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Original Article

The Effect of Government Spending on the Education and Health Sectors on the Human Development Index of Central Sulawesi Province from 2020 to 2024

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Abstract

Human development remains a central objective of regional development policies, as improvements in education and health are widely recognized as key determinants of societal welfare and economic progress. This research seeks to investigate the influence of public fiscal allocations to the education and health sectors on the Human Development Index (HDI) in Central Sulawesi Province over the 2020–2024 period. Utilizing panel data drawn from 13 districts and municipalities, the study applies panel regression techniques to capture both cross-sectional and temporal dynamics. Model specification tests, namely the Chow and Hausman tests, confirm the Fixed Effect Model (FEM) as the most suitable analytical framework. The empirical findings demonstrate that government outlays in the education and health sectors exert a statistically significant and positive joint effect on HDI. When examined individually, educational expenditure exhibits a positive and significant contribution to human development outcomes, while health-sector spending likewise shows a significant effect, characterized by a comparatively larger coefficient magnitude. Furthermore, the coefficient of determination suggests that variations in HDI across districts and cities in Central Sulawesi are largely accounted for by differences in education and health expenditures. Overall, the results underscore the critical role of sustained and equitably distributed investment in education and health as fundamental levers for fostering inclusive and balanced human development at the regional level.

Keywords: Education, Government Expenditure, Health, Human Development Index.

1. Introduction

Human development represents a quintessential metric of a nation's progress. The developmental stature of a country is not merely contingent upon its gross domestic product, but is profoundly shaped by qualitative dimensions, including longevity, the robustness of public health, and the scholarly attainment of its citizenry. In conceptual terms, human development represents a deliberate endeavor to broaden individuals' opportunities to attain a dignified standard of living, which is generally pursued through the enhancement of basic capabilities and the strengthening of purchasing power. When people have skills, their productivity will increase, and that is when they will become an effective source of economic growth (Tjodi et al., 2018).

The education and health sectors are manifestations of the state's commitment to achieving quality human development. Human quality is considered good if education and health are in optimal condition. With proper education, people will have better thinking skills

and become more creative; in short, the quality of human resources will improve. Good health results in optimal physical strength, enabling people to work longer and with greater intensity (Nursita et al., 2025).

One of the key indicators of development success is reflected in the level of human development achieved within a region. Consequently, governments are required to demonstrate a strong commitment to enhancing human development outcomes (Adatsi et al., 2020). Such commitment is concretely manifested through public expenditure, which represents the government's active role in economic regulation and social intervention. Among the various components of government spending, allocations to the education and health sectors are particularly pivotal, as they exert a substantial influence on the quality and sustainability of human development (Ismail et al., 2021).

The issue of the Human Development Index (HDI) constitutes one of the government's key policy priorities, as the index serves as a comprehensive measure of the quality of human development derived from several fundamental dimensions of human life. Moreover, human development represents a central concern that extends beyond the scope of economic growth alone, encompassing broader social, health, and educational dimensions that collectively shape overall societal well-being. In terms of education, many people drop out of school, many graduates have their diplomas withheld due to economic factors, and many honorary teachers earn below-average salaries. In terms of health, many people from lower-middle-class families lack access to health facilities, there are still disparities between government and non-government facilities, and health workers' salaries are below average. Therefore, the interconnection between these variables is that if government expenditure can be optimised, human development will also increase. One way to achieve this is by providing relief to the community in the fields of education and health (Fadila et al., 2023).

In economic theory, the education and health sectors are widely regarded as critical pillars of development. The productivity of human resources is strongly conditioned by health status, which in turn affects the effectiveness of education in supporting sustainable development. Consequently, health and education are recognized as essential components of economic growth and development, functioning as key inputs in the aggregate production process. Their dual character as both inputs and outcomes of development underscores their strategic importance in driving long-term economic progress (Santoso et al., 2013).

According to the Central Statistics Agency (2024), the Human Development Index (HDI) rose from 69.55 in 2020 to 72.24 in 2024. Despite this upward trend, human development in the province still shows regional disparities. The city of Palu consistently ranks in the very high category with an HDI of 82.88 in 2024, while several districts such as Banggai Islands (67.43), Poso (72.87), and Parigi Moutong (67.49) still rank in the medium category. This disparity indicates that the quality of education, health, and living standards has not developed evenly across all districts/cities in Central Sulawesi. At the same time, the local government has allocated fluctuating education and health budgets for 2020–2024, especially during the post-COVID-19 pandemic recovery period. These changes in local spending priorities have the potential to affect the effectiveness of public services, which ultimately determines the HDI achievements in each region.

Although local governments continue to increase education budget allocations every year, their effectiveness in improving human development has not been proven to be evenly distributed across all districts/cities in Central Sulawesi Province. Meanwhile, the health budget experienced a significant increase during the COVID-19 pandemic, but this increase in spending did not necessarily reduce disparities in the quality of health services between regions. Tarigan and Saharuddin (2025) show that education and health spending

simultaneously have a significant positive effect on the Human Development Index (HDI), but other studies in several provinces, such as research Darmawan et al. (2023) and Fitra et al. (2023) found that this influence was not always significant. Differences in results between studies show that the relationship between government spending and HDI is contextual and not uniform. This condition raises the question of whether the allocation and reallocation of budgets during 2020-2024 in the post-pandemic period has proportionally influenced HDI improvement in all districts/cities in Central Sulawesi. Accordingly, this study endeavors to ameliorate this research deficiency by scrutinizing the extent to which governmental allocations in the education and health sectors influence the Human Development Index in Central Sulawesi over the 2020–2024 timeframe.

This study assesses the impact of governmental spending in the education and health sectors on the Human Development Index in Central Sulawesi Province over the 2020-2024 period. More precisely, it seeks to assess the degree to which fiscal allocations in these two pivotal sectors facilitate enhancements in the quality of human development across the province's districts and municipalities. In addition, the study aims to explore whether variations in regional spending patterns, particularly during and in the aftermath of the COVID-19 pandemic, affect disparities in HDI outcomes among regions. Accordingly, the findings are expected to provide empirical insights into the effectiveness of regional fiscal policies in advancing more balanced and equitable human development.

2. Literature Review

2.1. Human Development Index

Human development is regarded as an indispensable prerequisite for the cultivation of competent human capital, which can be effectively mobilized to support national reconstruction and development (Safitri, 2016). The Human Development Index (HDI) constitutes a composite metric designed to appraise the extent of a nation's socio-economic advancement, formulated on the basis of achievements in the domains of education, health, and income. The configuration of these dimensions indicates that subdued economic growth does not invariably correspond with diminished human development outcomes.

The trajectory of regional development is often delineated through its level of human development, as captured by the Human Development Index (HDI), which is widely recognized as a salient gauge of societal well-being. HDI data for Central Sulawesi Province reveal a consistent upward trajectory over the 2020–2024 period. In 2020, the province recorded an HDI value of 69.55, which rose modestly to 69.79 in 2021. This positive trend continued in 2022, reaching 70.28, followed by a more pronounced increase to 70.95 in 2023. By 2024, the HDI had further improved to 71.56. This sustained rise in the HDI reflects progressive enhancements in its core dimensions, particularly education and health, indicating gradual but meaningful improvements in human development outcomes across the province.

HDI indicator achievements can be categorised as follows:

1. Very High = HDI above 80
2. High = HDI between 70-79
3. Medium = HDI between 60-70
4. Low = HDI below 60

HDI achievements between districts/cities in Central Sulawesi Province show a clear disparity. The high HDI region group consists of Palu City (82.88), Morowali (73.54), and Poso

(72.87), which generally have more adequate access to education and health. The medium HDI region includes North Morowali (70.58), Sigi (70.51), and Buol (70.28). Meanwhile, Banggai Islands (67.43), Donggala (67.45), Tojo Una-Una (66.97), and Parigi Moutong (67.49) are classified as low HDI, reflecting the limited distribution of education and health services in these areas. The HDI of regencies/cities in Central Sulawesi shows disparities in achievements between regions. Palu City recorded the highest HDI in the year of the study with a value of 82.88 in 2024, while Tojo Una-una ranked lowest with 66.97. This condition shows that urban areas have much better access to education and health compared to island and coastal areas (BPS, 2025).

2.2. Government Expenditure Theory

Government expenditure constitutes a key instrument of fiscal policy, primarily directed toward maintaining macroeconomic stability while simultaneously supporting economic growth. Over time, the scope of government activity has expanded, with an increasingly prominent role across nearly all sectors of the economy. The realization of the Human Development Index (HDI) is intrinsically associated with the implementation of public expenditures, particularly through the delivery of essential public services. In accordance with Law No. 32 of 2004 concerning Regional Government, regional spending is primarily directed toward safeguarding and enhancing the welfare of the populace by fulfilling mandated regional responsibilities. Such responsibilities are operationalized through the provision and improvement of basic public services, the advancement of educational opportunities, the delivery of adequate healthcare, and the development of social and public infrastructure as well as social security systems, while taking into account expenditure standard analyses, price standards, performance benchmarks, and minimum service standards as stipulated by prevailing laws and regulations (Kahang et al., 2016).

2.3. Theory of Government Expenditure in the Education Sector

Education represents a deliberate and systematic undertaking to create a learning environment and pedagogical process that empowers learners to actively cultivate their potential, including spiritual awareness, self-discipline, personal integrity, intellectual capabilities, moral values, and competencies essential for individual, societal, and national development. Educational resources encompass all elements utilized in the delivery of education, including educators and educational staff, community participation, financial support, as well as facilities and infrastructure.

Furthermore, Articles 10 and 11 of Part IV concerning the rights and responsibilities of central and local governments stipulate that local governments are vested with the authority to regulate, guide, support, and oversee the implementation of education in accordance with prevailing laws and regulations. Correspondingly, local governments bear the obligation to provide adequate services and facilities and to ensure the delivery of quality education for all citizens without discrimination (Lubis et al., 2024).

2.4. Theory of Government Expenditure in the Health Sector

Health is regarded as a fundamental barometer of societal welfare. The judicious allocation of public expenditure within the health sector is expected to enhance the equitable provision of healthcare services for all societal groups. To facilitate public access to healthcare, the government has implemented various initiatives, including free healthcare programs, health insurance schemes, and the provision of assistance mechanisms such as poverty cards (Andiny & Sari, 2018).

2.5. Previous Research

Empirical studies conducted previously have provided compelling evidence regarding the pivotal role of governmental expenditure in enhancing human development outcomes. Lawrence et al. (2017) demonstrate that expenditure by the government in the health and education sectors has been found to exert a significant influence on the Human Development Index (HDI) in North Sulawesi Province. Similarly, Suhendi and Astuti (2023), in their study "Analysis of the Effect of Poverty Levels, GRDP, and Government Expenditure on Health and Education on the HDI in Papua Province from 2017 to 2022," find that poverty levels exert a significant negative influence on the Human Development Index (HDI), whereas Gross Regional Domestic Product (GRDP), government expenditure on health, and government expenditure on education demonstrate significant positive effects on HDI in Papua Province during the period under observation.

In addition, Maryozi et al. (2022) report that expenditure on education has been shown to exert a significant and positive effect on the Human Development Index (HDI) of Riau Province, indicating that augmented investment in the education sector contributes to enhanced human development outcomes. Their findings also reveal that health-sector spending significantly and positively affects HDI, suggesting that improved health investment enhances human development. Furthermore, the study highlights that road infrastructure development exerts a significant positive influence on HDI, underscoring the role of supporting infrastructure in promoting human development in Riau Province.

3. Methods

This study employs an associative research design within a quantitative framework, aimed at elucidating the nature and magnitude of relationships among two or more variables. Specifically, it seeks to empirically examine the effects of governmental expenditure in the health and education sectors on the Human Development Index (HDI) across regencies and municipalities in Central Sulawesi Province over the 2020–2024 period.

Data analysis in this study is conducted using panel data regression, given that the dataset integrates time-series observations from 2020 to 2024 with cross-sectional data from 13 regencies and municipalities in Central Sulawesi Province. The application of panel data regression is warranted due to its capacity to simultaneously capture temporal and regional variations, provide more comprehensive and nuanced information, enhance degrees of freedom, and mitigate multicollinearity issues relative to analyses that rely solely on time-series or cross-sectional data (Riyanto & Hatmawan, 2020). The analysis was carried out using Eviews 13 software, which provides complete features for panel data model estimation.

The model employed in this study includes one dependent variable, the Human Development Index (HDI), and two explanatory variables: government expenditure in the health sector and government expenditure in the education sector. The data collection technique used was documentation, namely by collecting secondary data sourced from official government publications such as the Central Statistics Agency (BPS).

The following is the equation model in multiple regression analysis:

$$Yit = a + b1X1it + b2X2it + e$$

Explanation:

Y = HDI

X1 = Government Expenditure in Education

X2 = Government Expenditure in Health

a = Constant

b1 & b2 = Regression coefficients
i = Cross Section
t = Time Series
e = Disturbance error

4. Results and Discussion

4.1. Research Results

4.1.1. Selection of Panel Data Models

A. Chow Test

Table 1. Chow Test Results

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	488.059984	(12, 49)	0.0000
Cross-section Chi-square	306.678805	12	0.0000

Source: Processed data source using Eviews 13

The Chow test presented in Table 1 produces a probability value of 0.0000, which falls below the 0.05 significance level, thereby indicating that the Fixed Effect Model (FEM) represents the most appropriate specification for the analysis.

B. Hausman test

Table 2. Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.917634	2	0.0315

Source: Processed data source using Eviews 13

The results of the Hausman test, as presented in Table 2, reveal a probability value of 0.0315, which lies below the customary 0.05 level of significance, thus necessitating the rejection of the null hypothesis and substantiating the Fixed Effect Model (FEM) as the preferred estimation technique. In light of the consistent indications from both the Chow and Hausman diagnostics favoring the Fixed Effect specification, further assessment via the Lagrange Multiplier (LM) procedure is deemed unwarranted.

4.1.2. Classical Assumption Test

A. Normality Test

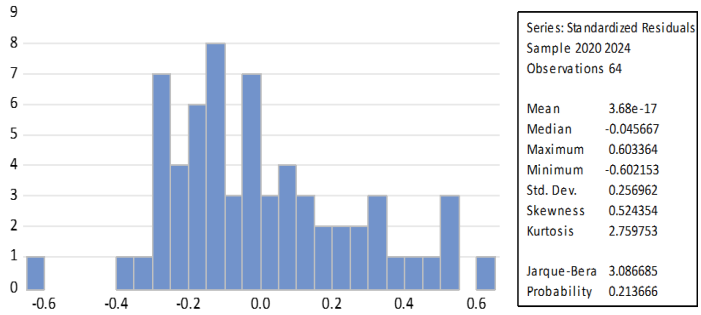

Figure 1. Normality Test Results
Source: Processed data source using Eviews 13

As illustrated in Figure 1, the normality assessment yields a Jarque–Bera statistic of 3.086685 with a corresponding probability value of 0.213666. Since this probability surpasses the 0.05 significance threshold, the null hypothesis of normally distributed residuals cannot be rejected. Consequently, the residuals may be regarded as conforming to a normal distribution, implying that the regression model fulfills the normality assumption and that the estimated results are sufficiently robust for further statistical interpretation.

B. Multicollinearity Test

Table 3. Multicollinearity Test Results

Effects Test	EDUCATION	HEALTH
EDUCATION	1.000000	0.587889
HEALTH	0.587889	1.000000

Source: Processed data source using Eviews 13

Table 3 indicates that the correlation coefficient between X1 and X2 is 0.587889, remaining well below the conventional 0.90 cut-off point, thereby suggesting that multicollinearity does not pose a concern within the estimated model.

C. Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.874726	0.981974	0.890783	0.3774
EDUCATION	-0.020698	0.082486	-0.250928	0.8029
HEALTH	-0.105268	0.171382	-0.614232	0.5419

Source: Processed data source using Eviews 13

As indicated in Table 4, the probability values associated with each independent variable exceed the 0.05 significance level, thereby suggesting the absence of heteroscedasticity in the estimated model.

4.1.3. Hypothesis Testing

A. F-test

Table 5. F Test Results (FEM)

R-squared	0.996640
Adjusted R-squared	0.995680
F-statistic	1038.281
Probability of F-statistic	0.000000

Source: Processed data source using Eviews 13

Table 5 reports an F-statistic of 1038.281 accompanied by a probability value of 0.000000, which falls considerably below the established 0.05 significance benchmark. This finding warrants the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_1). Hence, the explanatory variables are jointly significant in accounting for variations in the dependent variable, thereby corroborating the overall adequacy of the regression framework and permitting subsequent parameter evaluation through individual t-statistics.

B. T-test

Table 6. T-test results (FEM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	33.87887	1.889372	17.93128	0.0000
EDUCATION	0.378932	0.158708	2.387613	0.0209
HEALTH	6.425399	0.329748	19.48576	0.0000

Source: Processed data source using Eviews 13

It can be seen from the table 6 that a statistically significant influence of government expenditure in the education sector (X_1) on the Human Development Index was observed at the 5% significance level. The positive coefficient of 0.378932 indicates that increases in education spending are associated with corresponding enhancements in the Human Development Index. Similarly, a significant effect of government expenditure in the health sector (X_2) on the Human Development Index was also demonstrated. The positive coefficient of 6.425399 suggests that increases in health sector spending led to substantial improvements in human development outcomes. Accordingly, both education and health expenditures exhibit significant and positive relationships with the Human Development Index.

C. Determination Coefficient Test (R^2)

Table 7. R^2 Test Results (FEM)

R-squared	0.996640
Adjusted R-squared	0.995680
F-statistic	1038.281
Probability of F-statistic	0.000000

Source: Processed data using Eviews 13

As reported in Table 7, the selected Fixed Effect Model yields a coefficient of determination (R^2) of 0.996640, indicating that variables X1 and X2 collectively account for 99.66% of the variation in the Human Development Index (HDI) variable (Y), while the remaining 0.34% may be attributed to other factors beyond the scope of the model.

4.2. Discussion

Based on the results of panel data analysis conducted using the EViews software, the Fixed Effect Model (FEM) was determined to be the most appropriate specification, as evidenced by both the Chow test and the Hausman test. The estimation results indicate that the Human Development Index (HDI) in Central Sulawesi Province over the 2020-2024 period is positively and statistically significantly influenced by government expenditure in the education and health sectors.

In this study, the influence of governmental expenditure in the education and health sectors on the Human Development Index (HDI) was evaluated using a panel data regression framework based on the Fixed Effect Model (FEM). The selection of FEM accommodates the existence of unobserved, time-invariant heterogeneity across districts and municipalities, which may systematically shape disparities in HDI performance.

The partial assessment employing the t-statistic indicates that government spending in the education sector produces a probability value of 0.0209, falling beneath the 0.05 significance threshold. This finding signifies that educational expenditure exerts a positive and statistically significant influence on HDI in Central Sulawesi Province. The positive regression coefficient of 0.378932 further suggests that increases in budget allocations to the education sector are associated with corresponding improvements in HDI levels.

In the context of Central Sulawesi Province, the increase in education spending during 2020-2024 is also related to efforts to recover the education sector after the COVID-19 pandemic. During the pandemic, the learning process experienced various obstacles, such as limited access to technology, declining learning quality, and an increased risk of school dropouts. Therefore, the allocation of the education budget during the research period plays an important role in supporting the recovery of the education system and encouraging the improvement of human resources, which is reflected in an increase in the HDI. However, there are still regional disparities in HDI achievements in Central Sulawesi. This shows that the effectiveness of education spending is not only determined by the size of the budget, but also by the equitable distribution and efficient use of the budget in each district/city. Therefore, optimising education spending remains a major challenge for local governments.

Partial testing further indicates that government expenditure in the health sector yields a probability value of 0.0000, well below the 0.05 significance threshold. This result demonstrates that health-sector spending has a statistically significant and positive effect on the Human Development Index in Central Sulawesi Province. Moreover, the positive regression coefficient of 6.425399 suggests that increases in governmental expenditure on health are associated with substantial improvements in HDI levels.

In addition to the education sector, the results of this study demonstrate that government spending on health is a crucial determinant of human development. The positive direction of the coefficient implies that increased health expenditure contributes to improvements in human development through enhanced public health outcomes. Such expenditure supports broader access to health services, the provision of adequate medical facilities, and improvements in the quality and availability of health personnel, all of which play a pivotal role in strengthening overall human development.

This study shows that the increase in HDI in Central Sulawesi Province cannot be separated from the active role of the local government in allocating budgets to the education and health sectors. Education has been proven to be a major factor in driving HDI improvement, while the health sector plays a supporting role in strengthening the quality of life of the community. Therefore, government spending policies need to be directed not only

at increasing the budget, but also at improving the effectiveness, equity, and sustainability of education and health programmes.

5. Conclusion

Based on the panel data analysis of 13 districts and municipalities in Central Sulawesi Province during the 2020-2024 period, government expenditure in the education and health sectors plays an important role in improving the Human Development Index (HDI). Simultaneous testing elucidates that fiscal disbursements in the education and health domains collectively manifest a statistically significant effect on HDI. This finding corroborates the premise that enhancements in human development are contingent upon the orchestration of integrated regional fiscal policies, particularly in sectors intrinsically linked to the amelioration of communal well-being.

Investment in education contributes to the strengthening of human capital through improved access to and quality of education, while expenditure in the health sector supports better public health outcomes and quality of life. Together, these sectors represent key components in advancing regional human development. However, the effectiveness of these expenditures depends not only on the size of the budget but also on how efficiently and equitably the funds are allocated and implemented across districts and municipalities. Therefore, policy efforts should focus on improving the quality, accessibility, and distribution of education and health services to ensure more balanced human development in Central Sulawesi Province.

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