Journal of International Conference Proceedings (JICP)
Vol. 9 No. 4, pp. 332-343, November, 2026
E-ISSN: 2621-993X P-ISSN: 2622-0989
https://ejournal.aibpmjournals.com/index.php/JICP/index

Poverty Dynamics in the Pandemic and Recovery Era: The Role of Health Expenditure, Unemployment, Gender Development, and Economic Growth in Central Java

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ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Sriwinarti, A., Suharsih, S., Astuti, R. D., & Mahaputra, A. D. (2026). Poverty dynamics in the pandemic and recovery era: The role of health expenditure, unemployment, gender development, and economic growth in Central Java. *Journal of International Conference Proceedings (JICP), 9*(4), 332–343

DOI:
https://doi.org/10.32535/jicp.v9i4.5165

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Received: 7 September 2026
Accepted: 10 October 2026
Published: 13 November 2026

ABSTRACT

Poverty remains a multidimensional challenge in Central Java, particularly during the COVID-19 pandemic and subsequent economic recovery. This study examines the effects of health expenditure, the Open Unemployment Rate (TPT), Gender Development Index (GDI), and economic growth on poverty across Central Java. Using a quantitative approach, panel data covering 35 regencies and cities from 2019 to 2024 were obtained from the Central Bureau of Statistics (BPS) and Directorate General of Fiscal Balance (DJPK). The Chow and Hausman tests selected the Fixed Effect Model (FEM), with White period robust standard errors addressing heteroskedasticity and autocorrelation. Results indicate that health expenditure, GDI, and economic growth significantly reduce poverty, while TPT significantly increases it. Collectively, these variables significantly explain poverty variations, with an R^2 of 0.987. The findings emphasize efficient health spending, labor-intensive employment creation, and gender mainstreaming as essential strategies for strengthening regional poverty alleviation policies and promoting inclusive economic development.

Keywords: Economic growth; Gender development; Health expenditure; Panel data; Poverty; Unemployment

INTRODUCTION

Poverty is a multidimensional development problem and a central concern of the first Sustainable Development Goal, which calls for ending poverty in all its forms. In Central Java, poverty changed markedly during 2019–2024 because the observation window includes both the COVID-19 shock and the economic reopening that followed. Statistics Indonesia data (BPS) show that the provincial poverty rate increased from 10.80% in 2019 to 11.41% in 2020 and peaked at 11.79% in 2021. It then declined to 10.93% in 2022, 10.77% in 2023, and 10.47% in 2024. The resulting inverted-U pattern indicates that the pandemic temporarily reversed previous welfare gains, while the recovery brought poverty below the pre-pandemic baseline. The slower decline toward the end of the period nevertheless suggests the persistence of structural poverty that cannot be addressed by aggregate growth alone (BPS, 2024; Todaro & Smith, 2015).

Local fiscal policy is one important channel through which regional governments can protect vulnerable households. Health expenditure functions as both a social safety net and an investment in human capital. When public health services, health insurance subsidies, and primary-care facilities reduce households' out-of-pocket medical costs, poor families can preserve expenditure for food, education, housing, and other basic needs. Human Capital Theory further suggests that better health improves physical and cognitive capacity, raises labor productivity, and supports higher earnings (Schultz, 1961; Grossman, 1972; Bloom et al., 2004). The effectiveness of this mechanism, however, depends on whether public spending actually reaches low-income groups and translates into accessible services (Sasana, 2019).

Labor-market conditions provide a second transmission channel. The Open Unemployment Rate (TPT) captures the share of the labor force that is actively seeking work but remains unemployed. A rise in unemployment can abruptly remove the main income stream of a household, weaken purchasing power, and push near-poor households below the poverty line. This mechanism is consistent with Okun's Law and the broader Keynesian view that weak labor absorption is associated with lower output and household income (Okun, 1962; Sukirno, 2016). In a province with a large number of informal and low-wage workers, the poverty consequences of job loss can be particularly severe because financial buffers are limited.

The inclusiveness of development also matters. The Gender Development Index (GDI, locally abbreviated IPG) compares human-development achievements between women and men in health, education, and living standards. Higher gender development is expected to reduce poverty by expanding women's access to education, employment, income, and productive resources. Sen's capability approach views poverty not only as low income but also as deprivation of substantive opportunities, while the Gender and Development perspective emphasizes that women's participation can strengthen household welfare and intergenerational outcomes (Sen, 1999; Boserup, 2007). More equal access to human-capital and labor-market opportunities can therefore create a second source of household income and improve spending on children's health and education.

Economic growth is the fourth determinant considered in this study. Growth expands regional output and, when it is sufficiently inclusive, can generate jobs, business opportunities, and higher per-capita income. Classical development arguments and pro-poor growth literature therefore treat growth as a necessary condition for poverty reduction (Kuznets, 1955; Dollar & Kraay, 2002; Ravallion, 2001). Nevertheless, the trickle-down process may be weak when gains are concentrated in capital-intensive sectors or when inequality prevents low-income households from accessing new

opportunities. The question is therefore not only whether the economy grows, but whether growth is transmitted through employment, household income, public services, and wider participation.

Previous empirical studies report mixed findings. Economic growth and lower unemployment are generally associated with poverty reduction, while health spending and improvements in gender-related human development can reinforce household resilience (Pratama & Setiawan, 2021; Handayani et al., 2021; Sari & Rahayu, 2020; Wahyuni & Arsyad, 2019). Yet other studies note that public spending may be ineffective when allocation is inefficient and that growth may be inelastic with respect to poverty when the benefits of expansion do not reach lower-income groups (Fadillah, 2020; Ramadhan & Firmansyah, 2020; Kusuma & Asmara, 2023). Most earlier studies also examine these channels separately. This study therefore integrates fiscal, labor-market, gender-development, and macroeconomic dimensions in a single regional panel model covering the unusual transition from pandemic disruption to post-pandemic recovery. Its objective is to estimate how health expenditure, unemployment, gender development, and economic growth are associated with poverty across 35 regencies and cities in Central Java during 2019–2024.

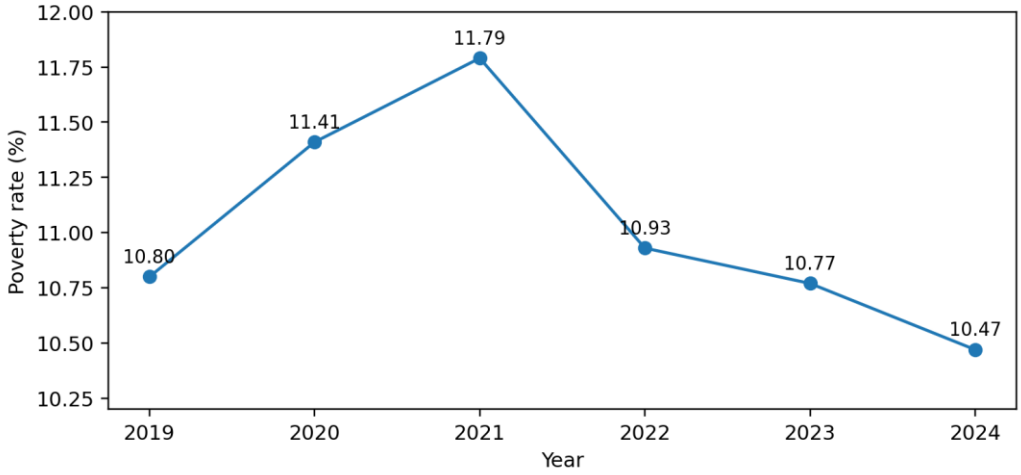


Figure 1. Poverty Rate in Central Java, 2019–2024 (%)

Source: Statistics Indonesia (BPS), 2019–2024.

LITERATURE REVIEW

Health Expenditure and Poverty

Health expenditure can influence poverty through both risk protection and productivity. Medical shocks are financially damaging to poor and near-poor households because treatment costs arise at the same time that illness can reduce labor supply and income. Public provision of primary care, insurance subsidies, vaccination, and preventive services can reduce this double burden. Human Capital Theory treats health as an asset that raises an individual's productive capacity; healthier workers lose fewer working days, can remain economically active for longer, and may earn higher income (Schultz, 1961; Becker, 1964; Grossman, 1972). In the Indonesian regional context, the effectiveness of health expenditure depends on allocation quality, service accessibility, and whether spending reaches vulnerable groups. Sari and Rahayu (2020) and Putri and Wibowo (2021) emphasize the poverty-reduction role of public health functions, while Fadillah (2020) highlights the possibility of weak effects when spending is inefficient. Fiscal policy also interacts with regional development more broadly: Sanggrangbano et al. (2024), in

an AIBPM-published IJAFAP study, show that fiscal policy through public expenditure can significantly support regional economic development, reinforcing the argument that the composition and effectiveness of local spending matter.

Unemployment and Poverty

Unemployment affects poverty primarily through the loss of earned income. For households near the poverty line, even a short unemployment spell can reduce consumption below minimum needs. The theoretical relationship is consistent with Okun's Law, which links labor-market slack to weaker economic activity (Okun, 1962). It is also consistent with the Keynesian emphasis on effective demand and employment. Indonesian evidence has repeatedly connected unemployment with poverty, especially during periods of macroeconomic disruption (Pratama & Setiawan, 2021; Handayani et al., 2021; Riyanto & Hakim, 2023). The 2020–2021 pandemic period is particularly relevant because mobility restrictions and business closures affected labor-intensive manufacturing, trade, and services. Conversely, reopening in 2022–2024 allowed firms to reabsorb workers and restore household income. Murniati et al. (2023), in the Asia Pacific Journal of Management and Education, also document an empirical link between economic growth and labor-force participation in Indonesia, supporting the view that labor absorption is a central pathway through which macroeconomic recovery can affect welfare.

Gender Development and Poverty

Gender development affects poverty by changing the distribution of capabilities and earning opportunities within households. The Gender Development Index captures relative achievements of women and men in longevity, knowledge, and living standards. When women gain better access to education, health, employment, and income, households may become less dependent on a single earner and more resilient to shocks. Sen's (1999) capability approach provides the conceptual foundation for this argument because poverty includes deprivation of opportunities, not merely low monetary income. Klasen (2002) further shows that gender inequality in education can weaken development performance. In Indonesia, women's economic participation is also connected with household welfare and labor-market resilience. Although the GDI is broader than employment alone, evidence on human development and economic activity suggests that improvements in human capabilities can support regional development (Runtunuwu & Kotib, 2021). This study therefore expects higher GDI values to be associated with lower poverty.

Economic Growth and Poverty

Economic growth can reduce poverty when expansion raises labor demand, real income, and business opportunities for low-income groups. The classic trickle-down proposition suggests that gains originating in modern sectors can spread to traditional sectors through employment, demand for local inputs, and income circulation (Lewis, 1954; Rostow, 1960). Contemporary pro-poor growth research, however, stresses that the poverty effect of growth depends on distribution and access (Dollar & Kraay, 2002; Ravallion, 2001). When growth is capital intensive or inequality is high, poverty can fall more slowly than aggregate output rises. Evidence from Indonesian regions remains mixed, which makes the Central Java case during a crisis-recovery cycle especially informative. The expected sign in this study is negative: higher economic growth should be associated with lower poverty, provided that the expansion generates jobs and income opportunities that are accessible to vulnerable households.

Integrated Analytical Framework

The four explanatory variables represent complementary dimensions of poverty reduction. Health expenditure captures local fiscal protection and human-capital

investment; unemployment captures labor-market exclusion; the GDI captures gendered access to capabilities; and economic growth captures the overall expansion of regional economic activity. Estimating them jointly helps distinguish their partial associations with poverty while holding the other dimensions constant. The integrated approach is especially relevant for 2019–2024 because the pandemic simultaneously affected health needs, employment, public budgets, gendered economic roles, and output. The study consequently tests whether stronger health spending, higher gender development, and faster economic growth are associated with lower poverty, while higher unemployment is associated with higher poverty.

RESEARCH METHOD

This study uses a quantitative explanatory design based on balanced panel data for all 35 regencies and cities in Central Java over 2019–2024. The combination of 35 cross-sectional units and six annual periods produces 210 observations. All variables are secondary data obtained from Statistics Indonesia (BPS) and the Directorate General of Fiscal Balance (DJPK), Ministry of Finance. The dependent variable is the poverty rate (POV), measured as the percentage of the population living below the official poverty line. The explanatory variables are the natural logarithm of realized local government health expenditure (LNHEALTH), the Open Unemployment Rate (TPT), the Gender Development Index (GDI/IPG), and the regional economic growth rate (PE).

Panel-data regression is used because it combines variation across regions with variation over time and allows the model to control for unobserved regional characteristics that are relatively persistent (Baltagi, 2013, 2021; Wooldridge, 2010). Model selection follows the standard sequence of specification tests. The Chow test compares the Common Effect Model with the Fixed Effect Model, while the Hausman test compares Fixed and Random Effects (Hausman, 1978). The Lagrange Multiplier test is relevant when the Common and Random Effects alternatives need to be compared; however, once the Chow and Hausman tests both select Fixed Effects, the Fixed Effect Model becomes the preferred specification for this dataset.

The empirical specification is: $POV_{it} = \beta 0 + \beta 1\ LNHEALTH_{it} + \beta 2\ TPT_{it} + \beta 3\ GDI_{it} + \beta 4\ PE_{it} + \mu_i + \varepsilon_{it}$, where i denotes a regency/city, t denotes year, μ_i captures time-invariant regional fixed effects, and ε_{it} is the idiosyncratic error term. The coefficient β1 measures the association between logged health expenditure and poverty; β2 captures the effect of unemployment; β3 captures the effect of gender development; and β4 captures the effect of economic growth.

Diagnostic tests are used to assess the assumptions of the baseline model. Normality is evaluated using the Jarque-Bera test. Multicollinearity is assessed through the correlation matrix and the conventional VIF criterion. Heteroskedasticity is evaluated using a regression of the absolute residuals, while serial correlation is examined using the Durbin-Watson statistic. The source estimation identifies heteroskedasticity and positive serial correlation. Because the dataset is a short panel and the dependence is concentrated in the time dimension, the final inference is based on Fixed Effects estimated with White-period robust standard errors and covariance. Hypothesis testing uses a 5% significance level.

RESULTS

The model-selection tests strongly support the use of province-style cross-sectional fixed effects at the regency/city level. The Chow test produces a cross-section Chi-square probability of 0.0000, rejecting the pooled Common Effect Model. The Hausman test then

produces a probability of 0.0044, rejecting the Random Effect specification in favor of Fixed Effects. These results indicate that unobserved regional characteristics are correlated with the explanatory variables and should be controlled through fixed intercepts.

Table 1. Chow Test for Fixed Effects

Effects Test	Statistic	d.f.	p-value
Cross-section F	255.416775	(34, 171)	< .001
Cross-section Chi-square	828.889579	34	< .001

Source: Authors' calculation from EViews output.

Table 2. Hausman Test

Test summary	Chi-square statistic	d.f.	p-value
Cross-section random	15.163096	4	.0044

Source: Authors' calculation from EViews output.

The baseline Fixed Effect Model has an R-squared of 0.987009 and an adjusted R-squared of 0.984122. The overall F-statistic is 341.9000 with $p < 0.001$, indicating that the explanatory variables are jointly significant. In the baseline estimation, health expenditure has a coefficient of -0.315993, unemployment 0.164712, the GDI -0.207052, and economic growth -0.049653; all four coefficients are statistically significant at the 5% level.

Table 3. Baseline Fixed Effect Model

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	36.67539	7.257181	5.053669	< .001
LNHEALTH	-0.315993	0.126981	-2.488512	.0138
TPT	0.164712	0.036281	4.539950	< .001
GDI (IPG)	-0.207052	0.082333	-2.514816	.0128
Economic growth	-0.049653	0.015710	-3.160643	.0019

Note. R^2 = .987009; adjusted R^2 = .984122; F = 341.9000, p < .001; Durbin-Watson = 1.669682. N = 210.

The diagnostic results require robust inference. The Jarque-Bera test yields a probability of 0.275245, so residual normality is not rejected. Pairwise correlations among the explanatory variables are all below 0.80, indicating no severe multicollinearity. The heteroskedasticity test, however, identifies a significant coefficient for LNHEALTH ($p = 0.0131$), while the Durbin-Watson statistic of 1.669 is below the reported lower critical bound of 1.726, indicating positive serial correlation. The final model therefore retains the Fixed Effect coefficients but uses White-period robust standard errors.

Table 4. Diagnostic Summary

Diagnostic	Statistic / indicator	Result	Interpretation
Normality	Jarque-Bera p = .275245	p > .05	Normality not rejected
Multicollinearity	All pairwise |r| < .80	Below threshold	No severe multicollinearity
Heteroskedasticity	LNHEALTH p = .0131	p < .05	Heteroskedasticity detected
Serial correlation	DW = 1.669; dL = 1.726; dU = 1.805	DW < dL	Positive serial correlation

Source: Authors' calculation from EViews output.

The robust results confirm the direction and statistical significance of all four explanatory variables. LNHEALTH remains negative and significant ($\beta = -0.315993$; $p = 0.0373$). TPT remains positive and highly significant ($\beta = 0.164712$; $p < 0.001$). GDI remains negative and significant ($\beta = -0.207052$; $p = 0.0073$), and economic growth remains negative and

significant (β = -0.049653; p = 0.0006). The coefficient of determination remains 0.987, meaning that 98.7% of the sample variation in poverty is explained by the regional fixed effects and the included explanatory variables, while 1.3% is associated with factors outside the model.

Table 5. Fixed Effect Model with White-Period Robust Standard Errors

Variable	Coefficient	Robust Std. Error	t-statistic	p-value
Constant	36.67539	6.983461	5.251750	< .001
LNHEALTH	-0.315993	0.150536	-2.099128	.0373
TPT	0.164712	0.037518	4.390157	< .001
GDI (IPG)	-0.207052	0.076265	-2.714917	.0073
Economic growth	-0.049653	0.014163	-3.505948	.0006

Note. R^2 = .987009; adjusted R^2 = .984122. White-period standard errors and covariance, d.f. corrected. N = 210.

DISCUSSION

Health Expenditure and Poverty

The negative and statistically significant coefficient on health expenditure indicates that larger local health budgets are associated with lower poverty across Central Java's regencies and cities. The result is economically plausible because illness can simultaneously increase household expenditure and reduce the ability to work. For poor and near-poor households, a serious health shock may therefore create a direct pathway into poverty. Public financing for primary health care, insurance subsidies, vaccination, and local health facilities can reduce catastrophic out-of-pocket costs and protect consumption of food, education, and other necessities. The result is consistent with Human Capital Theory: health expenditure is not merely consumption by government but an investment that helps preserve the productive capacity of workers (Schultz, 1961; Becker, 1964; Grossman, 1972). It is also consistent with Sari and Rahayu (2020) and Putri and Wibowo (2021), who emphasize the poverty-reducing role of health-related public spending. More broadly, the finding aligns with AIBPM evidence that effective regional fiscal expenditure can support local development outcomes (Sanggrangbano et al., 2024).

The timing of the sample strengthens this interpretation. During 2020–2021, budget refocusing toward pandemic control, vaccination, and treatment functioned as a shock absorber when households were simultaneously exposed to health and income risks. Without public intervention, the increase in Central Java's poverty rate to 11.79% in 2021 could have been more severe. During 2022–2024, continued access to health services supported the return of workers to productive activity as the economy reopened. The policy implication is not simply to increase the nominal health budget, but to improve its efficiency and targeting. Spending is more likely to reduce poverty when it reaches primary care, preventive services, insurance coverage, and vulnerable households rather than being absorbed by low-impact administrative expenditure.

Open Unemployment and Poverty

The open unemployment rate has a positive and significant association with poverty. A one-percentage-point increase in TPT is associated with an increase of about 0.165 percentage points in the poverty rate, holding the other variables and regional fixed effects constant. This is consistent with the income-loss mechanism: unemployment interrupts the main income stream of a household and rapidly reduces purchasing power. Households with little savings or social protection are especially exposed, because even a short period without earnings can push per-capita expenditure below the poverty line. The finding supports Okun's Law and earlier Indonesian evidence linking unemployment

with poverty (Okun, 1962; Pratama & Setiawan, 2021; Handayani et al., 2021; Riyanto & Hakim, 2023). AIBPM evidence also supports the broader growth-employment linkage; Murniati et al. (2023) show that economic growth and labor-force participation are dynamically connected in Indonesia.

The crisis-recovery pattern in Central Java illustrates this mechanism. During the pandemic, restrictions on mobility and economic activity generated layoffs and weaker labor demand in manufacturing, trade, and services. The increase in unemployment coincided with the rise in poverty. During the reopening period, firms restarted production and rehired workers, allowing the poverty rate to decline. The policy implication is that poverty programs cannot be separated from labor-market policy. Regional governments need employment creation in labor-intensive activities, skills programs aligned with local industry needs, and investment facilitation that encourages job creation rather than output growth with limited labor absorption. Such policies are particularly important for informal and low-wage workers who remain close to the poverty threshold.

Gender Development and Poverty

The GDI coefficient is negative and statistically significant, indicating that regions with stronger gender development tend to have lower poverty after controlling for health spending, unemployment, growth, and time-invariant local characteristics. This result supports the capability perspective: when women gain more equal access to health, education, and economic opportunities, the household's portfolio of capabilities expands and vulnerability decreases (Sen, 1999). A higher GDI can also increase the probability of dual-earner households, reduce dependence on a single income source, and improve household expenditure on children's nutrition, health, and education. These mechanisms help explain why gender development can contribute to both current poverty reduction and the interruption of intergenerational poverty.

The finding is consistent with earlier Indonesian studies on gender equality and poverty (Wahyuni & Arsyad, 2019; Lestari & Santoso, 2019; Wicaksono & Mulyani, 2022; Utami & Indraswari, 2021). It also connects with AIBPM evidence emphasizing the relationship between human development and broader economic development (Runtunuwu & Kotib, 2021). During the pandemic, gender-related capabilities may have been especially important because households had to adjust quickly to employment and care shocks. Where women had better education, health, digital access, and economic opportunities, they were potentially better positioned to diversify household income through informal work, microenterprises, or other activities. The policy implication is that gender mainstreaming should be treated as part of economic resilience, not only as a social objective. Expanding women's access to education, formal employment, entrepreneurship finance, and equal remuneration can strengthen household income and reduce poverty risk.

Economic Growth and Poverty

Economic growth has a negative and significant coefficient, indicating that stronger regional growth is associated with lower poverty. The result is consistent with the view that economic expansion can reduce poverty through several transmission channels. First, higher output raises demand for labor and increases household earnings. Second, expanding firms purchase inputs and services from local suppliers, creating indirect income effects. Third, higher economic activity can strengthen the fiscal base available for public services and social programs. The finding therefore supports the broad pro-poor growth proposition that growth is a necessary, although not always sufficient, condition for sustained poverty reduction (Dollar & Kraay, 2002; Ravallion, 2001).

The Central Java experience during 2019–2024 provides a clear context. Economic growth contracted by about 2.65% in 2020, while poverty subsequently reached 11.79% in 2021. After mobility restrictions were relaxed, growth recovered to around 5% and poverty declined to 10.47% by 2024. This pattern suggests that the recovery restored income-generating opportunities and allowed the benefits of aggregate expansion to reach a wider set of households. The result is also consistent with AIBPM research showing that economic growth is linked to human capital and labor participation in Indonesia (Murniati et al., 2023) and that regional fiscal policy can help stimulate development (Sanggrangbano et al., 2024). Nevertheless, the coefficient should not be interpreted as proof that growth automatically reduces poverty. The source literature warns that the trickle-down effect can fail when growth is highly unequal or concentrated in capital-intensive sectors (Ramadhan & Firmansyah, 2020; Siregar & Wahyuni, 2022). The most effective strategy is therefore inclusive growth combined with health investment, employment creation, and gender equality.

Integrated Policy Implications

Taken together, the four coefficients indicate that poverty reduction in Central Java is a joint fiscal, labor-market, social-inclusion, and growth challenge. Health expenditure reduces vulnerability by protecting households from medical shocks and preserving human capital. Lower unemployment is essential because job loss directly weakens household income. Gender development broadens capabilities and income opportunities, while economic growth creates the macroeconomic space in which employment and earnings can expand. Policy should therefore avoid treating these instruments as substitutes. A growth strategy without labor absorption may have a weak poverty effect; health spending without efficient targeting may fail to protect the poor; and employment programs that ignore women's participation can leave a large share of productive potential underused. Coordinated regional policy is more likely to convert recovery into durable poverty reduction.

CONCLUSION

Using balanced panel data for 35 regencies and cities in Central Java during 2019–2024, this study finds that health expenditure, gender development, and economic growth are negatively and significantly associated with poverty, while the open unemployment rate is positively and significantly associated with poverty. The Fixed Effect Model is selected by both the Chow and Hausman tests, and White-period robust standard errors are used because the baseline residuals exhibit heteroskedasticity and positive serial correlation. The robust coefficients are -0.315993 for logged health expenditure, 0.164712 for unemployment, -0.207052 for the Gender Development Index, and -0.049653 for economic growth. The overall model explains 98.7% of the sample variation in poverty.

The results imply that Central Java's poverty-reduction strategy should combine efficient health spending, employment creation, gender mainstreaming, and inclusive economic growth. Local governments should prioritize primary health services and sustainable health-insurance support for vulnerable households; direct investment and industrial policy toward labor-intensive activities; strengthen reskilling and upskilling through training institutions linked to local industry demand; and expand women's access to education, formal employment, entrepreneurship finance, and equal economic opportunities. The central policy message is that the post-pandemic decline in poverty is more likely to be sustained when macroeconomic recovery is translated into jobs, capabilities, and effective public services.

LIMITATION

This study has several limitations. It relies on aggregate secondary data and therefore cannot capture household-level heterogeneity in poverty, health shocks, or gender inequality. Health expenditure is proxied by local-government budget realization and does not include private spending or central-government health expenditure. The six-year observation period is relatively short for identifying long-run structural effects and is unusually influenced by the COVID-19 shock. The static panel specification also does not address potential reverse causality, for example between poverty and public spending or between poverty and growth. Finally, the geographic scope is limited to one province, so the estimated relationships should not be generalized mechanically to regions with different economic structures. Future research could use longer panels, dynamic estimators, household microdata, and broader measures of health and gender-related investment.

ACKNOWLEDGMENT

The author expresses gratitude to the institutions and data providers that supported the preparation of this research, particularly Statistics Indonesia (BPS) and the Directorate General of Fiscal Balance (DJPK), Ministry of Finance.

DECLARATION OF CONFLICTING INTERESTS

The author declares no potential conflicts of interest concerning the study, authorship, or publications of this article.

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