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Research Article

Do Education and Health Sectors Matter for Poverty Reduction?

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Abstract: This research aims at measuring and analyzing the effects of spending on education and health sectors on poverty reduction both in short- and long-term perspectives for the case of Aceh province, Indonesia. This study contributes toward the achievement of the Sustainable Development Goals (SDGs) as it has been a focal point targeted by the government in the country. The Autoregressive Distributed Lag (ARDL) panel model is used to analyze the issue by using the annual secondary data over the 2008-2017 period, covering 23 districts/cities in the province of Aceh, Indonesia. The study found that spending on education and health sectors has an insignificant effect in the short-term on poverty reduction. In the long-term, however, spending on education and health sectors showed a positive effect on poverty reduction. These findings implied that to further reduce the poverty rate, the long-term focus should be given on enhancing the education and health sectors by providing excellent facilities, teaching, and medical staff, and supported by sufficient operational budgets for schools and medical centers.
Keywords: Poverty, Education, Health, Government Expenditures.

INTRODUCTION

Commitment to alleviate poverty and improve welfare globally still requires special attention from countries in the world. This was confirmed by the Declaration of the Millennium Development Goals (MDGs) and continued with the Sustainable Development Goals (SDGs). The commitment was implemented with multidimensional steps in poverty agreements under the United Nations Decade No. 55/2 of 18 September 2000 (A/Ris/55/2 UN Millennium Development Goals) (Mihai and Manea, 2015). Indonesia is an archipelago with a variety of ethnic and cultural groups that have rich natural resources used for poverty alleviation. Other constraints are also caused by the unequal level of education and health among the citizens (Gounder and Xing, 2015).

The existence of the relationship between poverty, education, and health has been well-researched. For example, Bashwara and Bintang (2018) found that the average level of schooling and life expectancy had a negative and significant impact on poverty levels. Furthermore, Edi and Jolianis (2014) documented that education related to literacy rates and health needed with life expectancy have relationships with the number of poor people. These previous studies on education, health, and their relations to poverty have been focussing on the long-run relationship, and few of them investigated both short- and long-term relationships.

Different from earlier studies, this study aims to measure and analyze the effects of spending on education and health sectors on poverty reduction in both the short- and long-term across 23 districts/cities in the province of Aceh, Indonesia. The focus of this study also is not only on the level of education but also on the health level and poverty reduction. However, this study also includes the effects of total expenditure, direct and indirect expenditure, education expenditure, and health expenditure on poverty reduction in Aceh province.

This study is important considering the existing condition of each region in Aceh province that is closely related to the implementation of the decentralized system, where each region can manage and develop the financial potential for the development of a region. In implementing this decentralization, Aceh obtained funds not only from the General Allocation Fund and the Special Allocation Fund but also from the Special Autonomy Fund. In 2017, the province of Aceh received IDR4.8 trillion of development funds and IDR7.7 trillion of Special Autonomy funds with 20% allocated for education development and 10% allocated for the healthy development sector (Education Office and Aceh Health Service, 2017).

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The findings of this study are expected to provide important policy recommendation for poverty eradication by allocating development funds for enhancing education and health sector across 23 districts and cities in the province of Aceh, Indonesia.

The rest of this study is structured as follows. Section 2 provides the selected literature reviews and followed by the discussion on the research method in Section 3. Section 4 provides the findings and their discussion and ended with the concluding remarks in Section 5.

LITERATURE REVIEW

In a vicious cycle of poverty, there are three main axes that cause a person to be poor, namely low levels of health, low income, and low levels of education (Majid, 2014, Dewi *et al*., 2018, and Ogwumike and Ozughalu, 2018). The low level of health is one of the triggers of poverty because a low level of public health will cause a low level of productivity. Low levels of productivity further lead to low incomes, and low incomes cause poverty (Ottoni *et al*., 2018, Sani *et al*., 2019, Naqsadiqa *et al*., 2019, Marisa *et al*., 2019, and Majid *et al*., 2019). Therefore, every effort to reduce poverty should be directed at terminating the poverty cycle and the poverty trap.

According to Lenkei *et al*. (2018), education is a long-term investment to change the quality of the future. The higher level of education will certainly affect the acquisition of a person's wage or income level. As stated by Ganegodage and Rambaldi (2011), education can provide two benefits at once, namely increasing the value of self-esteem and great productivity capabilities.

In addition, health is one of the people's welfare variables that can describe the level of public health in relation to the quality of life (Manaf and Ibrahim, 2017). The health condition of the population is one of the assets for the success of national development because, with a healthy population, development is expected to run smoothly. The variable used to describe the level of health is life expectancy. The impact of poverty will be related to the fundamental conditions that are a condition of the ongoing development of a country. Williamson (2001) documented that the higher the health rate in an area, the more socio-economic development related to health facilities in the region is indicated to be more advanced. The progress of development in the health sector shows that the level of health available can be accessed by all levels of society and that means an increase in the value of health will increase productivity so that it will drive the rate of economic growth which in turn will reduce poverty (Aue *et al*., 2016).

Furthermore, Mihai and Manea (2015) found that poverty is caused by a lack of education for the case of Romania. Datzberger (2018) recorded that to reduce poverty in Uganda, it can be done with a strategy that is to increase access to education, improve the quality of education, and create jobs through education. Williamson (2001) found that poverty negatively affects the health of individuals, communities, and society. The first strategy is to take advantage of social assistance and minimum wages that are not sufficient to meet basic needs in the community. Second, try to change the social, economic, and political conditions among the poor. In addition, Kaluge and Fithri (2017) stated that the influence of government spending in the education sector has a negative insignificant effect on poverty.

On the other hand, government spending in the health sector has a positive and insignificant effect on poverty. Furthermore, Bashwara and Bintang (2018) stated that the average length of schooling and life expectancy had a negative and significant impact on poverty levels. This empirical shreds of evidence showed that the level of education and health affect poverty varies in the context of each region. Therefore, this study aims to re-examine the effect of education and health expenditures on poverty reduction which includes the conditions of the decentralized system in each region. The variables included in this study are total expenditure, direct and indirect expenditure, education expenditure and health expenditure both in the short- and long-terms on poverty reduction in 23 districts/cities in the province of Aceh, Indonesia.

RESEARCH METHODS

The annual data used is secondary data covering 23 districts/cities in Aceh provinces, Indonesia. Education, health, and poverty data over the period from 2008 to 2017 were used and gathered from the reports of Statistics Agency (BPS – Statistics Indonesia) and from the Directorate General of Financial Management, the Republic of Indonesia. The education data are viewed from the indicator of the average length of the school, while health data are viewed from the indicator of each life expectancy annually. Aceh poverty data is a percentage of Aceh's poor population. Data on total expenditure, direct expenditure, and indirect expenditure are measured in units of trillions of Indonesian Rupiah (IDR), while data on education expenditure and education expenditure are measured in units of billions of IDR.

This study uses the Autoregressive Distributed Lag (ARDL) method that tolerates differences in the stationarity level of the data. In addition, this model can also be used for a relatively small number of observations, so that the ARDL method is very appropriate to be used in this study. This ARDL model is used for short-term and long-term estimation (Bildirici and Kayikci, 2013). To estimates the short-term relationship between education and health sector on poverty reduction, the following equation is used:

$$\Delta P_{j,t} = \alpha_{0i} + \sum_{i=1}^{n} \alpha_{1i}\Delta P_{j,t-i} + \sum_{i=1}^{n} \alpha_{2i}\Delta E_{j,t-i} + \sum_{i=1}^{n} \alpha_{3i}\Delta H_{j,t-i} + \theta_1 ECT_{t-1} + u_{4it} \quad \text{.....(1)}$$

Meanwhile, to estimate the long-run relationship between education and health sector on poverty reduction, the following equation is used:

$$P_{j,t} = \beta_{01} + \beta_{11}P_{j,t-1} + \beta_{21}E_{j,t-1} + \beta_{31}H_{j,t,1} + \varepsilon_t \quad \text{..... (2)}$$

The ARDL Panel model used in this study is based on the formulation of the equation of Pesaran *et al*. (2001) and Dogan *et al*. (2014), as below:

$$\Delta P_{j,t} = \alpha_{0i} + \sum_{i=1}^{n} \alpha_{1i}\Delta P_{i,t-1} + \sum_{i=1}^{n} \alpha_{2i}\Delta E_{i,t-1} + \sum_{i=1}^{n} \alpha_{3i}\Delta H_{i,t-1} + +\beta_{11}P_{j,t-1} + \beta_{21}E_{j,t-1} + \beta_{31}H_{j,t-1} + u_{j,t}$$
....(3)

where *P* is poverty rate, *E* is education sector, *H* is health sector, α_i is the short-term estimated coefficient, β_i is the long-term estimated coefficient; *t* is the study period (2008-2017), *j* is the area of 23 districts/cities in Aceh Province, *i* is the lag sequence; u is the error term.

Next, Equation (3) is then modified by including other controlled variables including direct expenditure (DE) and indirect expenditure (IE), as shown below:

$$\Delta P_{j,t} = \alpha_{0i} + \sum_{i=1}^{n} \alpha_{1i}\Delta P_{i,t-1} + \sum_{i=1}^{n} \alpha_{2i}\Delta E_{i,t-1} + \sum_{i=1}^{n} \alpha_{3i}\Delta H_{i,t-1} + \sum_{i=1}^{n} \alpha_{4i}\Delta DE_{i,t-1} + \sum_{i=1}^{n} \alpha_{5i}\Delta IE_{i,t-1} + \beta_{11}P_{j,t-1} + \beta_{21}E_{j,t-1} + \beta_{31}H_{j,t-1} + \beta_{41}DE_{j,t-1} + \beta_{51}IE_{j,t-1} + u_{j,t} \quad \text{..... .....(4)}$$

FINDINGS AND DISCUSSION

Table 1 reports the results of the panel unit root unit tests and shows that some investigated variables are stationary in the level and some other are stationary at the first difference. Stationarity testing used in this study include the ADF-Fisher approach with individual intercept and trend as this study uses the ARDL model.

Table 1. Findings of Panel Unit Root Test

Variable	Individual Intercept			
	LLC	**IPS**	**ADF-Fisher**	**PP-Fisher**
Poverty	-10.399 (0.000)	-3.539 (0.000)	92.053 (0.000)	289.938 (0.000)
Education	-2.860 (0.002)	-0.425 (0.335)	69.322 (0.000)	-36.684 (0.014)
Health	-63.338 (0.000)	-32.983 (0.000)	292.375 (0.000)	-160.331 (0.000)
ΔPoverty	-10.152 (0.000)	-2.191 (0.014)	73.376 (0.006)	73.062 (0.006)
ΔEducation	-38.839 (0.000)	-15.321 (0.000)	224.804 (0.000)	105.965 (0.000)
ΔHealth	-228.846 (0.000)	-77.120 (0.000)	317.246 (0.000)	269.104 (0.000)
	Individual Intercept and Trend			
Poverty	-10.097 (0.000)	0.760 (0.776)	48.307 (0.379)	52.838 (0.226)
Education	-43.053 (0.000)	-11.332 (0.000)	207.670 (0.000)	58.456 (0.102)
Health	-309.634 (0.000)	-65.537 (0.000)	296.811 (0.000)	174.061 (0.000)
ΔPoverty	-15.611 (0.000)	-2.179 (0.014)	100.355 (0.000)	158.549 (0.000)
ΔEducation	-31.698 (0.000)	-3.819 (0.000)	133.047(0.000)	129.382 (0.000)
ΔHealth	-132.497 (0.000)	-19.309 (0.000)	248.146 (0.000)	253.511 (0.000)

Note: LLC = Levin, Lin, and Chu , IPS = Im, Pesaran, and Shin, ADF-Fisher = Augmented Dickey Fuller-Fisher Chi-Square , and PP-Fisher = Phillips-Peron-Fisher. The figures in bracket (.) = probability value.

After testing the panel unit root tests to ensure the stationarity of variables in the first stage for the model using time series data and cross sections data, in the second stage, the cointegration test is performed. This test is aimed to identify whether there is a long-term equilibrium between the independent variables and the dependent variable. To test cointegration, Panel Cointegration based on Predoni and KAO approaches and their findings are reported in Table 2. As illustrated in the table, the study found a cointegration between poverty, education, and health at the 5% significant level. It could be concluded that there was a long-term relationship between the three variables.

Table 2. Findings of Panel Cointegration Tests Based on Predoni and KAO Approach

Cointegration Test	Statistics (p-value)	Weighted Statistic
Predoni Panel v-Statistic	1.122 (0.130)	3.103 (0.001)
Predoni Panel rho-Statistic	3.551 (0.999)	3.592 (0.999)
Predoni Panel PP-Statistic	0.034 (0.513)	-0.783 (0.216)
Predoni Panel ADF-Statistic	-4.476 (0.000)	-3.583 (0.000)
Predoni Group rho-Statistic	5.588 (1.000)	
Predoni Group PP-Statistic	-1.956 (0.025)	
Predoni Group ADF-Statistic	-4.716 (0.000)	
KAO ADF-Statistic	-7.545 (0.000)	

Next, the empirical findings of the relationship between education and health sectors on poverty reduction are reported in Table 3. Referring to the table, the study found that the level of education has a negative and significant effect on poverty. This is in accordance with previous studies such as by Ataguba *et al*. (2013), Kaluge and Fithri (2017), Bashwara and Bintang (2018), Mariyanti and Mahfudz (2016), and Bakhtiari and Meisami (2010) who documented that the improvement in the education sector has reduced poverty. As the residents possessed high levels of education, it reduced their possibility of becoming poor (Hong and Pandey, 1979).

Meanwhile, the level of health is found to have a positive and significant effect on the poverty level. The results of this study are supported by Astri Meylina *et al*. (2013) and Widodo Adi *et al*. (2011) who documented that the level of health affected the level of poverty. This can be interpreted that if the quality of the health of the people of Aceh increases, the level of poverty in Aceh is believed to be declining. This is as argued by Strauss (1995) that there was a strong link between health and poverty. Individual health determines productivity, so the lower the level of health; the more likely an individual is to be trapped in poverty.

Based on the area of education which has a negative effect on poverty lies in the districts of Gayo Lues and Bener Meriah, which have a significant influence at least at the 5% level. Different findings are recorded for the districts of Aceh Besar, Aceh Barat Daya, Pidie Jaya, and Lhokseumawe where the positive and significant influence on the level of education on the poverty level was recorded. Furthermore, the health sector negatively affected poverty is the districts of North Aceh, Southwest Aceh, and Nagan Raya at the 5% significance level.

Table 3. Findings of Short- and Long-Terms Relationship between Education, Health, and Poverty

Variable	Coefficient	Standard Error	t-Statistics	Prob.*
Long-Run				
Education	-2.484	0.139	-17.748	0.000
Health	0.651	0.032	19.907	0.000
Short-Run				
ECT	-0.294	0.065	-4.508	0.000
Education	0.066	0.661	0.099	0.920
Health	-0.216	0.495	-0.437	0.662
Constant	-1.449	0.343	-4.221	0.000

The difference in short-term influence across the districts/cities is influenced by several factors, including economic conditions in each region, lack of skills, the income gap between skilled and unskilled workers, food prices in each region, the inequality between each age group of each disease. Increasing life expectancy is not only a matter of longevity but also a matter of healthy living and productivity. Healthy is not only the absence of disease but also the ability of people to develop their potential during life.

Finally, Table 4 reports the findings of the relationships between education, health, direct government expenditure, and indirect government expenditures on the poverty level in Aceh province, Indonesia.

Table 4. Findings of Short- and Long-Terms Relationship between Education, Health, Direct and Indirect Expenditures, and Poverty

Variable	Long Run	Short Run
	Coefficient (Prob)	Coefficient (Prob)
Education	-2.856 (0.000)	-0.461(0.548)
Health	-0.173 (0.005)	0.078(0.886)
Direct Expenditures	0.088 (0.000)	0.037 (0.007)
Indirect Expenditures	-0.053 (0.000)	0.004 (0.441)
ECT	-0.184	(0.010)

As illustrated in Table 4, in the long run, education, health, indirect expenditures have a negative and significant effect on poverty, while direct expenditures have a positive and significant effect on poverty. Conversely, in the short term education has a negative insignificant effect and health has a negative insignificant effect on poverty, and direct expenditure has a positive effect of the poverty level. In the long term, education, education expenditure, and health expenditure have a negative and significant effect on poverty, and health has a positive and significant effect on poverty, while short-term education has a positive and insignificant effect on poverty. Health, education spending, and health spending have a negative and insignificant effect on poverty.

These findings showed that, although education and health were insignificant determinants for poverty reduction, they contributed to the reduction of poverty in the long-run. This implied that any efforts to reduce poverty is should be focused on enhancing the education and health levels of the society.

CONCLUSIONS

Based on the above discussion, several conclusions can be made. First, the level of education and health sectors has no short-term effect on poverty, while in the long run, the level of education and health has a negative effect on poverty. These findings showed the importance of improving the education and health level of the citizens in order to reduce the poverty level in the long-run. Second, direct expenditure has a positive and significant effect on poverty both in the short- and long-term. This showed that an inefficient allocation of direct expenditure has contributed to an increasing in the level of poverty. Finally, indirect spending has no effect on poverty reduction in the short-run, but it has a significant effect on the long-run.

To further reduce the poverty rate, thus it is suggested to improve educational infrastructure through the addition of facilities and infrastructure, the addition of teaching staff, the provision of scholarships for outstanding students, establishing an appropriate education curriculum that is expected to improve the urban and rural education system that will be able to improve the quality of human resources. The government is also advised to design policies in accordance with the needs of each region, improves the quality of health by increasing health facilities equally, not only concentrated in one region, and assigns qualified health workers to regions that are still difficult to reach by rural and island communities so that it has an impact on development. Finally, the government needs to manage properly indirect spending, education, and health spending to reduce poverty in Aceh.

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