increase in access to clean water across 33 provinces in Indonesia over the period 2010-2017. Using the panel regression model, the study found that the increase in quality of life has contributed to the decline in the PHI and the increase in clean water access.

Comparing to all quality of life factors, income was found to be the most dominant factor affecting the realization of achieving the sustainable development target of reducing the PHI. In addition to the income, the tertiary education level has contributed more to the reduction in the PHI than the secondary level of education, indicating the importance of having a higher level of education to accelerate the poverty and hunger reduction as the employment with a higher level of education status would get a better payment. In the view of the employment status, only the formal employment, such as labour in across the economic sectors in Indonesia has contributed towards the reduction in the PHI, while other types of employment, i.e., self-employed and freelance employment were found to have no significant effect on the reduction of the PHI.

As for the access to clean water, the study documented the highest contribution of the tertiary level of education to the increase in clean water access, followed by the increase in population per capita income. However, the secondary level of education was found to adversely affect the clean water access. These findings further indicate the significance of the population to have a higher level of education, particularly knowledge of important to live healthily by consuming hygienic water.

Thus, to achieve the sustainable development targets of fully uplift the population from the poverty and hunger and provides full access to the clean water; the government should design policies focusing on the enhancement of the quality of life of the citizens. Granting more scholarships for the poor-smart students and creating more jobs by giving financial support to the SMEs nationwide would enhance the per capita income of the population, education level, and employment opportunities. This would, in turns, realize the aspiration of the country achieving the sustainable development target of “zero goals” by 2030. To accelerate the achievement of the sustainable development target of full clean water access, the government might provide subsidy or granting free access by the poor to the clean water nationwide.

Further studies on the topic of achieving sustainable development in Indonesia could provide better and comprehensive empirical findings by considering more variables in the model of estimation. These factors could include the water infrastructures, the level of rainfall, level of population awareness on the healthy life, forest damage rates, quality and quantity of raw water supply, and so on. Other political, socio-economic, technological, legal, and environmental factors might also be considered. Additionally, comparing different countries across the regions into the analysis would also enrich the existing empirical shreds

of evidence on influences of quality of life factor on the realization of the sustainable development target. Finally, comparing the private and public organization would also enrich the existing empirical findings on the investigated topic.

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