THE EFFECT OF GOVERNMENT EXPENDITURE ON EDUCATION, HEALTH, AND HOUSING AND PUBLIC FACILITIES ON THE HUMAN DEVELOPMENT INDEX IN BANGKALAN REGENCY, 2010–2024

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ABSTRACT

Bangkalan Regency has raised its Human Development Index (HDI) every year since 2010, yet it still lies below the East Java average, and local spending on the sectors that shape human development has moved unevenly over the same period. This study examined whether government expenditure on education, health, and housing and public facilities affected the HDI of Bangkalan Regency in 2010–2024. Annual secondary data were taken from Statistics Indonesia (BPS) and the Directorate General of Fiscal Balance (DJPK). Expenditure was converted into natural logarithms, and the model was estimated by multiple linear regression (OLS) in SPSS 26 after a set of classical assumption tests. The results show that education expenditure has a positive but insignificant effect on the HDI (t = 2.014; Sig. = 0.069). Health expenditure has a positive and significant effect (t = 2.417; Sig. = 0.034). Housing and public facilities expenditure has a significant effect with a negative sign (t = –3.910; Sig. = 0.002), which largely reflects an allocation that swung sharply from year to year while the HDI kept rising. Taken together, the three variables significantly affect the HDI (F = 15.231; Sig. < 0.001) and explain 80.6 percent of its variation. The size of a sectoral budget therefore matters less than how steadily and how well it is spent. For Bangkalan, health spending is the most direct lever, while education and infrastructure spending need better targeting and a more stable allocation before their effect shows up in the HDI.

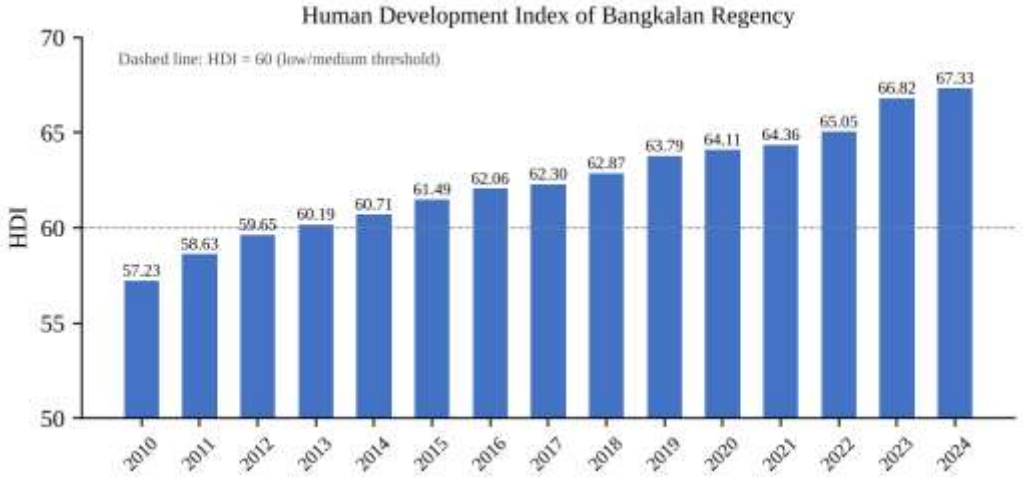
Keywords: Government Expenditure, Education, Health, Housing and Public Facilities, Human Development Index

INTRODUCTION

For a long time, the success of development was judged mainly by how fast output grew. Gross domestic product and income per capita were the numbers that mattered. That view has changed. Growth that leaves people poorly educated or in poor health is a thin kind of progress, and development economics now treats people as the purpose of development, not only as one of its inputs. UNDP (2024) describes human development as widening the choices people have: to live a long and healthy life, to gain knowledge, and to enjoy a decent standard of living.

In Indonesia, these choices are measured through the Human Development Index (HDI) compiled by Statistics Indonesia (BPS). The index combines three dimensions: a long and healthy life, measured by life expectancy at birth; knowledge, measured by expected years of schooling and mean years of schooling; and a decent standard of living, measured by adjusted real per capita expenditure (BPS 2024). The national HDI has kept rising (BPS 2025), but the gains are not spread evenly. Regions differ in economic structure, fiscal capacity and geography, and their governments differ in how well they run public programmes. The result is a persistent gap between districts that are already well off and districts that are still catching up.

East Java shows this gap clearly. As the second most populous province in the country, it contains cities with high HDI scores next to regencies that remain in the medium category. Bangkalan Regency, at the western tip of Madura Island, belongs to the second group. Its HDI rose from 57.23 in 2010 to 67.33 in 2024 (Figure 1), a gain of about ten points in fifteen years, and the index went up in every single year of that period. The trend is encouraging. Even so, Bangkalan remains below the provincial average and has not yet reached the “high” category, which starts at 70.



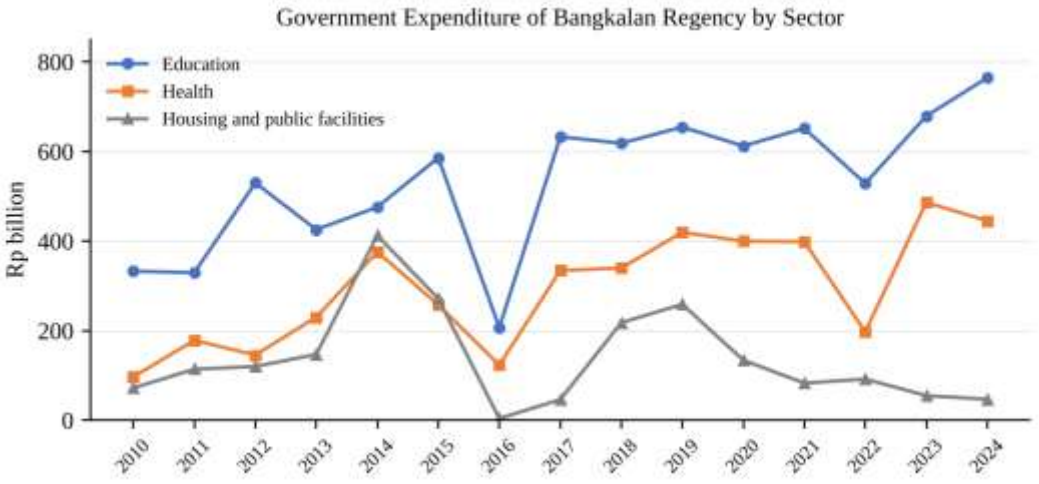
Source: BPS Kabupaten Bangkalan (processed data)

Figure 1. Human Development Index of Bangkalan Regency, 2010–2024

Local government spending is one of the few policy tools that a regency fully controls. Through the regional budget (APBD), the Bangkalan government pays for schools and teachers, health centres and medicines, roads, clean water, sanitation and housing. Rostow

(1960) argued that in the early stages of development the state has to invest heavily in exactly these things, because private capital will not build the foundation on which later growth depends. Musgrave and Musgrave (1989) reached a similar conclusion from the side of public finance: through its allocation function, the government provides goods that markets supply poorly or not at all, such as education, health care and basic infrastructure. If both arguments hold, more spending on these sectors should eventually appear as a higher HDI.

Bangkalan's budget data do not tell such a tidy story (Figure 2). Education spending grew from about Rp333 billion in 2010 to roughly Rp765 billion in 2024, but it fell sharply in 2016 and again in 2022. Health spending rose from under Rp100 billion to around Rp445 billion, with similar dips in the same two years. Spending on housing and public facilities behaved very differently. It climbed to about Rp412 billion in 2014, dropped to only Rp4.3 billion in 2016, recovered to more than Rp250 billion in 2019, and then shrank again to below Rp50 billion by 2024. Throughout all of this the HDI kept going up. A budget line that falls while the outcome improves is not what the theory predicts, and that mismatch is the starting point of this study.



Source: DJPK, Ministry of Finance (processed data)

Figure 2. Government Expenditure of Bangkalan Regency by Sector, 2010–2024 (Rp billion)

Earlier studies have not settled the question either. Imantria and Kurnia (2024) found that local spending on education, health and economic affairs raised the HDI of Indonesian districts, and Wahyuni and Amar (2023) reported positive and significant effects of all three sectors examined here in West Sumatra. Other results are less clear-cut. Meydiasari and Soejoto

(2017) found the effect of education spending on Indonesia's HDI to be positive but insignificant, while Fajar and Indrawati (2020) found that housing and public facilities spending had no significant partial effect on the HDI of Cianjur Regency. Studies of Mataram (Aulia, Daeng, and Fatimah 2023) and of Indonesian provinces (Damayanti and Suryaningrum 2023) also point to results that depend heavily on the region and the period. Most of this work relies on provincial or national panels. Evidence for a single regency that is still catching up, such as Bangkalan, is scarce.

This study therefore asks a narrow question: did spending on education, health, and housing and public facilities move Bangkalan's HDI between 2010 and 2024? Its contribution is mainly empirical. It tests the Rostow–Musgrave view on local data in which the three budget lines behaved very differently from one another, and it shows which kind of spending has actually tracked improvements in human development. For the Bangkalan government, the answer is useful when deciding where an additional rupiah of the APBD is likely to do the most good.

LITERATURE REVIEW

Government Expenditure Theory

Rostow (1960) divided economic development into five stages: the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass consumption. In the first two stages, public investment takes a large share of total investment because the economy still lacks schools, health services, roads and transport. These are the preconditions that allow private activity to grow later. Musgrave added that government spending does not shrink once the economy matures. Private investment takes over part of the work, but the state is still needed to supply public goods, correct market failures and reduce inequality (Musgrave and Musgrave 1989). In his framework the government has three functions: allocation, distribution and stabilisation. Education, health and basic infrastructure fall mainly under the allocation function.

The same idea runs through Indonesian textbooks and studies. Sukirno (2019) treats government expenditure as a tool to support growth, create jobs, spread income more evenly and improve public services, and Yulianti and Daud (2022) note that, in the Rostow–Musgrave view, a growing economy brings rising demand for public spending on education, health and

infrastructure. For a regency such as Bangkalan, which is still building its basic services, the theory implies that these three budget lines should matter a great deal for human development.

Human Development Index

The concept of human development was introduced by UNDP in the first Human Development Report, which argued that people, not income, should be the measure of development (UNDP 1990). BPS calculates the HDI for Indonesia following the UNDP approach. Since 2014 it has used a revised method in which the literacy rate and gross enrolment ratio were replaced by expected years of schooling and mean years of schooling, gross national income per capita was replaced by adjusted real per capita expenditure, and the arithmetic mean was replaced by a geometric mean so that weak performance in one dimension cannot be fully offset by another (BPS 2024). BPS groups HDI values into four categories: low (below 60), medium (60 to below 70), high (70 to below 80) and very high (80 and above). Bangkalan moved from the low to the medium category in 2013, when its HDI passed 60.

Education Expenditure and the HDI

Human capital theory sees schooling as an investment in people that raises their knowledge, skills and productivity, and with them their lifetime income (Becker 1993). Local education spending pays for school buildings and repairs, teachers' salaries and allowances, operational assistance for schools and support for poor students (Abdillah and Primitasari 2023). When this spending widens access and keeps children in school longer, it should raise expected years of schooling and, over time, mean years of schooling, which are the two indicators in the knowledge dimension of the HDI. The link is expected to be positive, but slow. Mean years of schooling refers to adults aged 25 and over, so it changes only as better-educated cohorts reach adulthood.

Health Expenditure and the HDI

Health spending finances health centres and hospitals, medical staff, medicines and public health programmes. It is meant to make care easier to reach and better in quality, so that people fall ill less often and live longer (Abdillah and Primitasari 2023). Its channel to the HDI is fairly direct: better health raises life expectancy at birth, which is the indicator of the long and healthy life dimension. Healthy people also learn and work more productively, so the effect can spill over into the other two dimensions. Maulina and Andriyani (2020) found a positive and significant effect of health spending on Indonesia's HDI, and Sasongko and Wibowo

(2022) found that education and health spending both raised the HDI, which in turn supported regional growth.

Housing and Public Facilities Expenditure and the HDI

Spending on housing and public facilities covers settlements, local roads, clean water, sanitation, drainage, markets and street lighting. Its link to the HDI is less direct than that of education or health. Clean water and sanitation improve health; roads and markets lower the cost of getting to school, to clinics and to work; decent housing improves living conditions and productivity (Fajar and Indrawati 2020). Through these routes the expected effect is positive. The benefits, however, depend on projects being finished and used, and that often takes several years. This is one reason why studies of this sector report positive, insignificant and sometimes negative results.

Research Model

Based on the theory above, the HDI of Bangkalan Regency is modelled as a function of the three types of expenditure. Because expenditure is measured in rupiah and its values run into hundreds of billions, each spending variable is entered in natural logarithm form. The model is:

$$HDI_t = \alpha + \beta_1 \ln EDU_t + \beta_2 \ln HEALTH_t + \beta_3 \ln HOUSING_t + \varepsilon_t$$

Where:

HDI_t = Human Development Index of Bangkalan Regency in year t

$\ln EDU_t$ = natural logarithm of government expenditure on education

$\ln HEALTH_t$ = natural logarithm of government expenditure on health

$\ln HOUSING_t$ = natural logarithm of government expenditure on housing and public facilities

α = constant; β_1, β_2, β_3 = regression coefficients; ε_t = error term

RESEARCH HYPOTHESIS

The hypotheses follow the research questions of the study. Based on the theory reviewed above, the expected sign is positive for all three variables.

H_1: Government expenditure on education has an effect on the HDI of Bangkalan Regency.

H_2: Government expenditure on health has an effect on the HDI of Bangkalan Regency.

H_3: Government expenditure on housing and public facilities has an effect on the HDI of Bangkalan Regency.

RESEARCH METHODS

This study used a quantitative approach. The object of research was Bangkalan Regency in East Java Province, and the period of observation was 2010–2024, which gives fifteen annual observations. All data were secondary time series. HDI figures were taken from BPS Kabupaten Bangkalan (2025), and realised regional expenditure by function (education, health, and housing and public facilities, in millions of rupiah) was taken from the regional finance data published by the Directorate General of Fiscal Balance (DJPK) of the Ministry of Finance (DJPK, n.d.). Data were collected through documentation, that is, by recording and compiling figures from these official publications.

The dependent variable is the HDI, an index on a scale of 0–100 calculated by BPS. The independent variables are government expenditure on education (X_1), health (X_2), and housing and public facilities (X_3). Each was transformed into a natural logarithm. This narrows the very large range of the raw values, reduces the risk of heteroscedasticity and makes the coefficients easier to read: in a model where the dependent variable is in levels and the independent variables are in logs, a coefficient divided by 100 gives the change in HDI points associated with a one percent rise in spending.

The model was estimated by multiple linear regression using Ordinary Least Squares in SPSS version 26. Before the hypotheses were tested, the data were checked for normality (One-Sample Kolmogorov Smirnov), multicollinearity (tolerance and VIF), heteroscedasticity (Glejser test) and autocorrelation (Durbin–Watson), following Ghozali (2018). Hypotheses were then tested with the t-test for each variable, the F-test for the variables jointly, and the coefficient of determination (R^2), all at a five percent significance level. With only fifteen observations, dynamic time-series models such as the error correction model or VAR, which require unit root and cointegration tests, were not feasible. A static OLS model with classical assumption tests is the approach commonly used in district-level studies with short annual series, and its limits are discussed at the end of the article.

RESULTS OF RESEARCH AND DISCUSSION

1. Descriptive Statistics

Table 1 summarises the data. The spending variables are shown in natural logarithms, as they enter the model.

Table 1 Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Education expenditure (ln)	15	12.24	13.55	13.141	0.352
Health expenditure (ln)	15	11.48	13.10	12.489	0.510
Housing and public facilities expenditure (ln)	15	8.37	12.93	11.466	1.080
HDI	15	57.23	67.33	62.439	2.890

Source: SPSS output, processed data (2026)

The standard deviations already show where the story lies. Education spending was the most stable of the three, with a standard deviation of only 0.352 in log terms. Health spending varied a little more (0.510). Housing and public facilities spending varied far more than either (1.080), and its minimum of 8.37 corresponds to the Rp4.3 billion recorded in 2016. The HDI ranged from 57.23 in 2010 to 67.33 in 2024, with a mean of 62.44.

2. Classical Assumption Test Results

a. Normality Test

Normality was tested with the One-Sample Kolmogorov Smirnov test on each variable. The data are considered normal if the significance value is above 0.05.

Table 2 Normality Test (One-Sample Kolmogorov Smirnov)

Variable	Statistic	df	Sig.
Education expenditure	0.209	15	0.076
Health expenditure	0.209	15	0.078
Housing and public facilities expenditure	0.186	15	0.174
HDI	0.080	15	0.200

Source: SPSS output, processed data (2026)

All four significance values are above 0.05, ranging from 0.076 for education to 0.200 for the HDI. The data therefore meet the normality assumption and can be analysed with parametric tests.

b. Multicollinearity Test

A regression model is free of multicollinearity when every independent variable has a tolerance value above 0.10 and a variance inflation factor (VIF) below 10 (Ghozali 2018).

Table 3 Multicollinearity Test

Variable	Tolerance	VIF	Information
Education expenditure	0.297	3.363	Free
Health expenditure	0.345	2.901	Free
Housing and public facilities expenditure	0.747	1.339	Free

Source: SPSS output, processed data (2026)

Every tolerance value is above 0.10 and every VIF is below 10. Education and health spending are the most closely related pair, which is not surprising because both tend to rise with the overall size of the budget, but their VIF values of 3.363 and 2.901 are well within the limit. The three variables can be used together in one model.

c. Heteroscedasticity Test

The Glejser test regresses the absolute value of the residuals on the independent variables. Heteroscedasticity is present if any variable has a significance value below 0.05.

Table 4 Heteroscedasticity Test (Glejser)

Model	B	t	Sig.
(Constant)	7.673	0.769	0.458
Education expenditure	2.111	1.619	0.134
Health expenditure	1.229	1.472	0.169
Housing and public facilities expenditure	0.341	1.273	0.229

Source: SPSS output, processed data (2026)

The significance values for education (0.134), health (0.169), and housing and public facilities (0.229) are all above 0.05. None of the variables explains the size of the residuals, so the model shows no sign of heteroscedasticity.

d. Autocorrelation Test

Autocorrelation was checked with the Durbin Watson statistic, reported together with the model summary in Table 5.

Table 5 Model Summary and Durbin Watson Test

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
0.898	0.806	0.753	1.43631	2.062

Source: SPSS output, processed data (2026)

With n = 15 and k = 3, the Durbin Watson table at the five percent level gives dL = 0.814 and dU = 1.750, so 4 dU = 2.250. The statistic of 2.062 lies between dU and 4 dU (1.750 < 2.062 < 2.250), which is the region of no autocorrelation. Since the model passes all four tests, the estimates can be used for hypothesis testing.

3. Multiple Linear Regression Analysis

Table 6 Multiple Linear Regression Results

Model	B	Std. Error	Beta	t	Sig.
(Constant)	10.817	15.323		0.706	0.495
Education expenditure	4.033	2.003	0.491	2.014	0.069
Health expenditure	3.099	1.282	0.547	2.417	0.034
Housing and public facilities expenditure	1.609	0.411	0.601	3.910	0.002

Source: SPSS output, processed data (2026)

The estimated equation is:

HDI = 10.817 + 4.033 lnEDU + 3.099 lnHEALTH 1.609 lnHOUSING + e

Because the spending variables are in logarithms while the HDI is in index points, the coefficients are best read through percentage changes. A one percent rise in education spending, other things equal, is associated with an HDI that is about 0.040 points higher. For health spending the figure is about 0.031 points. A one percent rise in housing and public facilities spending is associated with an HDI that is about 0.016 points lower. Put in more practical terms, a ten percent increase in each budget line corresponds to roughly +0.38, +0.30 and 0.15 HDI points respectively. The constant of 10.817 has no meaningful economic interpretation, since it refers to a situation in which the log of every spending variable is zero, far outside the range of the data.

The standardised coefficients (Beta) add another angle. Housing and public facilities spending has the largest Beta in absolute terms (0.601), followed by health (0.547) and education (0.491). In other words, the volatile infrastructure budget is the

variable whose movements line up most strongly with the HDI in this sample, though in the opposite direction from what theory predicts.

4. Hypothesis Test Results

a. t-Test

With df = n k 1 = 15 3 1 = 11, the critical t value at the five percent level (two-tailed) is 2.201. The results in Table 6 lead to the following decisions.

For education expenditure, the t value is 2.014, below 2.201, and the significance value is 0.069, above 0.05. Education spending therefore has no significant partial effect on the HDI of Bangkalan Regency, and H_1 is rejected. The sign is positive, and the p-value is not far from the threshold, so the result is better described as a weak positive association than as no relationship at all.

For health expenditure, the t value is 2.417, above 2.201, with a significance value of 0.034. Health spending has a positive and significant partial effect on the HDI, and H_2 is accepted.

For housing and public facilities expenditure, the t value is 3.910, whose absolute value is above 2.201, with a significance value of 0.002. This variable has a significant partial effect on the HDI, so H_3 is accepted in the sense that an effect exists. Its direction, however, is negative, which is the opposite of the theoretical expectation.

b. F-Test

Table 7 F-Test (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	94.265	3	31.422	15.231	< 0.001
Residual	22.693	11	2.063		
Total	116.957	14			

Source: SPSS output, processed data (2026)

The F value of 15.231 is well above the critical F value of 3.587 (df = 3; 11), and the significance value is below 0.001. Expenditure on education, health, and housing and public facilities jointly has a significant effect on the HDI of Bangkalan Regency.

c. Coefficient of Determination (R^2)

Table 5 shows an R^2 of 0.806. The three spending variables together account for 80.6 percent of the variation in Bangkalan's HDI over 2010 2024, and the remaining 19.4 percent comes from factors outside the model. The adjusted R^2, which corrects for the number of variables relative to the number of observations, is 0.753. A figure this high should be read with some care. The HDI rose almost in a straight line, and any variable with a trend of its own will appear to explain a large share of that movement. The R^2 says the model fits well; it does not by itself say that the spending caused the rise.

5. Discussion

a. Education Expenditure and the HDI

Education spending in Bangkalan moves in the same direction as the HDI, but the effect is not strong enough to be significant at the five percent level. This does not mean that schooling does not matter for human development. It means that, year to year, the size of the education budget is not a good predictor of where the HDI goes next.

The most likely reason is timing. Money spent on classrooms, teachers and school operations this year shows up in the HDI only after children stay in school longer and, much later, enter the adult population. Mean years of schooling, one of the two education indicators, measures people aged 25 and above, so it moves slowly by construction. Bangkalan illustrates this well. According to BPS, in 2025 expected years of schooling in the regency stood at 12.09 years, but mean years of schooling was only 6.15 years. Children today are expected to finish senior secondary school, while the average adult has barely completed primary school. Closing that gap takes a generation, not a budget cycle.

A second reason is that a large share of any education budget goes to salaries and routine operations, which keep the system running but do not necessarily expand access or raise quality. The size of the allocation says little about how it is spent. The sharp drops in 2016 and 2022 also show that the education budget was not as steady as its rising trend suggests. This result agrees with Meydiasari and Soejoto (2017), who

found a positive but insignificant effect of education spending on Indonesia's HDI, and differs from Fajar and Indrawati (2020) and Wahyuni and Amar (2023), who found education spending significant in Cianjur and West Sumatra.

b. Health Expenditure and the HDI

Health spending is the only one of the three variables with the effect that theory predicts: positive and significant. Years in which Bangkalan spent more on health were, other things equal, years in which its HDI was higher. This fits the human development view, because health is one of the HDI's three dimensions and the path from spending to outcome is short. Better-equipped health centres, more medical staff and wider coverage of basic services can lower illness and mortality within a few years, and these gains feed into life expectancy at birth. BPS figures show that life expectancy in Bangkalan reached 73.62 years in 2025.

The local context supports this reading. Bangkalan has many villages far from the regency capital, and access to care in these areas has been a recurring concern in the planning of the regency health office. When spending widens that access, the effect reaches a part of the population whose health outcomes have the most room to improve. The finding is in line with Maulina and Andriyani (2020), Sasongko and Wibowo (2022), Wahyuni and Amar (2023), and Imantria and Kurnia (2024), all of whom found health spending to raise the HDI.

c. Housing and Public Facilities Expenditure and the HDI

The negative and significant coefficient for housing and public facilities spending is the result that needs the most care. It should not be read as evidence that building roads, water systems or settlements makes people worse off. Theory gives no reason to expect that, and nothing in the data suggests it. What the coefficient captures is how this particular budget line moved compared with the HDI over these fifteen years.

Figure 2 makes the pattern visible. Housing and public facilities spending was by far the most erratic of the three. It rose to about Rp412 billion in 2014, collapsed to Rp4.3 billion in 2016, recovered in 2018 2019, and then fell steadily to under Rp50 billion in 2024. Over the same years, especially after 2019, the HDI kept climbing.

When one series trends down while the other trends up, a static regression will report a negative relationship, whether or not one causes the other. A single-year fall of the size seen in 2016 is also more likely to reflect a change in project cycles or in how spending was classified than a real disappearance of public services, and such an extreme value carries a lot of weight in a sample of fifteen.

There are substantive explanations as well. Infrastructure takes time to plan, build and come into use, so spending in a given year may only benefit residents several years later. Spending in this sector may also rise precisely when facility gaps are largest, which would link higher spending to weaker conditions in the same period. And the impact depends heavily on what is built: a new road in a well-served area adds little to human development, while clean water in a village without it can add a great deal. Previous studies show the same mixed picture. Fajar and Indrawati (2020) found no significant effect in Cianjur, while Wahyuni and Amar (2023) found a positive and significant effect in West Sumatra. The Bangkalan result adds a case in which an unstable allocation, rather than the sector itself, appears to drive the sign.

Taken together, the three findings suggest that budget size alone is a weak guide to human development outcomes in Bangkalan. Spending that reaches people quickly and directly, as health spending does, shows up in the HDI. Spending whose benefits are slow to arrive, or whose allocation swings sharply from year to year, does not show up in a simple annual model, even if it matters in the long run.

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CONCLUSIONS AND ADVICE

Over 2010 2024, government expenditure on education, health, and housing and public facilities jointly had a significant effect on the HDI of Bangkalan Regency and explained about 80 percent of its variation. Taken one at a time, the three types of spending behaved differently.

Education spending had a positive but insignificant effect, most plausibly because its benefits reach the HDI only after many years. Health spending had a positive and significant effect, consistent with the short path from better health services to longer lives. Housing and public facilities spending had a significant negative coefficient, which mainly reflects a highly unstable allocation that fell in recent years while the HDI kept rising, rather than any harmful effect of infrastructure itself.

For the Bangkalan government, the clearest message is to keep health spending as a priority, with particular attention to access in remote villages. In education, the focus should move from the size of the budget to what it buys: keeping children in school through senior secondary level and improving teaching quality, with progress tracked through school completion and mean years of schooling rather than budget absorption. For housing and public facilities, the allocation needs to be steadier and planned over several years, so that projects are finished and used, and it should be directed first to clean water, sanitation and settlements where basic facilities are still lacking.

This study has clear limits. Fifteen annual observations are few, the model is static, and it does not allow for delayed effects or for the common upward trend in the data. Future research could add lagged spending variables or a time trend, use a panel of the four Madura regencies or of all East Java districts to increase the number of observations, and include control variables such as poverty, unemployment and per capita income.

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