

-RESEARCH ARTICLE-

DOES THE EDUCATION SECTOR CONTRIBUTE TO OVERCOMING POVERTY IN THE TOMINI BAY AREA OF INDONESIA? METHOD OF MOMENTS QUANTILE APPROACH

Muhammad Amir Arham

Faculty of Economics, Universitas Negeri
Gorontalo, Gorontalo, Indonesia

Email: muhammad.arham@ung.ac.id
<https://orcid.org/0000-002-9008-9445>

Fitri Hadi Yulia Akib

Faculty of Economics, Universitas Negeri
Gorontalo, Gorontalo, Indonesia

email: fitriakib@ung.ac.id
<https://orcid.org/0000-0002-7666-5709>

Haerul Anam

Faculty of Economics, Tadulako University,
Sulawesi Center, Indonesia

email: chaerul.anam30@gmail.com
<https://orcid.org/0000-0002-1455-8203>

—Abstract—

Although there are numerous potential resources in the Tomini Bay area, their exploitation has not been optimized for the community's benefit, and the poverty rate in the region is relatively high. On this basis, this study was conducted to evaluate the contribution of the education sector, which is believed to be capable of enhancing the quality of human resources and aiding in poverty reduction. Method of Moments Quantile Regression (MMQR) was utilized to analyze ten locations over the past ten years (2011–2020). Results suggested that government expenditures on education,

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education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. This study advises policymakers on developing the formal sector (labor-intensive investment) to facilitate the incorporation of high school graduates into the labor force by providing work-related skills.

Keywords: Potential Resources, Performance of Education, Rural Poverty, Tomini Bay.

JEL Classifications: A20, H75, I121

1. INTRODUCTION

One of the aims of economic development in a country (area) is eradicating poverty. Based on the experiences of both industrialized and developing nations, it is possible to eliminate poverty by maximizing all available resources. According to [Acharya et al. \(2019\)](#), natural resources are crucial accelerators for economic development in developing nations. [Ulucak et al. \(2020\)](#) argue that natural resources have several functions as drivers, the most promising paths, and effective escape mechanisms for overcoming poverty, particularly for dominating agrarian countries (regions) like the Tomini Bay Area in Indonesia. The Tomini Bay region possesses various potential natural resources that might serve as the foundational capital for economic development. However, the three districts of the Tomini Bay Area have high poverty rates. In 2020, the population of South Bolaang Mongondow Regency in North Sulawesi was 12.77 percent, Boalemo Gorontalo Regency was 18.57 percent, and Tojo Una-Una Regency in Central Sulawesi was 16.6 percent. In the world's largest bay, North Sulawesi Province, Gorontalo Province, and Central Sulawesi Province have rural poverty rates of 10.25%, 14.69%, and 23.45%, respectively ([Arham et al., 2020](#)).

This pattern indicates that the availability of natural resources is not the sole factor that can stimulate economic growth (welfare). Human resources and human capital are required additional variables. According to [Pomi et al. \(2021\)](#), human capital drives economic growth and contributes favorably to economic development. This conclusion, however, contradicts the findings of [Ogundari et al. \(2018\)](#), who showed that human capital was not a significant predictor of economic growth. Recent studies have shown, however, that improving skills at all levels of education have a substantial long-term impact on economic growth ([Liang et al., 2019](#)). Moreover, human capital can simultaneously promote long-term economic expansion and alleviate poverty ([Doepke et al., 2019](#)). Indonesian stakeholders, including the central and local governments, acknowledge that human development investment must be prioritized in policymaking through the education sector. As a result of the reform, the education budget allocation has been set at a minimum of 20% of the State Revenue and Expenditure Budget (APBN) and the National Revenue and Expenditure Budget. Spending in the Regions (APBD). The provision of funds is anticipated to expedite human resource quality improvement.

Nonetheless, this premise has not been utilized to its maximum capacity. As measured by the Human Development Index, there are still disparities between regions regarding human development (HDI). Even though each region's HDI has gradually increased, the HDI in the Tomini Bay Area is still below the national average, except for Gorontalo City (see Graph 1). Human development is a priority for all regions. Hence this scenario deserves additional examination.

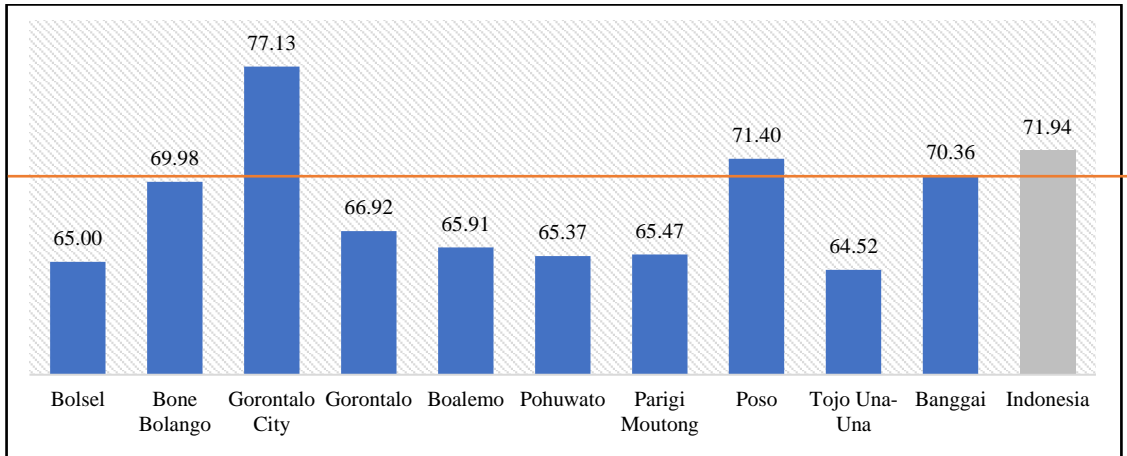


Figure 1. Comparison of HDI Levels in Indonesia

Source. Central Bureau of Statistics

Economy, education, and health are the three components of the HDI. This study focuses on the education sector's performance, which has a relatively significant annual budget. The education sector's budget (public expenditure) strongly affects poverty reduction (Sarkodie et al., 2020). (Sarkodie et al., 2020). Other supporting factors include the contribution of the education sector to the economic formation, the Pure Participation Rate (NER) at the high school level, the average length of schooling, high school graduates, vocational high school students, teacher-student ratios for SMA/SMK, and income levels in the informal sector. Access to education is directly determined by the number of high school graduates, the proportion of the labor force with a high school education, and the agricultural sector's labor productivity. Furthermore, the components supporting the formation of the HDI from the perspective of educational performance want to see their direct impact on poverty by taking samples at the high school or equivalent level, assuming that the higher the level of school participation, the better the quality of human resources (Yao et al., 2019). In addition to proving that greater access to education can increase human quality, the necessity of high school education and the effectiveness of many local government efforts that make high school education free are examined. Hofmarcher (2021) asserts that increasing educational participation can reduce poverty rates. A higher level of education has relatively stronger positive effects on household welfare. Despite the findings of Sule et al. (2022), the poor were not assisted by the SMA participation rate. In addition to assessing the degree of access to

education and the average length of high school education in this study, it is essential to compare the effects of public and vocational school graduates on poverty. There is a growing global interest in enhancing vocational education and expanding the number of vocational schools to rapidly and successfully integrate young people into the workforce by equipping them with specialized skills (Bower et al., 2019). Meanwhile, because there are more public secondary schools throughout Indonesia (including the Tomini Bay Area), it is assumed that the profile of public school graduates is unconnected to the availability of work prospects and the area's potential, which affects the minimum reduction in poverty. Developing vocational education is crucial for economic and social growth in deprived areas, according to China's experience (Arsani et al., 2020).

In the regions, public and vocational (vocational) schools are frequently managed identically, primarily when recruiting human resources (teachers). While there is a need for vocational school instructors to engage with industry, become network advocates outside of educational institutions, and prepare students to enter the workforce (Paul, 2019) so that they are not unemployed when they graduate (Paul, 2019). Because of the proportional relationship between poverty and unemployment, Plucker et al. (2018) suggest that policymakers develop vocational training programs to alleviate unemployment challenges. Alternatively, the teacher-student ratio for high school (vocational) pupils must be investigated immediately, as a high ratio is connected with low achievement (Banerjee et al., 2021). Only urban schools have a low teacher-to-student ratio, whereas rural schools have a high teacher-to-student percentage. This external influence leads student achievement to be higher in urban regions than in rural areas, resulting in a higher quality of human resources (IPM) and lower poverty rates in urban areas. Furthermore, because informal sector laborers make up most of the labor in the Tomini Bay Area, this study focuses on their income after high school. According to Khan et al. (2019)'s empirical study, the informal sector can help maintain social stability but cannot eradicate poverty. However, Bates (2018)'s research demonstrates that informal laborers can assist in relieving poverty. Aside from informal sector workers, the number is relatively high due to educational issues that make productive sector employment less desirable. Because the rural poverty rate is still relatively high and most rural residents are farmers, it is essential to examine the agriculture sector's labor productivity. Consequently, it is vital to determine if the high rate of rural poverty in the Tomini Bay region results from low farmer production or some other factor. The findings of Perrin et al. (2020)'s investigation in Africa indicated that agricultural value-added per worker could relieve rural poverty.

In contrast to the preceding explanation, the urgency of this research is determined by examining three factors: 1) Although the Tomini Bay region possesses significant natural resources, the poverty rate is still high, creating a paradox. 2) The education sector is a regional focus, although the quality of human resources measured by the Human Development Index (HDI) is still below the national average. 3) Several

empirical studies on variables that support the education sector's performance show varied results so that researchers can conduct future studies. Determining the performance impact of the education sector on poverty reduction in the resource-rich Tomini Bay Region of Indonesia is the objective of the present study. The research described in this publication is structured as follows. The first part introduces the study's history, significance, and purpose. The second section provides theoretical studies about the education sector's performance and poverty, as well as a review of prior research. The third section describes the methodology, conceptual framework, and data collection. The fourth portion covers the results derived from dynamic panel data, while the final section contains the research's conclusions and policy recommendations.

2. LITERATURE REVIEW

Investing in human capital or human development is the key to accelerating economic growth and offers a greater return on investment regarding increasing output (Musibau et al., 2019). If just relying on natural resource riches, it has been demonstrated that many nations do not become entrapped by natural richness. Natural resources are neither a boon nor a blessing. Multiple studies indicate that abundant natural resources do not necessarily foster economic development. Investing in human capital through education must be a top priority in this scenario. According to Jorgenson et al. (2020), participation in primary, secondary, and higher education significantly impacts economic growth. The financial growth mechanism affects poverty reduction, with a faster rate of economic growth reducing poverty more rapidly in this instance.

Nonetheless, inclusive and sustainable economic expansion is required. Zhu et al. (2018) contend that equitable and sustainable economic growth is impossible without the substantial contribution of people's talents, knowledge, and values, also known as human resources. As a result, the rise in government expenditure on human capital investment through the education sector must receive a larger share than other sectors, as it has been shown to contribute to poverty reduction significantly. Kocourek et al. (2018) empirically demonstrate this theoretical explanation. Their study utilized time series regression analysis from 2005 to 2011 with the addition of a dummy variable to compare the expenditures of families with and without a high level of education. The findings revealed that public spending on education had a significant long-term impact on poverty reduction and that families with less education were more likely to remain poor. According to Tchamyu et al. (2019), higher public spending on human development enhances human quality indicators (HDI) and complements economic growth. The education sector influences human development and helps the formation of the economy in this regard. Even during the Covid-19 pandemic in Indonesia, the education and banking, and communication sectors developed positively while these sectors contracted. Therefore, the education sector is resilient to withstand crises, influence economic growth, and combat poverty simultaneously. Tang (2021) did a study to determine the influence of education in reducing poverty. The model was estimated

using time series data from 1980 to 2018 and the Engle-Granger two-step co-integration technique to determine the long-term and short-term economic dynamic aspects of education to eliminate poverty in the present age. The results found that education significantly reduced poverty rates, with higher education reducing poverty significantly. According to [Efendi et al. \(2019\)](#), education is crucial in reducing poverty and can prevent the following generation from becoming significantly poorer.

However, the education researched thus far has a macro perspective. This study employs several micro variables, such as the average length of schooling, to produce a composite HDI. The Average Length of Schooling (RLS) is the number of years a population receives formal education ([Zafar et al., 2022](#)). RLS can determine the amount of community education in an area. Indonesia's RLS is 7.95 years, suggesting that, on average, Indonesians aged 25 years and above have studied for 7.95 years or have practically finished class VIII. RLS can determine the quality of community education in a given area; hence, the higher the RLS, the higher the quality of human resources. In Indonesia, however, RLS and poverty reduction have been linked in several studies with varying outcomes. For example, the study by [Hüseysin et al. \(2018\)](#) employed the multiple linear regression analysis methods with the Ordinary Least Square (OLS) approach from 2005 – 2019. The results suggested that the average length of education had a negative and statistically significant impact on poverty reduction. This result is consistent with [Prasetyo et al. \(2020\)](#)'s investigation. [Diebolt et al. \(2022\)](#)'s study, which utilized associative quantitative research and analytical procedures in panel data analysis with a fixed effect model, found that RLS did not affect poverty.

The Net Enrollment Rate is an additional measure that supports education performance (NER). The Central Bureau of Statistics defines the population of a particular school age group that is currently attending school at the appropriate level of education (according to the age of the population with the provisions of school age at that level) as the proportion of that population that is currently attending school at the appropriate level. Non-Formal Education (Package A, Package B, and Package C) has been under consideration since 2007. The rise in the NER across all grade levels suggests more significant equity and access to education. This will then affect poverty reduction. Even though the association between APM and poverty remains controversial, multiple research findings indicate that an increase in APM affects poverty. Still, a study by [Bulturbayevich et al. \(2020\)](#), which utilized the multiple linear regression approach from 2008 to 2017, showed that the rise in the APM had no meaningful impact on reducing the poverty rate. It is anticipated that the growth in RLS and NER will raise the education level of the labor force to the high school level (SMA) since a higher level of education will make it simpler for the labor force to find employment outside the agriculture sector. Considering that the capacity of the agricultural sector to absorb labor is increasing smaller, there is even an accumulation that results in high poverty rates in rural areas. The current position of policymakers is that secondary and higher education is

unnecessary for economic progress. Hence, the government's attention is more concentrated on primary education, as indicated by the nine-year obligatory education program, in this case, just at the junior high school level being the aim for completion. Few local governments mandate education through the high school level; hence, secondary and postsecondary education is not a priority for many developing nations and international aid agencies (Xu et al., 2020). Even though there is a strong correlation between higher levels of education and a reduction in poverty and labor force participation, there is still a significant correlation between the two. The research of Collin et al. (2020) offers a strategy for alleviating poverty that emphasizes human development by expanding labor force education participation.

The premise is that a higher participation rate in education will boost production and income. Workers in Indonesia have been dominated by the informal sector, which includes self-employment, attempting to be assisted by non-permanent workers, attempting to be administered by permanent workers, laborers/employees, freelance workers in agriculture, casual workers in non-agriculture, and family workers. /not paid. The Central Statistics Agency (BPS) reported that informal laborers increased by 2.64 million between August 2020 and February 2021, from 77.68 million to 78.14 million. In an ideal world, a more significant share of labor would be found in the formal sector, but this is not the case in Indonesia. Numerous employees are not unemployed because of the informal sector, despite many informal workers having an insufficient income. According to Bosco et al. (2019), the informal sector can sustain social stability but cannot eliminate poverty.

A considerable number of workers in the informal sector contributes to the high percentage of rural poverty. According to Matthew et al. (2018), reducing poverty necessitates improving the conditions of workers in the informal sector, which entails paying minimum salaries and providing training. Based on this theoretical explanation, the emphasis on economic growth is on developing the formal sector (real sector) and increasing the income levels of informal workers to eliminate poverty. This research aims to address a gap in the literature by establishing a correlation between the education level (high school graduates) of informal sector employees in the Tomini Bay Region of Indonesia and poverty.

High school graduates further influence academic excellence (general and vocational). As the proportion of high school graduates rises, educational performance is deemed to improve. The phenomenon observed thus far is that the proportion of high school graduates with advanced degrees is decreasing. Not all elementary school graduates continue to junior high, etc. In contrast, both general and vocational high school graduates have an impact on improving productivity, which can reduce poverty. The results of a study conducted by Papadakis et al. (2020) on 1,280 disadvantaged households in Longsheng County and Ziyuan County in China's Guangxi Zhuang Autonomous Region indicate that the impact of general and vocational high school

graduates tends to be different. The findings demonstrate the long-term effects of alleviating poverty through vocational education, particularly in rural areas. According to [Asongu et al. \(2021\)](#), policymakers in many developing nations view technical and vocational education and training at the senior secondary level as crucial to economic growth and poverty alleviation. In light of the existence of vocational education as a method of human development, the European Union countries (partner countries) have undertaken several attempts to improve the teaching and vocational training system for human resource development, according to [McGrath \(2012\)](#). In contrast to the situation in Indonesia, vocational schools face numerous obstacles, such as being considered secondary schools, the majority of students coming from low-income families, the lack of adequate facilities, and teacher competence that is less relevant to the field of education, all of which have an impact on a large number of students. Compared to public school graduates, vocational school graduates have a higher unemployment rate ([Silva-Laya et al., 2020](#)).

Therefore, the competence of professors at technical and vocational schools is a crucial aspect that can enhance the quality of graduates. The ratio of teachers to students cannot be overlooked. According to [Keeney et al. \(2019\)](#), a smaller teacher-to-student ratio will result in a high level of literacy and achievement. In contrast, performance in literacy declines as group size (ratio) increases. This necessitates focusing on the teacher-to-student ratio to ensure that high school graduates have the necessary skills and qualifications. As a result, additional research into the effect of teacher-student ratios on student achievement and the production of competent graduates in vocational schools is required.

The open unemployment rate among vocational school graduates is now the greatest. Thus it is anticipated that recent graduates will be able to find employment immediately. The significant number of educated unemployed will undoubtedly affect poverty. The variable teacher-pupil ratio of vocational schools is a novelty of this research, which will fill in the gaps in the literature. Although the teacher-student ratio plays a vital function in improving accomplishment to generate graduates with high competence, research has thus far centered on teacher quality, and instructional approaches are regarded to have a more substantial influence on growing student achievement ([Awan et al., 2020](#)).

High competency is needed to work in different areas, including the agriculture industry, and they have increased productivity. According to [Abaidoo \(2021\)](#), there is a strong association between macroeconomic stability and poverty. The underlying element tying growth to poverty is labour productivity, which is closely associated with poverty. This viewpoint is congruent with [Ivinson \(2020\)](#)'s study, which utilized data from the 2009 Cambodian Socio-Economic Survey (CSES). This study examines the effects of worker and land productivity on the poverty of rice-farming households in Cambodia. Conclusion: improving agriculture's labor productivity is the way to alleviate poverty in

rural areas. Although the connection between educational achievement and poverty has been thoroughly studied in the literature, many unsolved concerns remain.

Therefore, additional research is necessary to investigate the dynamic relationship between educational attainment and poverty, especially for the region's economy, which is dominated by the agriculture sector and has other potential natural resources. This study, therefore, was carried out to fill a gap in the literature by using educational performance as measured by education sector financing, education sector contribution to the economic formation, the average length of schooling, NER level at senior high school level, the workforce of high school graduates, high school and vocational high school graduates, and labor productivity in the agricultural sector with low education as the main variables (Ellison et al., 2020). Meanwhile, the wage level of informal sector employees who graduated from high school and the teacher-student ratio of vocational schools are additional factors and updates from prior studies.

3. RESEARCH METHODS

3.1 Study Site and Design

This study used multiple regression using a dynamic panel data methodology spanning ten regions in the Tomini Bay Area and three provinces, namely North Sulawesi, Gorontalo, and Central Sulawesi, over the past ten years (2011 – 2020). To assist comprehension of the link between study variables. This is how the econometric model is constructed.

$$POVR_{it} = \gamma_0 + \gamma_1 GEEX_{it} + \gamma_2 EDS_{it} + \gamma_3 NER_{it} + \gamma_4 LEL_{it} + \gamma_5 INC_{it} + \gamma_6 LPAS_{it} + \varepsilon \quad (1)$$

Where,

- POVR* = Poverty Rate
- GEEX* = Government Educational Expenditures
- EDS* = Education Share in City
- NER* = Net Enrolment Rate
- LEL* = Labour Education Level
- INC* = Income Level of high school graduates
- LPAS* = Labour Productivity in the Agricultural Sector

The research employed poverty as a predictive variable and quantified it as a rural poverty rate %. In addition, six factors were included in the study: government education expenditures, education share in cities, net enrollment in schools, labor education level, income level of high school graduates, and agricultural labor productivity. Table 1 displays the measurement and data sources of the model.

Table 1. A Description of Research Variables

Variable	Measurement	Sources
Poverty Rate	Percentage (P0) of the district/city rural poverty level in the Tomini Bay Area.	Central Bureau of Statistics
Government Educational Expenditures	The amount of local government spending in the education sector, in rupiah.	Central Bureau of Statistics
Education Share in City	Percentage of business field contribution in the education sector on the economic formation.	Central Bureau of Statistics
Net Enrolment Rate	Percentage of Senior High School Net Enrollment Rate.	Central Bureau of Statistics
Labor Education Level	Percentage of the labor force employed by the level of high school education.	Central Bureau of Statistics
Income	Informal Sector Income at the district/city level by high school graduates.	Central Bureau of Statistics
Labor Productivity in the Agricultural Sector	Labor productivity in the agricultural sector with low education is measured by the number of workers in the agricultural industry divided by the PDRP constant prices	Central Bureau of Statistics; data analysis

Using descriptive statistics, the study examined the specifics of the constructs. In addition, the correlation matrix was utilized to analyze the correlation between the predictors. In addition, the variance inflation factor (VIF) was utilized to assess the model's multicollinearity. The following are the equations:

$$R^2_Y \longrightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it} \quad (2)$$

$$j = R^2_Y, R^2_{X1}, R^2_{X2}, R^2_{X3}, R^2_{X4}, R^2_{X5} \quad (3)$$

$$Tolerance = 1 - R_j^2 \quad VIF = \frac{1}{Tolerance} \quad (4)$$

The research also applied the MMQR to check the relationships between the constructs. This approach was introduced by Machado et al. (2019). This approach effectively deals with outliers and manages panel heterogeneity (Ike et al., 2020). In addition, this model provides dynamic outcomes in different situations, although the framework is non-linear (Aziz et al., 2020). This approach also controls panel studies' endogeneity and heterogeneity issues (An et al., 2021). Hence, the conditional quantile estimation is $Q\tau(\tau/X)$ for the locational-scale alternate model is mentioned below:

$$Y_{it} = \alpha_i + X_{it}\beta + (\delta_i + Z_{it}\lambda)U_{it} \tag{5}$$

Where, $P\{\delta_i + Z_{it}\lambda > 0\} = 1$. show the probability, α, β, λ and δ shown the parameters and α_i, δ_i $i = 1, \dots, n$ shown the individual fixed-effect. Therefore, the components are transformed with element l is given as:

$$Zl = Zl(X), l = 1, \dots, k \tag{6}$$

Where, U_{it} shown the orthogonal to X_{it} . Therefore, the conditional quantile of Y is mentioned below:

$$Q\tau(\tau/X_{it}) = (\alpha_i + \delta_i q(\tau)) + X_{it}\beta + Z_{it} \lambda q(\tau) \tag{7}$$

Where, X_{it} The independent constructs include GEEX, EDS, NER, LEL, INC, and LPAS. In contrast, Y_{it} It is a dependent construct like POVR. Hence $Q(\tau)$ is estimated as mentioned below:

$$Min_q = \sum_t \sum_i p\tau (R_{it} - (\delta_i + Z_{it} \lambda) q) \tag{8}$$

4. RESULTS AND DISCUSSION

Using descriptive statistics, the study examined the specifics of the constructs. The Tomini Bay region, which encompasses three provinces (North Sulawesi, Gorontalo, and Central Sulawesi), possesses many biological potentials, including flora, fauna, fisheries and marine resources, agriculture, minerals, and tourism. Despite its natural resource potential, this region is one of the most impoverished in Indonesia, as indicated by the Human Development Index (HDI). Education is vital for increasing social progress and reducing poverty. When analyzing the success of the education sector, several criteria, such as public education spending, must be taken into account. The factors include the contribution of the education sector to the formation of the economy, the average length of schooling, the pure participation rate at the high school level, the labor with a high school education, the income of high school-educated informal sector workers, and the labor productivity in the agricultural sector with low education. This data is shown in [Table 2](#).

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
POVR	100	16.278	4.813	5.450	22.430
GEEX	100	26.1401	0.647	23.798	27.849
EDS	100	0.046	0.021	0.020	0.091
NER	100	7.642	1.165	5.910	10.360
LEL	100	8.804	1.477	4.605	11.926
INC	100	14.221	0.283	13.544	14.854
LPAS	100	42.386	18.066	5.049	99.131

In addition, the correlation matrix was utilized to analyze the correlation between the predictors. Results suggested that government expenditures on education, education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. These numbers are presented in [Table 3](#).

Table 3. Correlation Matrix

Variables	POVR	GEEX	EDS	NER	LEL	INC	LPAS
POVR	1.000						
GEEX	-0.593	1.000					
EDS	-0.448	0.742	1.000				
NER	-0.271	0.219	0.625	1.000			
LEL	-0.204	0.732	0.435	-0.526	1.000		
INC	-0.429	0.281	0.123	0.121	0.302	1.000	
LPAS	-0.290	0.772	-0.352	-0.123	-0.299	0.324	1.000

In addition, the VIF was utilized to investigate the multicollinearity of the model. Results revealed that the reciprocal VIF values are more significant than 0.20 and that VIF values are less than five. These results indicated that there is no multicollinearity issue. These numbers are presented in [Table 4](#).

Table 4. Variance Inflation Factor

	VIF	1/VIF
GEEX	3.201	0.312
EDS	3.102	0.322
NER	2.881	0.347
LEL	2.710	0.369
INC	2.133	0.469
LPAS	1.892	0.529
Mean VIF	2.653	.

In addition, the MMQR was used to examine the correlations between the components. Results suggested that government expenditures on education, education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. These numbers are presented in [Table 5](#).

Table 5: Panel Quartile Estimation (MMQR)

Variables	Method of Moments Quantile Regression (MMQR)											
	Location	Scale	Grid of Quartiles									
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	
GEEX	0.453***	0.643*	-0.654**	-0.657**	-0.666*	-0.434**	-0.544*	-0.432*	-0.564*	-0.534*	-0.342*	
EDS	0.342**	0.187*	-0.776*	-0.574*	-0.875*	-0.768*	-0.643**	-0.544**	-0.666**	-0.434*	-0.021	
NER	0.754**	0.654**	-0.476*	-0.265*	-0.143	-0.544*	-0.611*	-0.432*	-0.121	-0.756**	-0.153*	
LEL	0.476**	0.756*	-0.453*	-0.655**	-0.675*	-0.765**	-0.213*	-0.543*	-0.232	-0.231*	-0.053	
INC	0.655**	0.468**	-0.755*	-0.709*	-0.657**	-0.477*	-0.499*	-0.121	-0.743*	-0.443**	-0.342**	
LPAS	0.276*	0.655**	-0.564*	-0.654**	-0.632**	-0.474*	-0.123	-0.111	-0.564*	-0.353*	-0.154	

***, **, and * represent significant level at 1%, 5%, and 10%, respectively

5. DISCUSSIONS

The study's results revealed that public expenditures in the education sector by function have a statistically negative impact. This demonstrates that if local governments boost investment in education, the poverty rate will decrease. Increasing public spending on education can lower poverty by 0.09 percent over the long term. This result is consistent with recent studies by [Gowayed \(2018\)](#). The education sector expenditure allocation has the opportunity to continue to be increased every year following the increase in the State budget and local Government budget because the proportion of the budget allocation for the education sector is 20 percent in the State budget/provincial Government budget, assuming that state revenues also increase, especially from taxes. However, it is vital to ensure that 20 percent of the allocation for the education sector is used to support equivalent progress in the quality of education. There is still a significant disparity in access to education between regions. Consequently, the quality of school graduates varies from region to region. Most provinces have meager local government budgets, necessitating significant central government financing interventions for provinces with poor infrastructure ([Yuan et al., 2023](#)).

It is hoped that the increase in public investment will stimulate greater access to education at all levels, mainly if a free education policy accompanies it so that the average length of schooling continues to rise. Where the variable Average Years of Schooling (MYS) is statistically demonstrated to reduce poverty rates, the elasticity of poverty reduction will improve over time if inhabitants in each region continue to pursue education. Average Years of Schooling (MYS) as an indicator of educational success is still underutilized by researchers; hence, this discovery is novel. MYS is a vital aspect that must be regarded by the government, although the field of MYS in the Tomini Bay Area remains relatively unequal. Some averages are lower than the national average. In addition, the Pure Participation Rate (PPR) at the SMA level is the proportion of the population in a given education-level age group who are still in school relative to the population. The estimation results indicate that the NER has a negative connection with poverty; as the NER at the SMA level has increased, the number of poor individuals has dropped, but the short- and long-term elasticity of the fall is minor. In addition, research indicates that the AMP at the high school level tends to drop compared to the NER at the elementary and middle school levels. In addition to diminishing, the NER at each level of the education unit tends to exhibit regional disparities due to the absence of economic equality. According to [Tsaurai \(2018\)](#), this scenario can disturb the education system due to the rapid human development in locations with big economic sizes.

The greater the number of high school graduates who continue their education, the higher their skill levels, which can be a prerequisite for employment. However, most of them cannot be accommodated in the regular labor market. Thus they must work in the informal sector. The value of the informal sector income coefficient for high school graduates points in a favorable direction. This scenario demonstrates that if the income

of the informal sector for high school graduates rises, it will have a short- and long-term effect on the number of poor individuals. This situation emerges because most informal sector workers are elementary school graduates or less. Therefore, if the informal sector gives preference to high school graduates for employment, employees with elementary school diplomas or less will be excluded, leading to a rise in the number of poor individuals. In other words, when the income of informal workers rises due to a wage increase, the employment options for high school graduates and those with less than a high school diploma decrease due to increasing production input prices. According to [Goings et al. \(2018\)](#), to assist the poor who work in the informal sector, it is necessary to establish a minimum wage that applies to all workers, not just high school graduates, because an increase in wages, regardless of education level, increases net income, even if it results in the loss of job opportunities for others due to no increase in labor input as a result of the wage increase.

In the subsequent stage, the estimation findings indicate that the variable of vocational school graduates negatively influences poverty, implying that more vocational school graduates will reduce poverty. The increase in vocational school graduates will reduce the poverty rate by 0.43 percent over the long term. This data corroborates the findings of a study by [Duarte et al. \(2018\)](#), showing vocational education has the highest input-output ratio and is the most effective method for reducing poverty. In addition, agricultural labor productivity should be boosted because estimation results indicate a negative influence. In both the short- and long-term, the number of poor people will continue to shrink as agricultural labor becomes more productive. The findings of this study are comparable to those of prior research conducted in Papua by [Ginting et al. \(2020\)](#). However, [Bellani et al. \(2019\)](#)'s research indicates that agricultural labor productivity has a short-term impact on poverty reduction.

6. CONCLUSIONS

Based on the model estimation and discussion outcomes, the following significant conclusions can be drawn: 1) Public spending on education effectively reduces poverty in the Tomini Bay Area over the short and long term. 2) The average years spent in education has an elastic effect on the poverty rate. Increasing the average length of schooling in each region will speed up the short- and long-term reduction of poverty rates. The enrollment rate in high school will effectively alleviate both short- and long-term poverty. 4) Graduates of vocational schools with the necessary skills and work readiness can lessen poverty in the short and long run. 5) Even with a low level of education, agricultural labor productivity can lower the number of poor people in the short and long term. 6) The informal sector income of high school graduates has a short- and long-term impact on rising poverty rates.

7. IMPLICATIONS

In the meantime, the contribution variables of the agricultural sector, high school labor, high school graduates, and the teacher-student ratio of vocational schools do not affect poverty in the Tomini Bay area, both in the short and long run. In this context, several recommendations must be made, including the following: 1) Public spending on education must continue to expand, with a greater emphasis on financing supporting facilities and enhancing learning support in schools. 2) Local governments must continue to promote broader access to education for all sectors of society by optimizing the existing budget, including using village funds to assist disadvantaged communities in continuing their education in rural areas. 3) Local governments must maximize high school enrollment rates and enhance the number of schools in the region so that the NER at the high school level continues to rise. 4) Vocational schools must be constructed following the area's economic structure and local potential, and their curricula must be updated to reflect the labor market. 5) Increase agricultural labor productivity by equipping workers with knowledge and skills through field school instruction. In addition, structural reforms in the economy must be accelerated so that labor does not accumulate in the agricultural sector and some labor enters the formal sector.

8. LIMITATIONS

In addition to the significant findings of this study, there are limitations. Several indices of educational performance that are not included as factors affecting the poverty rate contribute to the restrictions. To make future studies more comprehensive, the number of problems (phenomena) must be increased, and the inquiry must be conducted over a more extended period.

REFERENCES

- Abaidoo, A. (2021). The nexus between education and poverty reduction in Ghana from 2013 to 2017. *Cogent Social Sciences*, 7(1), 1986933. doi: <https://doi.org/10.1080/23311886.2021.1986933>
- Acharya, R. H., & Sadath, A. C. (2019). Energy poverty and economic development: Household-level evidence from India. *Energy and Buildings*, 183, 785-791. doi: <https://doi.org/10.1016/j.enbuild.2018.11.047>
- An, H., Razzaq, A., Haseeb, M., & Mihardjo, L. W. (2021). The role of technology innovation and people's connectivity in testing environmental Kuznets curve and pollution heaven hypotheses across the Belt and Road host countries: new evidence from Method of Moments Quantile Regression. *Environmental Science and Pollution Research*, 28(5), 5254-5270. doi: <https://doi.org/10.1007/s11356-020-10775-3>
- Arham, M. A., & Hatu, R. (2020). Does village fund transfer address the issue of inequality and poverty? A lesson from Indonesia. *The Journal of Asian Finance*,

Economics and Business, 7(10), 433-442. doi:
<https://doi.org/10.13106/jafeb.2020.vol7.no10.433>

- Arsani, A. M., Ario, B., & Ramadhan, A. F. (2020). Impact of education on poverty and health: Evidence from Indonesia. *Economics Development Analysis Journal*, 9(1), 87-96. doi: <https://doi.org/10.15294/edaj.v9i1.34921>
- Asongu, S., Amari, M., Jarboui, A., & Mouakhar, K. (2021). ICT dynamics for gender inclusive intermediary education: minimum poverty and inequality thresholds in developing countries. *Telecommunications Policy*, 45(5), 102125. doi: <https://doi.org/10.1016/j.telpol.2021.102125>
- Awan, A. G., & Malik, A. (2020). Impact of female education on poverty reduction: An Evidence from Pakistan. *Global Journal of Management, Social Sciences and Humanities*, 6(2), 220-236. doi: <https://orcid.org/0000-0001-5767-6229>
- Aziz, N., Mihardjo, L. W., Sharif, A., & Jermstittiparsert, K. (2020). The role of tourism and renewable energy in testing the environmental Kuznets curve in the BRICS countries: fresh evidence from methods of moments quantile regression. *Environmental Science and Pollution Research*, 27(31), 39427-39441. doi: <https://doi.org/10.1007/s11356-020-10011-y>
- Banerjee, R., Mishra, V., & Maruta, A. A. (2021). Energy poverty, health and education outcomes: evidence from the developing world. *Energy Economics*, 101, 105447. doi: <https://doi.org/10.1016/j.eneco.2021.105447>
- Bates, V. C. (2018). Equity in music education: Back to class: Music education and poverty. *Music Educators Journal*, 105(2), 72-74. doi: <https://doi.org/10.1177/0027432118803046>
- Bellani, L., & Bia, M. (2019). The long-run effect of childhood poverty and the mediating role of education. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 182(1), 37-68. doi: <https://doi.org/10.1111/rssa.12388>
- Bosco, I. E., Omekwe, S. O. P., & Obayori, J. B. (2019). Public expenditure in education and economic growth in Nigeria. *Asian Journal of Sustainable Business Research*, 1(2), 86-94. Retrieved from <http://aiipub.com/journals/ajsbr-191211-031121/>
- Bower, C. B., & Rossi, R. (2019). How do promise neighborhoods' strategies align with research evidence on poverty and education? *Education and Urban Society*, 51(9), 1172-1201. doi: <https://doi.org/10.1177/0013124518784651>
- Bulturbayevich, M. B., & Jurayevich, M. B. (2020). The impact of the digital economy on economic growth. *International Journal of Business, Law, and Education*, 1(1), 4-7. doi: <https://doi.org/10.56442/ijble.v1i1.2>
- Collin, M., & Weil, D. N. (2020). The effect of increasing human capital investment on economic growth and poverty: A simulation exercise. *Journal of Human Capital*, 14(1), 43-83. doi: <https://doi.org/10.1086/708195>
- Diebolt, C., & Hippe, R. (2022). The long-run impact of human capital on innovation and economic growth in the regions of Europe. In *Human Capital and Regional*

- Development in Europe* (pp. 85-115): Springer, 85-115. doi: https://doi.org/10.1007/978-3-030-90858-4_5.
- Doepke, M., & Tertilt, M. (2019). Does female empowerment promote economic development? *Journal of Economic Growth*, 24(4), 309-343. doi: <https://doi.org/10.1007/s10887-019-09172-4>
- Duarte, R., Ferrando-Latorre, S., & Molina, J. A. (2018). How to escape poverty through education?: Intergenerational evidence in Spain. *Applied Economics Letters*, 25(9), 624-627. doi: <https://doi.org/10.1080/13504851.2017.1352073>
- Efendi, R., Indartono, S., & Sukidjo, S. (2019). The Relationship of Indonesia's Poverty Rate Based on Economic Growth, Health, and Education. *International Journal of Multicultural and Multireligious Understanding*, 6(2), 323-330. doi: <http://dx.doi.org/10.18415/ijmmu.v6i2.704>
- Ellison, D. W., & Woods, A. M. (2020). A review of physical education teacher resilience in schools of poverty through the lens of occupational teacher socialization. *Urban Education*, 55(8-9), 1251-1279. doi: <https://doi.org/10.1177/0042085916672287>
- Ginting, T., Sudibia, I. K., Dewi, N. P. M., & Marhaeni, A. (2020). The effect of education and dependency ratio on economic growth and poverty in Papua. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 4(6), 186-195. Retrieved from <https://www.ajhssr.com/wp-content/uploads/2020/06/X2046186195.pdf>
- Goings, R. B., & Ford, D. Y. (2018). Investigating the intersection of poverty and race in gifted education journals: A 15-year analysis. *Gifted Child Quarterly*, 62(1), 25-36. doi: <https://doi.org/10.1177/0016986217737618>
- Gowayed, H. (2018). *The Unnecessary nudge: education and poverty policy in a Cairo slum*. Paper presented at the Sociological Forum: Wiley Online Library 33(2), 482-504. doi: <https://doi.org/10.1111/socf.12421>
- Hofmarcher, T. (2021). The effect of education on poverty: A European perspective. *Economics of Education Review*, 83, 102124. doi: <https://doi.org/10.1016/j.econedurev.2021.102124>
- Hüseyin, Ş., Ayşe, K., & Alpaslan, B. (2018). Education, health, and economic growth nexus: A bootstrap Panel Granger Causality Analysis for developing countries. *Sosyoekonomi*, 26(36), 125-144. doi: <https://doi.org/10.17233/sosyoekonomi.2018.02.07>
- Ike, G. N., Usman, O., & Sarkodie, S. A. (2020). Testing the role of oil production in the environmental Kuznets curve of oil producing countries: New insights from Method of Moments Quantile Regression. *Science of the Total Environment*, 711, 135208. doi: <https://doi.org/10.1016/j.scitotenv.2019.135208>
- Iverson, G., & Thompson, I. (2020). *Policy, Education and Poverty across the UK*. Poverty in Education Across the UK: Bristol University Press. 11-36.
- Jorgenson, D. W., & Fraumeni, B. M. (2020). Investment in education and US economic growth. In *The US savings challenge* (pp. 114-149): Routledge, 114-149.

Retrieved

from

<https://www.taylorfrancis.com/chapters/edit/10.4324/9780429315572-9>.

- Keeney, A. J., Hohman, M., & Bergman, E. (2019). Interprofessional education: A poverty simulation with elementary teachers and social work students. *Journal of Teaching in Social Work*, 39(2), 148-162. doi: <https://doi.org/10.1080/08841233.2019.1586808>
- Khan, M. Y., Alvi, A. K., & Chishti, M. F. (2019). An Investigation on The Linkages Between Poverty and Education: A Statistical Review. *Gomal University Journal of Research*, 35(1), 44-53. Retrieved from www.gujr.com.pk/index.php/GUJR/article/download/259/185
- Kocourek, A., & Nedomlelová, I. (2018). Three levels of education and the economic growth. *Applied Economics*, 50(19), 2103-2116. doi: <https://doi.org/10.1080/00036846.2017.1388910>
- Liang, W., & Yang, M. (2019). Urbanization, economic growth and environmental pollution: Evidence from China. *Sustainable Computing: Informatics and Systems*, 21, 1-9. doi: <https://doi.org/10.1016/j.suscom.2018.11.007>
- Machado, J. A., & Silva, J. S. (2019). Quantiles via moments. *Journal of Econometrics*, 213(1), 145-173. doi: <https://doi.org/10.1016/j.jeconom.2019.04.009>
- Matthew, O. A., Ede, C. U., Osabohien, R., Ejemeyovwi, J., Fasina, F. F., & Akinpelumi, D. (2018). Electricity consumption and human capital development in Nigeria: Exploring the implications for economic growth. *International Journal of Energy Economics and Policy*, 8(6), 8. doi: <https://doi.org/10.32479/ijeeep.6758>
- Musibau, H. O., Yusuf, A. H., & Gold, K. L. (2019). Endogenous specification of foreign capital inflows, human capital development and economic growth. *International Journal of Social Economics*, 46(3), 454-472. doi: <https://doi.org/10.1108/IJSE-04-2018-0168>
- Ogundari, K., & Awokuse, T. (2018). Human capital contribution to economic growth in Sub-Saharan Africa: does health status matter more than education? *Economic Analysis and Policy*, 58, 131-140. doi: <https://doi.org/10.1016/j.eap.2018.02.001>
- Papadakis, N., Amanaki, E., Drakaki, M., & Saridaki, S. (2020). Employment/unemployment, education and poverty in the Greek Youth, within the EU context. *International Journal of Educational Research*, 99, 101503. doi: <https://doi.org/10.1016/j.ijer.2019.101503>
- Paul, P. (2019). Effects of education and poverty on the prevalence of girl child marriage in India: A district-level analysis. *Children and Youth Services Review*, 100, 16-21. doi: <https://doi.org/10.1016/j.childyouth.2019.02.033>
- Perrin, J. M., Duncan, G., Diaz, A., & Kelleher, K. (2020). Principles And Policies To Strengthen Child And Adolescent Health And Well-Being: Study describes National Academies of Sciences, Engineering, and Medicine reports on poverty, mental, emotional, and behavioral health, adolescence, and young family health

- and education. *Health Affairs*, 39(10), 1677-1683. doi: <https://doi.org/10.1377/hlthaff.2020.00709>
- Plucker, J. A., & Peters, S. J. (2018). Closing poverty-based excellence gaps: Conceptual, measurement, and educational issues. *Gifted Child Quarterly*, 62(1), 56-67. doi: <https://doi.org/10.1177/0016986217738566>
- Pomi, S. S., Sarkar, S. M., & Dhar, B. K. (2021). Human or physical capital, which influences sustainable economic growth most? A study on Bangladesh. *Canadian Journal of Business and Information Studies*, 3(5), 101-108. doi: <https://doi.org/10.34104/cjbis.021.01010108>
- Prasetyo, P. E., & Kistanti, N. R. (2020). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues*, 7(4), 2575. doi: [http://doi.org/10.9770/jesi.2020.7.4\(1\)](http://doi.org/10.9770/jesi.2020.7.4(1))
- Sarkodie, S. A., Adams, S., Owusu, P. A., Leirvik, T., & Ozturk, I. (2020). Mitigating degradation and emissions in China: the role of environmental sustainability, human capital and renewable energy. *Science of the Total Environment*, 719, 137530. doi: <https://doi.org/10.1016/j.scitotenv.2020.137530>
- Silva-Laya, M., D'Angelo, N., García, E., Zúñiga, L., & Fernández, T. (2020). Urban poverty and education. A systematic literature review. *Educational Research Review*, 29, 100280. doi: <https://doi.org/10.1016/j.edurev.2019.05.002>
- Sule, I. K., Yusuf, A. M., & Salihu, M.-K. (2022). Impact of energy poverty on education inequality and infant mortality in some selected African countries. *Energy Nexus*, 5, 100034. doi: <https://doi.org/10.1016/j.nexus.2021.100034>
- Tang, C. F. (2021). The threshold effects of educational tourism on economic growth. *Current Issues in Tourism*, 24(1), 33-48. doi: <https://doi.org/10.1080/13683500.2019.1694869>
- Tchamyou, V. S., Asongu, S. A., & Odhiambo, N. M. (2019). The role of ICT in modulating the effect of education and lifelong learning on income inequality and economic growth in Africa. *African Development Review*, 31(3), 261-274. doi: <https://doi.org/10.1111/1467-8268.12388>
- Tsaurai, K. (2018). Is the complementarity between education and financial development a panacea for poverty reduction? *The Journal of Developing Areas*, 52(4), 227-248. doi: <https://doi.org/10.1353/jda.2018.0062>
- Ulucak, R., & Khan, S. U.-D. (2020). Determinants of the ecological footprint: role of renewable energy, natural resources, and urbanization. *Sustainable Cities and Society*, 54, 101996. doi: <https://doi.org/10.1016/j.scs.2019.101996>
- Xu, Y., & Li, A. (2020). The relationship between innovative human capital and interprovincial economic growth based on panel data model and spatial econometrics. *Journal of Computational and Applied Mathematics*, 365, 112381. doi: <https://doi.org/10.1016/j.cam.2019.112381>

- Yao, Ivanovski, K., Inekwe, J., & Smyth, R. (2019). Human capital and energy consumption: Evidence from OECD countries. *Energy Economics*, 84, 104534. doi: <https://doi.org/10.1016/j.eneco.2019.104534>
- Yuan, L., & Ding, Y. (2023). Poverty Alleviation Through Education: China's Approach and Its Significance to the World. In *The Frontier of Education Reform and Development in China* (pp. 339-365): Springer, 339-365. doi: https://doi.org/10.1007/978-981-19-6355-1_18.
- Zafar, M. W., Saleem, M. M., Destek, M. A., & Caglar, A. E. (2022). The dynamic linkage between remittances, export diversification, education, renewable energy consumption, economic growth, and CO2 emissions in top remittance-receiving countries. *Sustainable Development*, 30(1), 165-175. doi: <https://doi.org/10.1002/sd.2236>
- Zhu, T.-T., Peng, H.-R., & Zhang, Y.-J. (2018). The influence of higher education development on economic growth: evidence from central China. *Higher Education Policy*, 31(2), 139-157. doi: <https://doi.org/10.1057/s41307-017-0047-7>