

Research article

# Labor and Government Policies on Poverty Reduction in Sumatera Island, Indonesia

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**Abstract:** This study aims to analyze the effect of agricultural workers, education level, female workers and the role of government policies on poverty rate in Sumatera. Observations were made in 151 districts/cities in Sumatera during the period 2013-2015 and 2017-2018. The approach used is a panel data regression model. The method applied is random effect. The findings show the labor in the agricultural sector has a significant and positive effect on the poverty rate in Sumatera, while the level of education and government spending has a significant and negative effect on the poverty rate. The policy implication is that it is necessary to increase labor productivity in the agricultural sector and other industries that are more efficient. The government also needs to strengthen the agricultural sub-sector in order to have better value-added products. Optimizing and improving basic services such as education, health, economic and social.

**Keywords:** poverty, agriculture, education, female, government expenditures.

**JEL Classification:** I32, H75, F66

**Abstark:** Penelitian ini bertujuan untuk menganalisis pengaruh pekerja pertanian, tingkat pendidikan, pekerja perempuan dan peran kebijakan pemerintah terhadap tingkat kemiskinan di wilayah Sumatera. Pengamatan dilakukan sebanyak 151 kabupaten/kota di Sumatera selama periode 2013-2015 dan 2017-2018. Pendekatan yang digunakan adalah model panel data regresi. Metode yang diterapkan adalah random effect. Temuan penelitian menunjukkan bahwa tenaga kerja di sektor pertanian memiliki pengaruh signifikan dan positif terhadap tingkat kemiskinan di Sumatera, sedangkan tingkat pendidikan dan pengeluaran pemerintah memiliki pengaruh signifikan dan negatif terhadap tingkat kemiskinan. Implikasi kebijakan perlu meningkatkan produktivitas tenaga kerja di sektor pertanian dan industri lain yang lebih efisien. Pemerintah juga perlu memperkuat subsektor pertanian agar memiliki nilai tambah produk yang lebih baik. Optimalisasi dan meningkatkan layanan dasar seperti pendidikan, kesehatan, ekonomi dan sosial.

**Kata Kunci:** kemiskinan, pertanian, pendidikan, wanita, pengeluaran pemerintah.

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## 1. INTRODUCTION

Indonesia last experienced a double-digit increase in the poverty rate in 2017, due to the implementation of outstanding strategies by the government, which led to a 9.22% decrease in 2019. Unfortunately, these reduction efforts have been hindered due to the emergence of the COVID-19 pandemic, with the World Bank predicting an increase in the number of poor people in Indonesia by 5.5-8 million, assuming the government fails to provide social assistance (World Bank, 2020). Rambe and Purmini (2020) analyzed poverty in Indonesia using the Sumatera province, which

has unique characteristics and also known as the second largest area in terms of total government spending after Java. Sumatra has the highest economic progress, under normal conditions, the poverty rate is meant to be lower than others.

Unfortunately, the reverse is the case as this Island tends to experience a continuous increase in poverty rate. From 2014 to 2019, the poverty rate in the four provinces in Sumatera was always higher than the overall national rate. According to analysis, Aceh and Bengkulu, located in Sumatra, are among the 10 poorest provinces out of the 34 in Indonesia, thereby making the Island an important area of study. Empirical research shows that high economic growth can reduce poverty rates (Perera & Lee, 2013; Rambe & Purmini, 2020; Sasmal & Sasmal, 2016). One of the drivers of regional economic activity is the availability of natural resources, which provides opportunities to process industries capable of generating added value and creating income for people. In Sumatra, several districts such as Musi Banyuasin, Bengkalis, Tanjung Jabung Barat, and Natuna, have oil and natural gas. Although these places are included in rich areas, it turns out that they have varying levels of poverty. For instance, Musi Banyuasin (16.52%) and Tanjung Jabung Barat (11.1%) are in the high category, while Bengkalis (6.22%) and Natuna (4.68%) are low.

Meanwhile, Seluma regency (Bengkulu Province) has different characteristics with the main contribution of Gross Regional Domestic Product obtained from the agricultural sector. In addition, there is no abundant mineral resource from mining and a relatively low open unemployment rate, thereby leading to a high poverty rate (19.6%). This contrasts with Aceh Singkil Regency (Aceh Province), which does not have abundant natural resources with high poverty (21.25%) and the unemployment rate. Many studies have addressed the relationship between economic growth and unemployment, thereby leading to the production of numerous poverty alleviation models. On average, the unemployment rate in Sumatra is considered low, with the majority of the population unemployed, therefore, it is important to use this information to determine the beginning of the poverty problem on this Island. Furthermore, most people living on this Island are unable to acquire a decent income, thereby increasing the number of poor people. There are various types of employment capable of providing high income for the community, thereby decreasing the poverty rate in the region. Therefore, based on this phenomenon, it is essential to analyze the employment factors that reduce Sumatra's poverty rate, such as those in the business sector.

According to Gounder (2013), Prasada et al. (2020), Yunisvita (2020) and Iqbal et al. (2020), the poverty rate in rural areas of developing countries, associated with agriculture, is higher than those in the urban areas. This means that there is a high tendency of disguised unemployment in the agricultural sector and does not produce output similar to those employed. Therefore, this is probably one reason for the high poverty rate in the agricultural sector, mostly in rural areas. Out of the six districts in Sumatra previously described, the proportion of workers in the agricultural sector in Bengkalis and Natuna Districts is much lower than in others. In contrast, the largest proportion of workers in the Aceh Singkil and Seluma districts came from the agricultural sector. This information indicates a positive relationship between the proportion of workers in the agricultural sector and poverty rates, therefore, this domination can increase poverty in Sumatra.

Another employment factor is the level of education of workers. According to Akerele et al. (2012), Fernández-Ramos et al. (2016), and Satrio (2018), higher education levels provide better employment for workers, thereby reducing poverty rates. Studies have shown that most workers in Bengkalis and Natuna Districts are undergraduates with fairly high education levels. On the other hand, the proportion of high school workers and undergraduates in Musi Banyuasin, Tanjung Jabung Barat, and Seluma districts is very low. This condition shows that a high level of community education can reduce poverty in Sumatra. Another labor factor relating to the poverty rate is working women, which plays an important role in increasing income. According to several studies, women from poor households work in the informal sector to increase their family income. Stier & Lewin (2002) stated that working women can reduce the family's chances of becoming poor. Therefore, based on this study's results, it is interesting to analyze whether working women can play a role in reducing poverty in Sumatra.

Apart from employment factors, the government also contributes to determining poverty through spending (Affandi & Astuti, 2014; Mehmood & Sadiq, 2010; Sasmal & Sasmal, 2016;

Syamsuri & Bandiyono, 2018; Tsai & Huang, 2007). Affandi & Astuti (2014) stated that government spending does not significantly affect poverty. Their role in reducing poverty can also be seen in implementing the expansion of districts/cities. Regional expansion in Indonesia has grown rapidly since the enactment of Law No. 32 of 2004. Therefore, with the formation of new regional governments as expanded regions, the local governments are expected to improve the community's welfare, which can be interpreted as poverty reduction. Therefore, from these explanations, this study aims to analyze the effect of the agriculture worker, education level, female worker, government spending, and regional expansion status on reducing the poverty rate in Sumatra.

According to Kuncoro (2010), two concepts are recognized in poverty discourse, namely absolute and relative. Absolute poverty describes the population living below the poverty line, which is used to determine the minimum level of income a person needs in order to meet their various requirements for food, clothing, and shelter (Arsyad, 2010). Meanwhile, relative poverty occurs due to the community's inability to achieve the living standards of the people in the area (Kuncoro, 2010). Arsyad (2010) stated that the poor are always in a state of helplessness (inability) due to their inability to meet their basic needs, such as productive business activities (work and earn income) and access to socio-economic resources in the society. Arsyad (2010) further stated that this category of people often gets discriminatory treatment from their environment and are unable to free themselves from mental and inferiority complex.

Several literature studies have indicated reasons associated with the inability of the poor to get out of poverty. For instance, Kuncoro (2010) stated that poverty is due to market imperfection, backwardness, and underdevelopment, thereby leading to low income, inadequate savings, and investments. This makes it difficult for people to build infrastructure in various fields with the inability to catch up with other areas. This is a continuous condition that causes the poor to remain in this condition continuously. Agriculture is the dominant sector for economic growth in most developing countries and synonymous with rural areas. In this sector, many workers are not being paid by the government because they work on their family land. According to Sadaquat & Sheikh (2011), agriculture is the dominant sector where the majority of women work in South Asian countries. For instance, in Pakistan, 65% of workers are in the agriculture sector, with 73% of women that work as unpaid family workers. Meanwhile, Satrio (2018) examined the determinants of poverty in Indonesia by stating that agricultural workers have low incomes. Similarly, Gounder (2013) examined the determinants of poverty in Fiji by stating that people in rural areas are poorer than those living in urban areas because the majority work in the agricultural sector. Furthermore, research carried out by Iqbal et al. (2020) in Pakistan indicated that households in rural areas are poorer than those in urban areas. Pham & Riedel (2019) also stated that the workforce's proportion is a factor used to determine Vietnam's poverty rate. They further concluded that poverty can be decreased when poor people in the agricultural sector migrated and worked in cities. Mustapha et al. (2015) reported identical finding in Nigeria, agriculture growth sector correlate positively with poverty.

H<sub>1</sub>: Agriculture worker has a positive effect on poverty rates.

Another variable that is widely studied is education level. Empirical research shows that education can reduce poverty rates due to increasing a person's chances of getting a job. The proxies for obtaining formal education using respondent's cross-section data tend to be the same, irrespective of the use of various analysis methods, such as probit logit regressions in Pakistan (Iqbal et al., 2020), in Indonesia (Satrio, 2018), Mexico (Fernández-Ramos et al., 2016), Turkey (Bilenkisi et al., 2015), Portuguese (Crespo et al., 2013), and Nigeria (Akerle et al., 2012). In the other hand, Shimeles & Verdier-Chouchane (2016) employed probit regression method in their study in South Sudan. Glauben et al. (2012) used the Hazard-rate multivariates model to examine how education reduces the chances of poverty in China. Furthermore, Alia et al. (2016) used the Kernel function by maximizing the log-likelihood function to determine how education reduces the chances of being poor in Benin. Meanwhile, Gounder (2013) utilized the OLS regression model to determine the effect of education on poverty reduction. Hidalgo-Hidalgo & Iturbe-Ormaetxe (2018) applied a multiple regression method to examine the effect of government expenditure toward poverty of 16

European countries. Empirical researches with various regression models produce the same result, therefore, education has a negative effect on poverty.

H<sub>2</sub>: Education level has a negative effect on the poverty rate.

The next variable that has been widely studied regarding poverty is women's role in society, which is associated with the social, economic, political, religious, and cultural conditions of the local community. In some society, men are known as breadwinners, while women are meant to be at home taking care of the family and household. Meanwhile, in others, women have the freedom to work outside the home, with some occupying higher positions. The research carried out in Pakistan shows that not many women work as professionals, technicians, administrative personnel, and managerial positions (Sadaquat & Sheikh, 2011). One of the reasons women are allowed to work outside the home is to earn and provide additional support to the family. Therefore, more women are needed to make a living in poor households in order to meet family needs and get out of poverty. However, some women cannot work in the formal sector with high income, despite working outside the home. For instance, in Pakistan, they mostly work in the informal sector, which has low productivity with low pay, while in India, women workers' participation has decreased.

On the other hand, the number of women working in unpaid places, such as agriculture, has increased, leading to a rise in poverty. Therefore, women's decision to work to earn a living help their family out of poverty becomes impossible in such places (Singh & Pattanaik, 2019). According to Fernández-Ramos et al. (2016), in Mexico, families with a woman as the breadwinner have a big chance of being poor. However, another study in Bangladesh indicates that poverty can be reduced in families due to women's participation in work (Pujiyanti, 2015). In a similar fashion, Filandri & Struffolino (2019) concluded that in Europe, the participation of women worker correlate negatively with husband salary. Thus, most working women were coming from poor family.

H<sub>3</sub>: Female worker has a negative effect on the poverty rate.

Rambe & Purmini (2020), Mehmood & Sadiq (2010), Tsai & Huang (2007) stated that government spending plays a role in reducing poverty rates. Furthermore, several studies also reveal the role of government spending based on certain functions, such as infrastructure (Sasmal & Sasmal, 2016), social (Gomo, 2019; Yusuf, 2018; Celikay & Gumus, 2017; Fording & Berry, 2007;), and education and health (Affandi & Astuti, 2014). Based on this empirical research, government spending in this study refers to the activities in poverty initiated by the local government to alleviate economic, education, health, and social protection functions.

H<sub>4</sub>: Government spending has a negative effect on poverty rates.

The last variable is the regional expansion, with the causes in Indonesia explained in previous studies (Booth, 2011; Fitriani et al., 2005). Fitriani et al. (2005) stated that regency is associated with a rich and geographically isolated region, leadership ambitions, and claims for income from abundant natural resources and the division of territory in Indonesia. Meanwhile, Booth (2011) reported that the rapid expansion of regions is a reaction to people's inequality and injustice, especially those outside Java. This is because they stated that the implementation of autonomy and regional expansion provides opportunities to improve their region's welfare. Therefore, from this explanation, this study aims to analyze the ability of the welfare of the community to increase after a certain period of regional expansion, with increase in community welfare. This means that the expanded area can experience a decrease in the poverty rate.

H<sub>5</sub>: regional expansion status has a negative effect on poverty rates.

## **2. RESEARCH METHODS**

### **2.1. Data**

Data was obtained from the Central Bureau of Statistics (BPS) and the Ministry of Finance of the Republic of Indonesia from 2013 to 2018 was used in this research. However, due to limited employment BPS data in 2016, the year was eliminated in this research. Consequently, the data is

in the form of a data panel with a cross-section of 151 districts/cities in Sumatra and a 5-year time series, namely 2013-2015 and 2017-2018.

## 2.2. The Model Specification

The analytical method utilized to investigate the effect of labor and government policies on poverty reduction is the panel data regression model presented as follows:

$$PR_{it} = \alpha_0 + \beta_1 AW_{it} + \beta_2 EL_{it} + \beta_3 FW_{it} + \beta_4 \ln GS_{it} + \beta_5 DRES_{it} + \delta \quad (1)$$

Where:  $PR$  is poverty rate (%);  $AW$  is agriculture worker (proportion of labor in the agricultural sector),  $EL$  is education level of worker (proportion of labor with high school education and above),  $FW$  is female worker (proportion of female worker).  $GS$  is government spending on 4 functions (economy, education, health and social protection),  $DRES$  is dummy variable of regional expansion status,  $\delta$  is error term,  $\beta_i$  is independent variable coefficient,  $t$  is period (2013-2015 and 2017-2018),  $i$  is districts/cities in Sumatera.

The panel data regression model consists of 3 models, namely the common, fixed, and random effect models (Wooldridge, 2013). Therefore, it is necessary to carry out several tests using the Chow and Hausman tests to determine the best panel data regression model (Baltagi, 2005). Furthermore, hypothesis testing is carried out afterward (CEM, FEM, or REM) with the F-test and t-test on  $\alpha = 5\%$ .

## 3. RESULTS AND DISCUSSION

The first variable described is the regency/city poverty rate, as shown in Table 1. The analysis showed a slow decline on the average, with difficulty determining the short term, every year. For this reason, this study only analyzed poverty rates of regency/city in 2013 and 2018 to determine the highest and lowest rates, both in each province and in Sumatra.

In 2013, the poorest district was Meranti Island in Riau Province, with a poverty rate of 35%, whereas the poverty rate of Riau province was 8.42%. This shows that there is a gap between districts and cities in this province. Riau province has natural resources of oil and gas and this can provide a decent life for most of the people in its area, but the poverty rate in this district is still very high. This district is an archipelago which lacks infrastructure and transportation facilities, such as roads and bridges that are not yet adequate to connect these islands to other districts/cities. Shipping is the only transportation access between sub-districts in this district. Meranti Island was also the poorest district in Sumatra in 2018. This shows that it will take a long time to reduce poverty rates.

On the other hand, the district with the lowest poverty rate is Bangka Barat (Bangka Belitung province). Furthermore, the poverty rate between districts and cities in the province is almost evenly distributed, with the poverty rate in the province of Bangka Belitung being the lowest in Sumatra. Bangka Belitung is an archipelagic province but they are able to reduce poverty. In addition to having natural resources in the form of tin, several areas in this province have become national tourist destinations that are able to move the people's economy so that they can lift most people out of poverty. In 2018 the lowest poverty rate was still in the province of Bangka Belitung.

**Table 1.** Description of Provincial Poverty rate in Sumatra, 2013 and 2018

Regency/City	2013		2018	
Aceh	Mean:	17.60		Mean: 15.68
	min	8.03	Banda Aceh	7.25
	max	23.70	Aceh Barat	21.25
North Sumatra	Mean:	10.39		Mean: 8.94
	min	4.71	Deli Serdang	4.13
	max	30.94	Gunung Sitoli	26.72
West Sumatra	Mean:	7.56		Mean: 6.55
	min	2.28	Sawah Lunto	2.39
	max	16.12	Mentawai Island	14.44
South Sumatra	Mean:	14.06		Mean: 12.82
	min	9.00	Pagar Alam	8.77
	max	18.61	Lahat	16.52
Riau	Mean:	8.42		Mean: 7.21
	min	3.27	Pekan Baru	2.85
	max	35.74	Meranti Island	27.79
Jambi	Mean:	8.41		Mean: 7.85
	min	3.30	Sungai Penuh	2.76
	max	13.42	Tanjung Jabung Timur	12.38
Bengkulu	Mean:	18.34		Mean: 15.41
	min	7.24	Bengkulu Tengah	8.2
	max	23.25	Kaur	19.6
Lampung	Mean:	14.86		Mean: 13.01
	min	5.81	Mesuji	7.55
	max	23.67	Lampung Utara	20.85
Riau Islands	Mean:	6.35		Mean: 5.83
	min	3.78	Natuna	4.68
	max	14.03	Lingga	13.55
Bangka Belitung	Mean:	5.21		Mean: 4.77
	min	3.26	Bangka Barat	3.05
	max	8.48	Belitung	7.56

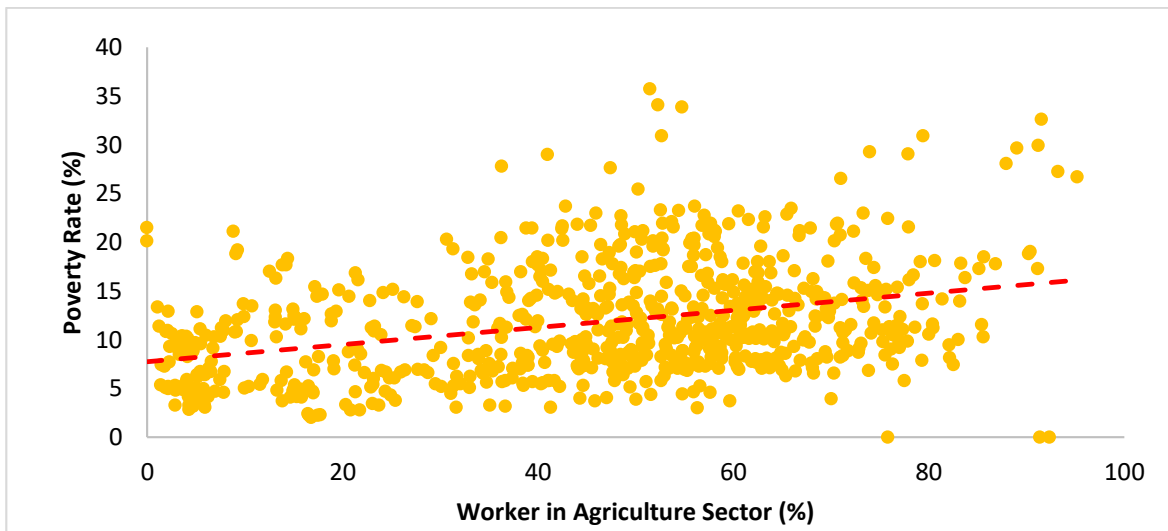
Source: BPS, 2014 and 2019

### 3.1. Relationship between Variables

The relationship between the independent variables and the poverty rate is elaborated after analyzing the regency and city. Firstly, it discussed the relationship between employment factors and poverty rates using three scatter diagrams, as shown in Figures 1-3. Meanwhile, the two scattered diagrams in Figure 4-5 explained the relationship between the government role and the poverty rate. In Figure 1, the scattered diagram shows a positive relationship between agriculture worker and poverty rates, with an even distribution of data among districts/cities. This positive trend means that an increase in agricultural workers' proportion leads to a rise poverty rate. The data shows that districts with a high proportion of agricultural sector workers have a high poverty rate.

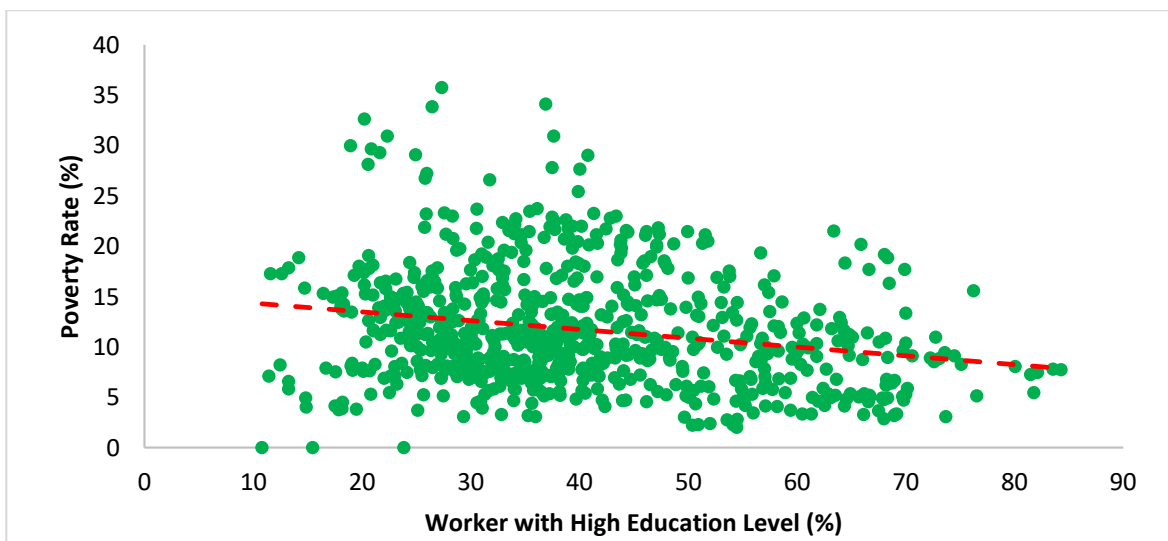
Meanwhile, the relationship between education level of worker and poverty rates is negative, as shown in Figure 2. The data on this chart is also scattered and forms a pattern different from the previous one. This negative trend shows that more numerous high school workers and undergraduate graduates tend to reduce the poverty rate.





**Figure 1. Relationship between Agriculture Worker and Poverty rates in Sumatra**

Source: BPS, processed data



**Figure 2. Relationship between Education Level and Poverty rates in Sumatra**

Source: BPS, processed data

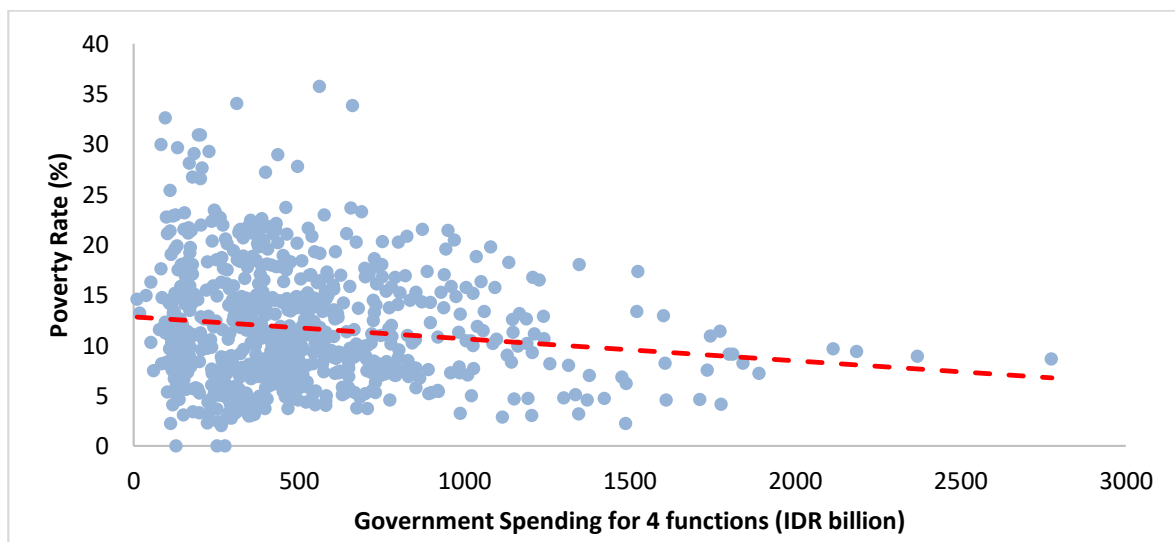


**Figure 3. Relationship between Female worker and Poverty rates in Sumatra**

Source: BPS, processed data

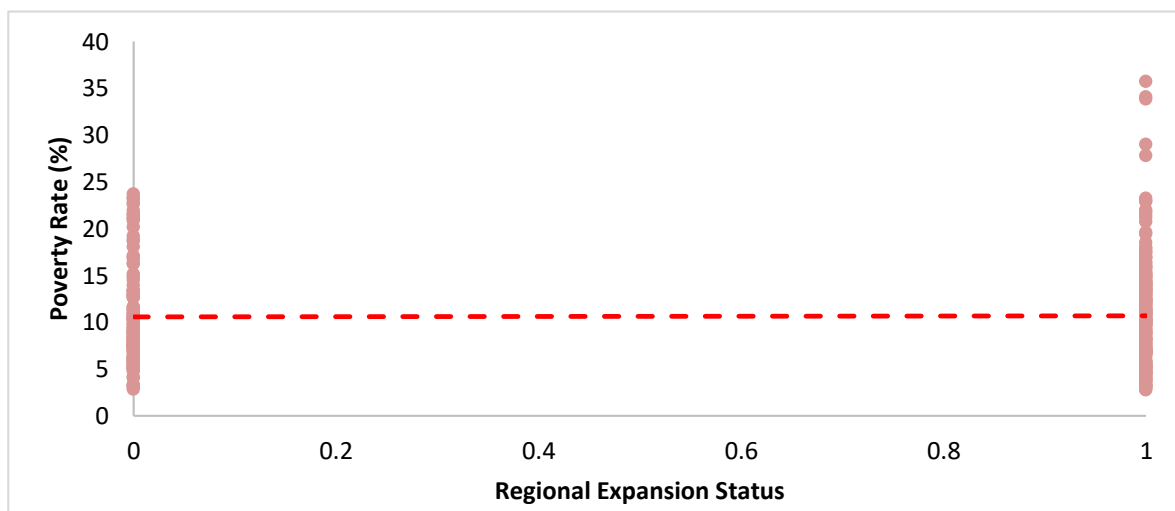
Furthermore, Figure 3 shows the relationship between female worker and poverty rates, which are not normally spread, with the majority collected in the middle. Therefore, despite the presence of a positive direction, there is a possibility of obtaining a weak relationship. These scattered diagrams do not support the research hypothesis, therefore indications of these three employment factors are further analyzed in the regression model test. Furthermore, Figures 2a and 2b are used to analyze the relationship between government factors and poverty, with reference to the regional expansion status and government spending in four functions.

Figure 4 shows an accumulation of low government spending with low poverty rates. However, some districts/cities with high government spending can reduce poverty in their regions, thereby indicating the possibility of a negative relationship pattern between both factors. The last scatter diagram, indicated by Figure 5, shows the relationship between regional expansion status and poverty rate, which indicates that a low level of poverty occurs in both expanded and unexpanded districts/cities. However, the high level of poverty is more common in those that have expanded because it illustrates the pattern of the positive relationship between regional expansion status and poverty.



**Figure 4.** Relationship between the government spending for four functions and poverty rate in Sumatra, 2013-2015 and 2017-2018

**Source:** BPS and Ministry of Finance of Republic of Indonesia, processed data



**Figure 5.** Relationship between regional expansion status and poverty rate in Sumatra island, 2013-2015 and 2017-2018

**Source:** BPS and Ministry of Finance of Republic of Indonesia, processed data



### 3.2. Empirical Result of Regression Model

Based on the Chow test, the best regression model is the fixed effect model (FEM), with a Chi-square cross-section comprising of 5% significance. Meanwhile, the Hausman test provides information that the best model is the random effect model (REM) because the random cross-section is significant at  $\alpha = 5\%$ . Therefore, the best regression model is the random effect model (REM), due to its ability to calculate residual that correlate with the cross-section and the time series as well as to overcome the weaknesses of FEM (Baltagi, 2005). Table 2 shows a summary of the regression model and the hypothesis of the F-test and t-test.

The use of REM, hypothesis testing with the F-test shows that all the variables studied collectively affect the poverty rate significantly with  $\alpha = 5\%$ . Furthermore, the determination coefficient of 35.7% indicates that this model is considered valid from the result of the testing process. Furthermore, the REM model uses the feasible generalized least squares (FGLS) estimation method due to the ability to eliminate heteroscedasticity. Therefore, this model does not test the classical assumptions used for the Ordinary Least Squares (OLS) method.

**Table 2.** Results of Research Data Processing: Random Effect Model

Dependent variable: PR			
Variable	Descriptions	Coefficient	Std. Error
C	Intercept	19.174***	(1.715)
AW	Agriculture worker	0.040***	(0.006)
EL	Education level	-0.022***	(0.007)
FW	Female worker	0.003	(0.007)
<i>ln</i> GS	Government spending	-0.333***	(0.056)
DRES	Regional expansion status	0.879	(0.637)
R <sup>2</sup> = 0.357			
F-Stat = 57.979 (Prob. = 0.000)			

Note: \*, \*\* and \*\*\* represent significance at 10%, 5% and 1% levels respectively

Source: Author's calculation

Based on the t-stat, three out of the five independent variables studied affect the poverty rate at  $\alpha = 5\%$ . The first variable is the agriculture worker (AW), with a positive and significant effect on poverty rates. This means that an increase in the proportion of labor in the agricultural sector leads to a rise in Sumatra's poverty rate. This study is in line with the research carried out in Pakistan (Iqbal et al., 2020; Sadaquat & Sheikh, 2011), Fiji (Gounder, 2013), Vietnam (Pham & Riedel, 2019), and Nigeria (Mustapha et al., 2015). In Pakistan, many workers in the agricultural sector were unpaid family workers. Meanwhile, in Fiji, people in rural areas are poorer than those in the urban because they work in the agricultural sector. Pham and Riedel (2019) stated that poverty can decrease in Vietnam, assuming the impoverished people in the agricultural sector migrate to cities. Furthermore, Satrio (2018) after examining poverty in West Java, concluded that those working in the agricultural sector increase their indications of becoming poor.

Saragih et al. (2020) also found that this process occurred mostly in the agricultural sector in Bengkulu. This sector comprises of young male workers between the ages of 24-29 years, with education levels below high school. For example, Bengkulu province has an open unemployment rate of 3.51%, with an underemployment rate of 8.5%. This condition can also occur in other provinces in Sumatra, where the majority of the population work is carried out in the agricultural sector. Unemployment or underemployment occurs because the capacity of workers has not been fully utilized (underutilized). The study also found that underemployment was higher among workers with general high school education than vocational.

Similar conditions occurred in Sumatra, where some workers in the agricultural sector are family workers that do not get paid, because they help their parents. Consequently, even though many people have jobs, their income is low, thereby making them poor. It is related to disguise unemployment, where some of these workers have low productivity. However, without working and becoming unemployed, agricultural production does not decline significantly. Therefore, based

on the regression coefficient obtained, when the agricultural sector workers increased by 1%, the poverty rate rises by 0.04%.

The second variable is the education level (EL), which has a negative and significant effect on the poverty rate. Therefore, an increase in proportion of labor with high school education and above (such as tertiary institutions) leads to a decrease in the poverty rate in Sumatra. This study is parallel with the research carried out in China (Glauben et al., 2012), Benin (Alia et al., 2016), Pakistan (Iqbal et al., 2020), 16 European countries (Hidalgo-Hidalgo & Iturbe-Ormaetxe, 2018), Sudan Selatan (Shimeles & Verdier-Chouchane, 2016), Mexico (Fernández-Ramos et al., 2016), Turkey (Bilenkisi et al., 2015), Portugal (Crespo et al., 2013), and Nigeria (Akerle et al., 2012). Furthermore, it also supports the findings of Satrio (2018) on research carried out to determine the opportunities to be poor in West Java, Indonesia. These studies used cross-section data to indicate that the higher the respondents' education levels, the greater the chance to get out of poverty.

The secondary data used in this study produced panels with similar findings. For instance, the greater number of workers with high school education and above, the lower the poverty rate in a regency/city. The occupation that needs minimum educational requirements for workers are jobs in the formal sector, such as government, banking, industrial companies, etc. This means that those without the required education are forced to look for work in the informal sector. In terms of income, formal sector jobs, on average, provide a higher wage. This condition occurred in Sumatra, where many workers with high school education and above are found in big cities, where industrial and service businesses dominate economic activity. On the other hand, in most districts, economic activity is dominated by the informal sector, thereby leading to low income of the people in the regency.

Similarly, government spending (GS) for four functions, namely economy, education, health, and social, has negative and significant effect on poverty rates. This means that an increase in government spending on four functions tends to reduce Sumatra's poverty rate. Out of these three significant variables, the government spending variable (4 functions) has the most substantial influence with the largest regression coefficient. Conversely, the proportion of workers in the agricultural sector has the smallest significant effect. This study is in line with research carried out in South Africa (Gomo, 2019), Pakistan (Mehmood & Sadiq, 2010) and Taiwan (Tsai & Huang, 2007). Furthermore, it is parallel with the research carried out by Rambe and Purmini (2020) on the analysis of poverty in Java and Sumatra. However, the proxies for spending used in the above study are different from those in this research. As previously explained, this study uses proxies for government spending for four functions, namely economic, education, health, and social. Meanwhile, the total government spending is allocated for the ten functions with a spending regression coefficient of -0.33. Furthermore, an increase of 1% for four functions has the ability to reduce the poverty rate by 0.33%. The government spending coefficient is the largest in this model. Meanwhile, female workers (FW) has a positive effect on poverty rates insignificantly. the results of this study are not in line with research conducted in Mexico (Fernández-Ramos et al., 2016), Bangladesh (Pujiyanti, 2015), and Europe (Filandri & Struffolino, 2019). The previous studies explained that most working women were coming from poor family. The income earned by these women workers can help to meet the needs of family life. Meanwhile, this study reveals that some female workers earn low incomes, or unpaid workers, so that their families remain poor even though these women work.

Dummy of regional expansion status (DRES) has a positive and significant effect on poverty rates insignificantly also. This study does not support the studies conducted by Booth (2011) and Fitriani et al. (2005). Districts/cities expands to improve the welfare of the people in its territory. The increase in community welfare is accompanied by a decrease in the poverty rate. In Sumatra, there are several expanded districts that have succeeded in reducing poverty levels, such as Sungai Penuh (Jambi Province) and Mesuji (Lampung Province), but some districts/cities with the highest poverty rates are expanded districts, such as Meranti Islands (Riau Province) and Gunung Sitoli (North Sumatra Province). The spread of poverty in all these districts/cities, both in expand and unexpand, causes the status of regional expansion not to significantly affect the poverty level.

Table 2 shows the average level of poverty in the absence of the five research variables at a constant level of 19.17. Compared to the actual poverty rate of districts/cities during the study

period of 11.78%, this study's variables need to be accommodated to ensure that the poverty rate is not as large as predicted by the regression model (19.17%).

The advantage of using panel data regression from previous studies shows that both FEM and REM models are the individual effect of the cross-section. Therefore, this individual effect was analyzed from the random effect of the cross-section. These effects are described for each province in the form of provincial average, minimum, and maximum effects, as shown in Table 3. This table showed that the average constant is 19.17%, while the individual variation and provincial constant range from 13.06% - 24.76%. The worst and lowest poverty rates were found in Aceh, and Bangka Belitung, respectively. This position is consistent with the actual poverty rate shown in Table 2. However, this predicted average poverty is far greater than the actual poverty, influenced by the five variables, with reference of three using the F-test and t-test.

**Table 3.** Poverty rates between Provinces (Based on the Cross Random Effect)

No	Province	Minimum Fixed Effect Within Provinces	Maximum Fixed Effect Within Provinces	C	Provincial Fixed Effect Average	Provincial Poverty
1	Aceh	-1.39 (Banda Aceh)	10.65 (Aceh Barat)	19.17	5.59	24.76
2	North Sumatera	-4.97 (Deli Serdang)	15.41 (Nias Utara)	19.17	0.38	19.55
3	West Sumatera	-7.76 (Sawah Lunto)	1.38 (Mentawai Island)	19.17	-4.10	15.16
4	South Sumatera	-3.23 (Pagar Alam)	5.58 (Lahat)	19.17	1.09	20.26
5	Riau	-5.85 (Siak)	19.63 (Meranti Island)	19.17	-1.57	17.60
6	Jambi	-5.72 (Tebo)	0.12 (Kota Jambi)	19.17	-3.98	15.19
7	Bengkulu	-4.87 (Bengkulu Tengah)	10.84 (Kota Bengkulu)	19.17	4.03	23.20
8	Lampung	-6.64 (Mesuji)	10.68 (Lampung Utara)	19.17	0.75	19.92
9	Riau Islands	-6.99 (Natuna)	1.83 (Lingga)	19.17	-3.49	15.68
10	Bangka Belitung	-9.08 (Bangka Selatan)	-6.11 (Belitung)	19.17	-6.11	13.06

**Source:** Author's calculation

After analyzing the five variables, the research results' implications for the three significant variables were discussed. The first is the agriculture worker, which stated that an increase in the employment leads to a rise in poverty. Therefore, efforts need to be improved to increase workers' productivity to raise people's income. Hence, it is necessary to create jobs to support agricultural products. This can also be formed by strengthening added value creation, especially in areas with primary economic structures. Employment supporting this sector is the processing industry based on agricultural products (downstream), such as horticulture or food with raw materials from production in their respective regions. The emergence of the horticultural or public food processing industry tends to become consumers of agricultural products in their respective regions. Furthermore, the added value of agricultural production provides additional income.

Furthermore, this study's implication is the need for efforts to promote schooling enthusiasm until the university level. In this case, the government can strengthen educational institutions, both through various programs and by making regulations for the business world to help finance education for the community. Local governments need to provide infrastructure and equipment for schools and colleges in their regions. They also need capacity building for teachers to ensure that high school and university graduates in the region have the qualities needed in the world of work. Furthermore, they can also collaborate with the business world to support the improvement of public education by strengthening corporate social responsibility (CSR) activities for high school students in the form of scholarships for poor people, internships, as well as financial support. These programs' implementations tend to increase the education level of labor, thereby reducing poverty rates in Sumatra.

The last is the use of specific government spending for the four functions in reducing poverty rates. The government can increase the amount of spending on economic, education, health, and social, with a total of 48.40% of the total expenditure obtained at the time of this research. For this reason, it is still possible for local governments to increase expenditure on these four functions.

#### 4. CONCLUSIONS

In conclusion, the variables of labor (agriculture worker and education level) and the role of government play a significant role on poverty rates. This is because the larger the labor proportion in the agricultural sector, the higher the poverty rate. Meanwhile, the higher the education level of workers and the proportion of government spending on the economy, education, health, and social affairs, the lower the poverty rate. Furthermore, in reducing the poverty rate, this study provides recommendations for the community and government to encourage labor productivity in the agricultural sector, by strengthening the product processing industry, such as household, micro, small or medium-scale downstream commodities, which supports agricultural production in the respective regency/city. This can be in the form of policies, regulations, training, capital, and marketing access and movements to use local products. Besides, they can attract the public, especially the business society, to be more active in strengthening the implementation and improvement of high school education quality. Therefore, more people can complete quality high school education before they enter the working world. Furthermore, to support these two elements, the government needs to focus more and increase spending on economic, education, health, and social functions to reduce poverty rates. Efforts to create these three conditions can be a solution to overcome and reduce poverty rates in Sumatra, which is predicted to increase due to the Covid-19 outbreak.

#### CONFLICTS OF INTEREST

The authors declare there is no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

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