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# The Effect of Health Expenditure, Education Expenditure, and Poverty on the Human Development Index in Lampung Province

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#### **Article Info**

#### Article history:

Received June 10, 2024 Revised July 7, 2024 Accepted July 20, 2024

#### Keywords:

Education Dynamic Panel Health Human Development Index Poverty

#### ABSTRACT

The Human Development Index can be used as an indicator of successful development in a country or region. In 2023, Lampung Province's Human Development Index in 2023 amounted to 72.48 and was the lowest in Sumatra Island. This study aims to determine how much the speed of convergence of the Human Development Index between districts/cities in Lampung Province and also to determine how much influence the variables of Health Expenditure, Education Expenditure, and Poverty affect the Human Development Index in Lampung Province in the short and long term. The study used secondary data on Health Expenditure, Education Expenditure, Poverty, and Human Development Index in 13 districts/cities in Lampung Province from 2014 to 2022. The research method used is dynamic panel data regression using the Sys-GMM model. The results showed that the Human Development Index gap between districts/cities in Lampung Province decreased by 54.49% per year. The elasticity of the short-term effects of Health Expenditure, Education Expenditure, and Poverty on the Human Development Index is 9.27%, -1.52%, and -2.41%, respectively. In the long run, health expenditure, education expenditure, and poverty affect the Human Development Index by 20.38%, -3.35%, and -5.30%, respectively. Therefore, the government should continue programs in the health sector, evaluate spending in the education sector, and create poverty alleviation programs that have a significant impact.

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#### INTRODUCTION

Humans are one of the resources that play a very important role in the world. The progress of a nation is determined by the role and quality of its human resources. Humans have an active role as subjects of development and growth in taking part in the process of increasing per capita output that occurs continuously over a relatively long time.

UNDP (1990) states that the main goal of development is people so the Human Development Index becomes an alternative measurement of the success of a country's development. Feriyanto in Asnidar (2018) states that the Human Development Index is a measure of human development achievements based on several basic components of quality of life. Therefore, the better the Human

Development Index, it is expected that development will have a good impact on society in a country or region.

Based on data from the Central Bureau of Statistics (BPS), the lowest Human Development Index in Sumatra Island in 2023 was Lampung Province with an index value of 72.48. The average Human Development Index in Sumatra Island is 74.73 and the Human Development Index in Indonesia is 74.39 (BPS, 2024).

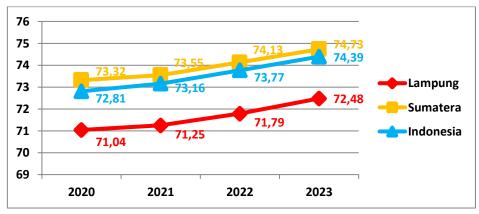


Chart 1. Comparison of the Human Development Index of Lampung Province, Sumatra, and Indonesia in 2020-2023

The government has an important role in carrying out development in a region including human resource capacity building. To improve the Human Development Index in Lampung Province, the Government can use fiscal policy. Fiscal policy is an economic policy to directs economic conditions to be better by changing government revenue and expenditure (Falianty, 2019).

One of the elements of fiscal policy that can be carried out by the Government to increase the Human Development Index is a policy in Government spending. The Government expenditure that is the object of this study is Government expenditure in the health sector, hereinafter referred to as Health Expenditure, and Government expenditure in the education sector, hereinafter referred to as Education Expenditure.

In addition, the effort to improve the Human Development Index in Lampung Province is by conducting poverty alleviation programs. The poor tend to have less or no access to health services, education, and income. So poverty has the potential to reduce the Human Development Index in Lampung Province.

Based on the problem of the Human Development Index, the Government's fiscal policy in the health and education sectors, and poverty in Lampung Province, this study was conducted to see how fast the convergence of the Human Development Index gap between districts/cities in Lampung Province and how much influence Health Expenditure, Education Expenditure, and Poverty affect the Human Development Index in Lampung Province in the short and long term.

#### LITERATURE REVIEW

#### **Human Development Index**

The Human Development Index is a geometric average measure of the achievement of human development dimensions which include a long and healthy life, education, and having a decent standard of living (Suhyanto et al., 2020). According to Rayana in Aisyaturridho et al., (2021), the human development index is a measurement and comparison of life expectancy, literacy, education, and living standards for all countries around the world.

BPS (2024) defines the Human Development Index (HDI) as a measure of the achievement of the main dimensions of human development, namely: longevity and healthy living, knowledge, and a decent standard of living. Longevity and healthy living are described by life expectancy at birth (e0), which is the number of years a newborn baby is expected to live assuming that the pattern of mortality rates by age at birth is the same throughout the baby's life. Knowledge is measured through

indicators of average years of schooling and expected years of schooling. Average years of schooling is the average length (years) of the population aged 25 years and over in undergoing formal education. Expected years of schooling are defined as the length (years) of schooling that a 7-year-old child is expected to undergo in the future. A decent standard of living is described by adjusted real per capita expenditure, calculated based on the value of per capita expenditure, price index, and purchasing power parity (BPS, 2024).

Based on this, it can be said that the Government's fiscal policy with the allocation of Health Expenditure and Education Expenditure, as well as Poverty alleviation, is expected to affect the Human Development Index.

#### **Health Expenditure**

Law of the Republic of Indonesia Number 39 of 2009 concerning Health mandates that the size of the Central Government health budget be allocated at least 5% of the state revenue and expenditure budget excluding salaries. The law also mandates that the health budget of Provincial and District/City Governments be allocated 10% of the regional revenue and expenditure budget excluding salaries. The amount of the budget to support health services is expected to be able to provide adequate health facilities in the regions. The budget can also be used for socialization and health counseling activities for the community so that it has an impact on improving public health and increasing the life expectancy of babies at birth. This is expected to increase the Human Development Index in Lampung Province.

# **Education Expenditure**

Government Regulation of the Republic of Indonesia No. 18 of 2022 mandates an annual education budget allocation of at least 20% of the total government budget. This very large budget is expected to increase the capacity of the people in Lampung Province. The provision of school facilities in the form of school buildings and the infrastructure in them, increasing the capacity of teachers, and also free education programs will make it easier for people to get education so that it is expected to increase the percentage of literate people, reduce illiteracy rates, and increase the average length of schooling of the community in Lampung Province. This will have an impact on increasing the Human Development Index in Lampung Province.

#### **Poverty**

Poverty is one of the causes of the low Human Development Index in a region. The poor are people who have no source of livelihood and/or have a source of livelihood but cannot meet the basic needs that are appropriate for the lives of themselves and/or their families (UU RI, 2011). Poverty is is a condition in which people have inadequate incomes (Butar Butar et al., 2023).

BPS (2021) defines poverty as a situation in which a person cannot/is unable to fulfill the minimum basic needs required for a decent and dignified life. The government (BPS and several parties in several seminars and meetings) agreed to measure poverty from an economic point of view with a monetary approach. BPS also states that a person with an income/expenditure less than the poverty line is categorized as poor.

Therefore, the government is expected to be able to create programs that can reduce the number of poor people, especially in Lampung Province, to increase the Human Development Index in Lampung Province.

#### **METHOD**

This study uses secondary data obtained from the Central Bureau of Statistics and the Ministry of Finance. Data on the Human Development Index and the Percentage of the Poor were obtained from the Lampung Province Central Bureau of Statistics and data on Health Expenditure and Education Expenditure were sourced from the Directorate General of Fiscal Balance and the Directorate General of Treasury, Ministry of Finance.

The data used in the study are data on the realization of Health Expenditure, realization of Education Expenditure, Percentage of Poor Population, and Human Development Index in 13 districts/cities in Lampung Province from 2014 to 2022. Data on districts/cities based on the time series are arranged to form panel data. Panel data is a combination of time series data and cross-sectional data (Basuki, 2014). Many economic relationships are dynamic and one of the advantages of panel data is that it allows researchers to better understand the dynamics of adjustment (Baltagi, 2005).

The methodology used in this research is quantitative method. The analysis method in this research is dynamic panel data regression. Two dynamic panel estimates are often used today, namely the First Difference Generalized Method of Moment (FD-GMM) and the Generalized Method of Moment System (Sys-GMM). Arellano & Bond (1991) developed FD-GMM to produce unbiased, consistent, and efficient parameters. However, Blundell & Bond (1998) proposed an estimator that is considered more efficient than FD-GMM, namely Sys-GMM.

The formula for the dynamic panel regression equation is:

 $\mathbf{Y}_{\mathbf{i},\mathbf{t}} = \mathbf{\delta} \, \mathbf{Y}_{\mathbf{i},\mathbf{t}-1} + \mathbf{X}'_{\mathbf{i},\mathbf{t}} \, \mathbf{\beta} + \mu_{\mathbf{i},\mathbf{t}} \qquad \qquad \dots \dots 1)$ 

With:

Y<sub>i,t</sub>: i-th observation unit in period t

 $\delta$  : coefficient of the explanatory endogenous variable  $X'_{i,t}$  : observation vector on independent variable (1xk)

 $\beta$  : vector of predictor variable coefficients

 $\mu_{i,t}$ : panel regression error for the i-th observation unit at period t

This study uses both dynamic panel methods, namely FD-GMM and Sys-GMM to see which model choice is best applied to see the effect of Health Expenditure, Education Expenditure, and Poverty on the Human Development Index in Lampung Province. The criteria for determining the best GMM model are valid, consistent, and unbiased instruments obtained by conducting a model specification test.

# **Model Specification Test**

Model specification tests on dynamic panel regression data are the Sargan Test, Arellano-Bond Test, and meeting the unbiasedness criterion.

#### Sargan Test

The Sargan test is conducted to determine the validity of using instrument variables that exceed the number of parameters identified (overidentifying restrictions) (Wawro in Suprayogi (2023). The hypotheses in the Sargan Test are:

 $H_0$ : The condition of overidentifying restrictions in model estimation is valid;

 $H_1$ : The overidentifying restrictions condition in the model estimation is invalid.

If the Sargan test probability value is smaller than the tolerance value ( $\alpha$ ) 0.05 then  $H_0$  is rejected and  $H_1$  is accepted, and vice versa.

#### **Arellano Bond Test**

The Arellano Bond test is conducted to test the consistency of the data in the model and there is no autocorrelation in the 2nd order first difference. The Arellano Bond Test hypotheses are:

 $H_0$ : There is no autocorrelation in the 2nd order first difference;

 $H_1$ : There is autocorrelation in the 2nd order first difference remainder.

If the probability value of the Arellano Bond test is smaller than the tolerance value ( $\alpha$ ) of 0.05 then  $H_0$  is rejected and  $H_1$  is accepted, and vice versa.

#### **Unbiasedness Test**

The test results are declared to meet the unbiased criteria if the lag value of the dependent variable in GMM is between the Fixed Effect Model (FEM) and Pooled Least Square (PLS) or FEM < GMM < PLS. This is because the FEM model tends to be biased downward and PLS tends to be biased upward.

Data processing was carried out using the RStudio application analysis tool. The exogenous variables used are Health Expenditure, Education Expenditure, and Percentage of Poor Population, while the endogenous variable used is the Human Development Index in Lampung Province from 2014 to 2022.

The dynamic panel regression equation is:

$$Log(IPM)_{i,t} = \delta Log(IPM)_{i,(t-1)} + \beta_1 Log(KES)_{i,t} + \beta_2 Log(DIK)_{i,t} + \beta_3 Log(KM)_{i,t} + \mu_{i,t}$$
 ....2)

With:

Log(IPM)<sub>i,t</sub>: Inverse Human Development Index of the i-th observation unit in period t

 $\delta$  : coefficient of the expanatory endogenous variable

 $Log(KES)_{i,t}$  : vector of observations on Health Expenditure variable (lxk)  $Log(DIK)_{i,t}$  : vector of observations on Education Expenditure variable (lxk)

 $Log(KM)_{i,t}$ : vector of observations on the variable Percentage of Poor Population (lxk)

 $\beta$  : coefficient vector of the predictor variable

 $\mu_{i,t}$ : panel regression error for the i-th observation unit at the t-th time period

# RESULT FD-GMM Model Test

Dynamic panel data regression has been conducted on the FD-GMM model with the results as in Table 1 below:

**Table 1. FD-GMM Regression Results** 

Variable	Coef. Estimate	Std. Error	z-value	Pr(> z )
lag(log(IPM))	-0.017502	0.070618	-0.2478	0.8042531
log(KES)	0.112157	0.012176	9.2116	0.0000000
log(DIK)	-0.040497	0.012086	-3.3507	0.0008061
log(KM)	-0.024551	0.014369	-1.7086	0.0875216

	p-value		
Sargan test	0.5321		
Autocorrelation test (1)	0.041761		
Autocorrelation test (2)	0.39426		
Wald test for coefficients	0,000000		

Source: Data processed

Based on Table 1, the Sargan test probability value is 0.5321 which is greater than 0.05, which means the data is valid. The Autocorrelation test (2) value of 0.39426 is greater than 0.05, meaning that there is no autocorrelation in the data.

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#### **Sys-GMM Model Test**

Dynamic panel data regression has been carried out on the FD-GMM model with the results as in Table 2 below:

**Table 2. Sys-GMM Regression Results** 

Variable	Coef. Estimate	Std. Error	z-value	Pr(> z )
lag(log(IPM))	0.5448795	0.0757143	7.1965	0,00000
log(KES)	0.0927472	0.0072036	12.8751	0,00000
log(DIK)	-0.0152475	0.0090168	-1.6910	0.09084
log(KM)	-0.0241209	0.0162869	-1.4810	0.13861

	p-value	
Sargan test	0.9976	
Autocorrelation test (1)	0.061875	
Autocorrelation test (2)	0.25257	
Wald test for coefficients	0,00000	

Source: Data processed

Based on Table 2, the Sargan test value is 0.9976 which is greater than 0.05, which means the data is valid. The Autocorrelation test (2) value of 0.25257 is greater than 0.05, meaning that there is no autocorrelation in the data.

# **Fixed Effect Model Regression**

Dynamic panel data regression using the Fixed Effect Model has been carried out with the results in Table 3 below:

**Table 3. Fixed Effect Model Regression Results** 

Variable	Coef. Estimate	Std. Error	t-value	Pr(> z )
lag(log(IPM))	0.5369296	0.0431951	12.4303	0,0000000
log(KES)	0.0065720	0.0027830	2.3615	0.0204330
log(DIK)	-0.0054870	0.0014723	-3.7269	0.0003441
log(KM)	-0.0330594	0.0084441	-3.9151	0.0001791

Source: Data processed

# **Pooled Least Square Model Regression**

Dynamic panel data regression using Pooled Least Square has been conducted with the results as shown in Table 4 below:

**Table 4. Pooled Least Square Model Regression Results** 

			0	
Variable	Coef. Estimate	Std. Error	z-value	Pr(> z )
lag(log(IPM))	0.92554460	0.02109353	43.8781	0,0000
log(KES)	-0.00149368	0.00271304	-0.5506	0.5832
log(DIK)	-0.00024312	0.00163742	-0.1485	0.8823
log(KM)	0.00016999	0.00328110	0.0518	0.9588

Source: Data processed

# **Model Specification Test**

The results of the model specification test can be seen in Table 5 and Table 6 as follows:

Table 5. Results of the Sargan Test and Arellano Bond Test

Model GMM	P-Value Sargan Test	Result	P-Value Arellano	Result
			Bond Test	
FD-GMM	0,5321	Not Reject H <sub>0</sub>	0,30426	Not Reject H <sub>0</sub>
		(Valid)		(Consistent)
Sys-GMM	0,9976	Not Reject $H_0$	0,25257	Not Reject $H_0$
		(Valid)		(Consistent)

Source: Data processed

Based on the Sargan Test and Arellano Bond Test, it is found that both FD-GMM and Sys-GMM models fulfill the criteria of valid and consistent data. Next, we will continue with the unbiased test.

**Table 6. Unbiased Test Results** 

Model	Coef. Estimate Lag(Log(IPM))	Coef. Estimate Lag(Log(IPM)) FEM	Coef. Estimate Lag(Log(IPM)) PLS	Result
FD-GMM	-0.017502	0.5369296	0.92554460	FD-GMM < FEM < PLS
				(Bias)
Sys-GMM	0.5448795	0.5369296	0.92554460	FEM < Sys-GMM < PLS
				(Unbiased)

Source: Data processed

Based on the model specification test, the most appropriate dynamic panel model used to estimate the Human Development Index in Lampung Province is the Sys-GMM model because it fulfills all the requirements of the model specification test so that it is concluded that the data is valid, consistent, and unbiased.

# **Interpretation of Results**

Based on the results of the Sys-GMM dynamic panel regression according to Table 2, the following equation is obtained:

$$\label{eq:log(IPM)} \begin{split} \text{Log(IPM)}_{i,t} = 0.5448795 \ \text{Log(IPM)}_{i,(t-1)} + 0.0927472 \ \text{Log(KES)}_{i,t} - 0.0152475 \ \text{Log(DIK)}_{i,t} - \\ 0.0241209 \ \text{Log(KM)}_{i,t} + \mu_{i,t} \end{split}$$

Dynamic panel data regression can be used to determine the short-term and long-term effects of variables that affect the endogenous variables. Based on the above equation, the convergence value between endogenous variables, short-term effects, and long-term effects of variables affecting the Human Development Index in Lampung Province can be formulated as listed in Table 7 as follows:

**Table 7. Short-term and Long-term Elasticities** 

Predictor	Convergence	Short-term Effect	Long-term Effect
$Log(IPM)_{i,(t-1)}$	0.5448795	-	-
$Log(KES)_{i,t}$		0.0927472	0.203786
$Log(KES)_{i,t}$		-0.0152475	-0.03350203
$Log(KM)_{i,t}$		-0.0241209	-0.05299891

Source: Data processed

# 1. Convergence Speed of Human Development Index Gap between Regency/City in Lampung Province

Based on the data in Table 7, the convergence value is 0.5448795. This means that the Human Development Index gap between districts/cities in Lampung Province is decreasing by 54.49% per year. Therefore, it is expected that the long-term impact is that there is no gap in the Human Development Index between districts/cities in Lampung Province.

# 2. Effect of Health Expenditure on the Human Development Index

Health expenditure has a positive and significant effect on the Human Development Index in Lampung Province. The short-term effect of health expenditure on the Human Development Index is 0.0927472 or 9.27% per year. This means that if there is an increase in health expenditure by 1%, there will be an increase in the Human Development Index by 9.27% in the short term with the assumption that the value of other variables does not change. The long-term effect of Health Expenditure on the Human Development Index is 0.203786 or 20.38% per year. This means that if there is an increase in Health Expenditure by 1%, there will be an increase in the Human

Development Index in the long term by 20.38%, assuming the value of other variables does not change.

This research is in line with research Setiawan & Fikriah (2020), and other researchers. Therefore, the government can continue the health programs that have been running so far and can maximize the realization of expenditure in the health sector to increase the Human Development Index in Lampung Province.

#### 3. Effect of Education Expenditure on the Human the Development Index

Education Expenditure has a negative and insignificant effect on the Human Development Index in Lampung Province. The short-term effect of Health Expenditure on the Human Development Index is -0.0152475 or -1.52% per year. This means that if education expenditure is decreased by 1%, it will increase the Human Development Index by 1.52% in the short term with the assumption that the value of other variables does not change. The long-term effect of Education Expenditure on the Human Development Index is -0.03350203 or -3.35% per year. This means that if education expenditure is decreased by 1%, the Human Development Index will increase in the long run by 3.35%, assuming the value of other variables does not change.

This contradicts the expectations of the Government's programme which should increase the Human Development Index but the results of this study show otherwise. Therefore, the Government should evaluate the implementation of the current education program to obtain more optimal results to increase the Human Development Index in Lampung Province.

#### 4. The Effect of Poverty on the Human Development Index

Poverty has a negative and insignificant effect on the Human Development Index in Lampung Province. The short-term effect of Poverty on the Human Development Index is -0.0241209 or -2.41% per year. This means that if there is a decrease in poverty by 1%, there will be an increase in the Human Development Index by 2.41% in the short term, assuming that the value of other variables does not change. The long-term effect of Poverty on the Human Development Index is -0.05299891 or -5.30% per year. This means that if there is a 1% decrease in poverty, there will be an increase in the Human Development Index in the long term by 5.30%, assuming the value of other variables does not change.

The negative effect of Poverty on the Human Development Index is in line with research conducted by Hidayati & Imaningsih (2022), Saputro (2022), Tarumingkeng et al. (2019), and other studies. Therefore, the government should create a program that can significantly reduce the poverty rate in Lampung Province.

# CONCLUSION

The conclusion that can be drawn from the results of this study is that the dynamic panel data model that is more appropriate to use to see the effect of Health Expenditure, Education Expenditure, and Poverty on the Human Development Index in Lampung Province is the Sys-GMM model. The results showed that the Human Development Index gap between districts/cities in Lampung Province decreased by 54.49% per year. The elasticity of the short-term effects of Health Expenditure, Education Expenditure, and Poverty on the Human Development Index is 9.27%, -1.52%, and -2.41%, respectively. In the long run, health expenditure, education expenditure, and poverty affect the Human Development Index by 20.38%, -3.35%, and -5.30%, respectively.

Therefore, the government should continue programs in the health sector, evaluate expenditure in the education sector, and create poverty alleviation programs that have a significant impact.

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