ANALYSIS OF THE EFFECTIVENESS OF GOVERNMENT SOCIAL PROGRAMS IN REDUCING POVERTY IN CENTRAL JAVA DURING THE 2021–2023 PERIOD

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Abstract

Using panel observations from 35 regencies and municipalities across Central Java, this quantitative investigation evaluates whether major public social assistance initiatives contributed to poverty alleviation between 2021 and 2023. The assessment encompasses *Program Keluarga Harapan* (PKH), BPJS, *Program Indonesia Pintar* (PIP), *Bantuan Pangan Non-Tunai* (BPNT), together with *Kartu Keluarga Sejahtera* (KKS). Empirical estimation relies exclusively on secondary datasets compiled by Statistics Indonesia (BPS) and the Ministry of Primary and Secondary Education. Three alternative panel regression specifications *Common Effect* Model (CEM), *Fixed Effect Model* (FEM), and *Random Effect* Model (REM) are estimated before statistical model selection is determined through the Chow, Hausman, and Lagrange Multiplier procedures. Comparative testing ultimately identifies the *Fixed Effect Model* (FEM) as the specification providing the most appropriate representation. The findings show that PKH, BPJS, and PIP have a negative and statistically significant effect on poverty, indicating that these programs effectively reduce poverty levels. In contrast, BPNT and KKS do not show a significant effect on poverty reduction. Overall, the results suggest that social assistance programs focused on education and health are more effective in alleviating poverty compared to consumption-based assistance programs.

Keywords: BPJS, *Program Keluarga Harapan*, *Program Indonesia Pintar*, Poverty, Social Assistance

INTRODUCTION

Poverty remains a multidimensional challenge in economic development because it reflects limitations in income, education, healthcare, social protection, and the fulfillment of basic needs. In developing countries, persistent poverty can create a *vicious cycle of poverty* that restricts human capital development and long-term economic growth. Government intervention through social protection therefore plays an important role in reducing household vulnerability and improving welfare. Previous evidence indicates that cash and non-cash social assistance programs can contribute to poverty reduction and improve consumption among low-income households (Hagen-Zanker et al., 2016).

Indonesia implements several social protection programs to address poverty and socioeconomic vulnerability, including *Program Keluarga Harapan* (PKH), *Bantuan Pangan Non-Tunai* (BPNT), *Program Indonesia Pintar* (PIP), the Social Security Administering Body (BPJS), and *Kartu Keluarga Sejahtera* (KKS). These programs adopt different intervention mechanisms. PKH provides conditional cash transfers associated with education and health requirements, BPNT supports household food consumption, PIP expands access to education, BPJS protects households from health-related financial risks, and KKS facilitates access to social assistance. Such interventions are expected to improve household welfare both directly through income and consumption support and indirectly through investment in human capital. Ariel et al. (2009) demonstrated that conditional social assistance can contribute to increased investment in human capital.

Table 1.
Poverty Level in Central Java Province, 2021–2023

Year	Number of Poor Population (Million Persons)	Percentage (%)
2021	4.11	11.25
2022	3.83	10.93
2023	3.79	10.77

Source: Central Java Statistics Agency (BPS), processed data.

Central Java recorded a gradual decline in poverty during 2021–2023. The percentage of the poor population decreased from 11.25% or approximately 4.11 million people in 2021 to 10.93% or 3.83 million people in 2022 and further declined to 10.77% or 3.79 million people in 2023. Although these figures indicate continuous improvement, the decline remained relatively limited despite the implementation of various social protection programs. This condition raises an empirical question regarding the extent to which major social assistance programs contribute to variations in poverty across regions and over time.

The relationship between social protection and poverty can primarily be explained through the *Capability Approach* and Human Capital perspective. The *Capability Approach* views poverty as a limitation in individuals' ability to achieve valued functions, while the Human Capital perspective emphasizes that investments in education and health can improve productivity and long-term economic welfare. In this context, social assistance can reduce immediate household burdens while programs related to education and healthcare can strengthen productive capacity. Therefore, the effectiveness of social protection depends not only on the provision of assistance but also on program coverage, implementation quality, and regional socioeconomic characteristics.

Previous studies have reported mixed findings regarding the effectiveness of social assistance programs. Pratiwi and Imsar (2022) found that although PKH and BPNT implementation followed established procedures, their effectiveness in reducing poverty remained limited due to external factors such as the pandemic and household consumption behavior. Similar findings were reported by Khodiziah et al. (2014) and Rahayu and Fitriani (2023), who concluded that PKH and BPNT had not achieved optimal effectiveness. Quantitative studies have also produced inconsistent results. Swandriano and Arif (2023) found that the Village Fund and PIP significantly affected poverty reduction, whereas PKH did not, although the variables were jointly significant with an explanatory power of 52.42%. Fadhli et al. (2023) reported that BPNT had no significant effect, whereas PKH significantly contributed to poverty alleviation, with an R^2 of 0.533. In contrast, Trisna et al. (2025) showed that KKS significantly improved community welfare, with an R^2 of 0.45, while Mirda and Mohammad (2025) found that PIP had a significant negative effect on poverty, whereas BPJS-PBI was insignificant. These differences indicate that the effects of social assistance may vary according to program characteristics, regional conditions, implementation effectiveness, and analytical approaches.

Despite the growing literature on social protection and poverty, previous studies generally examine only one or a limited number of assistance programs and frequently focus on individual regions or use cross-sectional and qualitative approaches. Empirical evidence simultaneously evaluating PKH, BPJS, PIP, BPNT, and KKS within a single regional panel-data framework remains limited, particularly in Central Java Province. This study addresses this gap by analyzing variations in poverty across regions and over time during the 2021–2023 period using the *Fixed Effects Model* (FEM), which controls for unobserved characteristics that differ across cross-sectional units but remain relatively constant over time. The novelty of this study lies in integrating five major social protection programs into a single panel-data model, thereby allowing their respective contributions to poverty variation to be evaluated simultaneously while accounting for regional heterogeneity. Accordingly, the study provides empirical evidence that can support a more comprehensive evaluation of social protection policies and poverty alleviation strategies in Central Java Province.

REVIEW OF LITERATURE

Previous studies on social protection and poverty alleviation demonstrate that the effectiveness of government assistance varies according to the type of intervention, program implementation, beneficiary characteristics, regional conditions, and analytical approach. Broadly, the literature can be classified into three main mechanisms: income and consumption support, investment in human capital, and integrated social protection. These mechanisms provide the empirical and theoretical foundation for examining the effects of PKH, BPJS, PIP, BPNT, and KKS on poverty.

Social assistance programs that directly support household income and consumption, such as BPNT, PKH, and other cash-transfer schemes, are generally designed to reduce the immediate economic burden of poor households. However, previous findings regarding their effectiveness remain inconsistent. Pratiwi and Imsar (2022) found that BPNT distribution in Batu Bara Regency generally followed government procedures in terms of targeting,

socialization, and monitoring, but the program had not substantially reduced poverty. External economic pressures, particularly the COVID-19 pandemic, as well as beneficiary consumption behavior, were identified as factors limiting its effectiveness. Similarly, Rahayu and Fitriani (2023) reported that BPNT reduced household expenditure burdens but had not effectively reduced poverty because of inaccurate beneficiary targeting, insufficient data updating, and weaknesses in program monitoring.

The empirical evidence regarding PKH is also mixed. Khodiziah et al. (2014) found that PKH implementation in Dawarblandong District had not optimally alleviated poverty because of limited resources, weak coordination, inadequate community support, and incomplete compliance with implementation procedures. In contrast, Fadhli et al. (2023) found that PKH positively contributed to poverty alleviation, whereas BPNT showed a negative but statistically weaker relationship. Swandriano and Arif (2023), using panel data for Kudus Regency during 2018–2021, also reported differences in the effects of social protection programs. PIP showed a positive relationship with poverty, while the Village Fund and PKH showed negative coefficients, although the effect of PKH was statistically insignificant. These differences indicate that the effectiveness of income-support programs depends not only on the amount of assistance but also on targeting accuracy, implementation quality, economic conditions, and the characteristics of beneficiaries.

International evidence provides further support for the role of direct transfers while also demonstrating variation in program outcomes. Light et al. (2024), through a systematic review of studies in Sub-Saharan Africa, showed that *Conditional Cash Transfers* (CCTs) generally improved education and health outcomes because recipients were required to fulfill specific behavioral conditions. In contrast, *Unconditional Cash Transfers* (UCTs) provided greater flexibility and tended to strengthen economic resilience and mental well-being, although their effects on some physical health and food-security outcomes were inconsistent. Similarly, Brydon et al. (2024) found that cash-transfer programs across high-income countries generally produced beneficial effects on physical health, mental health, well-being, and maternal and child health, although several outcomes remained statistically insignificant. Ku et al. (2025) also demonstrated that social pension programs in South Korea reduced poverty, while Magalhães et al. (2024) found that Brazil's *Bolsa Família Program* contributed to poverty reduction and improvements in education and health. These findings suggest that direct social transfers can reduce socioeconomic vulnerability, but their effectiveness depends on program design and the dimensions of welfare being evaluated.

A second mechanism concerns investment in human capital through education and healthcare. From the Human Capital perspective, programs such as PIP and BPJS are expected to reduce poverty indirectly by improving educational participation, health protection, productivity, and future earning capacity. Empirical evidence, however, remains heterogeneous. Mirda and Mohammad (2025), using panel data from 38 regencies and cities in East Java during 2019–2023, found that PIP had a significant negative effect on poverty, indicating that educational assistance may contribute to poverty alleviation. In contrast, BPJS-PBI did not demonstrate a statistically significant effect. Meanwhile, Swandriano and Arif (2023) found a positive relationship between PIP and poverty in Kudus Regency. The difference between these findings may reflect regional socioeconomic disparities, differences in program coverage, measurement of beneficiaries, observation periods, or the possibility

that education and health interventions require a longer period before their effects are fully reflected in poverty indicators.

Integrated social protection instruments, such as KKS, also seek to improve household welfare by facilitating access to multiple assistance programs. Trisna et al. (2025) found that KKS significantly improved community welfare in Sidenreng Rappang Regency. Similarly, Nasution and Satria (2025) found that social assistance programs in Bandar Khalifah Village improved household welfare, particularly through increased consumption, although the effectiveness varied across BLT, BPNT, and PKH. Their findings further indicated that healthcare services, educational quality, the adequacy of assistance, and distribution accuracy influenced program effectiveness. These results imply that the effects of social protection cannot be separated from the administrative and institutional mechanisms through which assistance is delivered.

The mixed empirical findings can therefore be explained through several mechanisms. First, differences in targeting accuracy may cause assistance to be received by households that are not the most economically vulnerable. Second, variations in program implementation, monitoring, coordination, and data updating can influence the extent to which assistance reaches eligible beneficiaries. Third, regional socioeconomic characteristics may affect how households respond to assistance. Fourth, programs focusing on education and health may generate effects over a longer period than programs providing immediate consumption support. Finally, differences in research design, study period, sample composition, and estimation technique may also produce different empirical conclusions. Consequently, findings from one region or program cannot necessarily be generalized to other regions without considering these contextual differences.

Regional panel-data studies further demonstrate the importance of controlling for heterogeneity across districts and periods. Aulia and Arrafiqi (2024), using observations from 35 districts and municipalities in Central Java during 2020–2022, applied panel regression and compared *Common Effect*, *Fixed Effect*, and *Random Effect* specifications through model-selection procedures. Their findings demonstrated significant differences in the effects of regional socioeconomic indicators. Similarly, Khaqiqi and Sugiarti (2025), examining Central Java during 2014–2023, found that the Human Development Index significantly reduced poverty, whereas economic growth and wages were statistically insignificant. Mirda and Mohammad (2025) also employed panel regression and identified the *Fixed Effect Model* as the appropriate estimator. These studies demonstrate that regional heterogeneity is an important element in explaining socioeconomic outcomes and reinforce the relevance of panel-data estimation in poverty research.

The theoretical framework of this study is therefore concentrated on the *Capability Approach*, Human Capital Theory, and Social Safety Net Theory. The *Capability Approach* explains poverty as a limitation in individuals' ability to achieve valued socioeconomic functions rather than merely a shortage of income. Within this perspective, PKH, BPNT, KKS, PIP, and BPJS are expected to expand household capabilities by improving access to food, education, healthcare, and other basic services. Human Capital Theory provides a more specific explanation for PIP and BPJS because investments in education and health can improve individual productivity and future income-generating capacity. Meanwhile, Social Safety Net Theory explains the role of PKH, BPNT, and KKS as instruments that protect vulnerable households from income shortages and socioeconomic shocks.

Based on these theoretical and empirical perspectives, the present study treats poverty as the dependent variable and PKH, BPJS, PIP, BPNT, and KKS as explanatory variables representing different social protection mechanisms. Unlike previous studies that generally examine individual programs, limited combinations of assistance schemes, or specific local contexts, this study evaluates five major social protection programs simultaneously within a panel-data framework in Central Java Province. The use of the *Fixed Effects Model* (FEM) enables the analysis to control for unobserved characteristics that differ across cross-sectional units but remain relatively stable over time. This approach is expected to provide a more integrated explanation of how variations in social protection participation are associated with variations in poverty across regions and periods.

RESEARCH METHOD

This study employs a quantitative approach using panel data regression to examine the effects of government social protection programs on poverty across 35 regencies and municipalities in Central Java Province during the 2021–2023 period. The panel dataset combines cross-sectional observations across administrative regions with annual time-series observations, resulting in 105 regional-year observations. All variables were obtained from official secondary data published by Statistics Indonesia (BPS) and government institutions responsible for the respective social protection programs.

The dependent variable is the poverty rate (POV), measured as the percentage of the population living below the poverty line in each regency or municipality. The explanatory variables consist of Program Keluarga Harapan (PKH), Social Security Administering Body (BPJS), Program Indonesia Pintar (PIP), Bantuan Pangan Non-Tunai (BPNT), and Kartu Keluarga Sejahtera (KKS). The operational definitions and measurements of the variables are presented in Table 2:

Table 2.
Operational Definition and Measurement of Variables

Variable	Operational Definition	Measurement	Data Source	Transformation
POV	Proportion of the population classified as poor in each regency/municipality	Percentage (%)	Statistics Indonesia (BPS)	None
PKH	Coverage or participation in Program Keluarga Harapan as an indicator of conditional social assistance	Percentage (%)	Statistics Indonesia (BPS)	None
BPJS	Number of participants receiving public health protection through BPJS	Persons	Statistics Indonesia (BPS)	Natural logarithm (ln)
PIP	Number/coverage of beneficiaries of Program Indonesia Pintar as educational assistance for low-income households	According to the original published data	Ministry of Primary and Secondary Education	Natural logarithm (ln)

Variable	Operational Definition	Measurement	Data Source	Transformation
BPNT	Value of non-cash food assistance received by beneficiary households	Indonesian Rupiah (Rp)	Statistics Indonesia (BPS)	None
KKS	Number/coverage of households possessing Kartu Keluarga Sejahtera as an indicator of access to integrated social assistance	According to the original published data	Statistics Indonesia (BPS)	Natural logarithm (ln)

The selection of these variables is supported by previous empirical studies. PKH is included as an indicator of conditional social assistance based on Swandriano and Arif (2023) and Fadhli et al. (2023). BPJS represents health-related social protection and refers to Mirda and Mohammad (2025). PIP represents educational assistance and is adopted from Swandriano and Arif (2023) and related research on educational social protection. BPNT represents household food and consumption assistance based on Pratiwi and Imsar (2022), Fadhli et al. (2023), and Rahayu and Fitriani (2023). Meanwhile, KKS represents access to integrated government social assistance and refers to Trisna et al. (2025).

Natural logarithmic transformations are applied to BPJS, PIP, and KKS because these variables exhibit relatively large differences in magnitude across regencies and municipalities. The transformation reduces scale disparities and excessive dispersion, improves the comparability of observations, and facilitates the estimation of relationships in a panel regression framework. In addition, logarithmic transformation enables the coefficients of these variables to be interpreted in proportional terms while retaining variations across regions and years. Variables expressed directly as percentages or monetary indicators that were retained in their original specification were not transformed.

The general empirical model is specified as follows:

$$POV_{it} = \alpha + \beta_1 PKH_{it} + \beta_2 lnBPJS_{it} + \beta_3 lnPIP_{it} + \beta_4 BPNT_{it} + \beta_5 lnKKS_{it} + \varepsilon_{it}$$

where:

POV_{it}	*Poverty rate in region i and year t*
PKH_{it}	*Program Keluarga Harapan*
$lnBPJS_{it}$	*Natural logarithm of BPJS participation*
$lnPIP_{it}$	*Natural logarithm of PIP participation*
$BPNT_{it}$	*Bantuan Pangan Non-Tunai*
$lnKKS_{it}$	*Natural logarithm of KKS participation*
α	*Constant*
β_1–β_5	*Regression coefficients*
i	*Cross-sectional unit representing regency/municipality*
t	*Time period, 2021–2023*
ε_{it}	*Error term*

Because the model-selection procedure identifies the Fixed Effect Model (FEM) as the appropriate estimator, the final regression specification can be expressed as:

$$POV_{it} = \alpha_i + \beta_1 PKH_{it} + \beta_2 lnBPJS_{it} + \beta_3 lnPIP_{it} + \beta_4 BPNT_{it} + \beta_5 lnKKS_{it} + \varepsilon_{it}$$

where α_i represents region-specific intercepts that capture unobserved characteristics of each regency or municipality that remain relatively constant during the observation period.

Based on the theoretical framework and previous empirical findings, social protection programs are expected to contribute to lower poverty. Therefore, increases in the coverage or implementation of PKH, BPJS, PIP, BPNT, and KKS are expected to be associated with reductions in regional poverty rates. Nevertheless, the direction and statistical significance of each relationship are determined empirically because previous studies have reported heterogeneous effects across programs and regions.

Panel-model selection was conducted sequentially by comparing the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The Chow test was first applied to determine whether CEM or FEM was more appropriate. Subsequently, the Hausman test was conducted to compare FEM and REM. Based on the results of these tests, FEM was selected as the final estimation model. The Lagrange Multiplier test was not included because the model-selection process had already identified FEM through the Chow and Hausman procedures, making an additional comparison between CEM and REM unnecessary for the final model selection.

The estimated model was subsequently evaluated using inferential statistical tests. The t-test was employed to determine the partial effect of each explanatory variable on poverty, while the F-test was used to assess whether the explanatory variables jointly affected poverty. The coefficient of determination (R^2) was used to evaluate the proportion of variation in poverty that could be explained by PKH, BPJS, PIP, BPNT, and KKS together with the regional fixed effects included in the model.

RESULTS AND DISCUSSION

Table 3 presents comparative outcomes from PLS, FEM, and REM estimations together with findings obtained through the corresponding model selection procedures.

Table 3.
Results of Panel Data Regression Econometric Estimation Models

Variable	Regression Coefficient		
	PLS	FEM	REM
C	-13.77063	64.47005	11.90709
PKH	0.146317	-0.037275	-0.056633
LOG(BPJS)	2.697402	-1.487387	1.175418
LOG(PIP)	-0.943503	-2.747745	-1.119530
BPNT	0.162850	0.003209	0.061326
LOG(KKS)	-0.663006	-0.289399	-0.428654
R^2	0.603026	0.992793	0.282508
Adjusted. R^2	0.582977	0.988469	0.246271
F-Statistic	30.07734	229.5875	7.796114
Prob. F-Statistic	0.000000	0.000000	0.000003
Model Selection Test			
1. Chow			
Cross- Section F(34,65) = 103,390367; Prob. F = 0,0000			
2. Hausman			
Cross-Section random $\chi 2$ (5) = 92,769205; Prob. $\chi 2$ = 0,0000			

Source: BPS, processed data

Model specification was determined through sequential Chow and Hausman testing procedures. Statistical evidence supported the adoption of the *Fixed Effect Model* (FEM), because both the F-test and χ^2 test generated probability values of 0.0000, which were below the 0.01 significance threshold. The detailed parameter estimates obtained from the final FEM specification are subsequently reported in Tables 4 and 5.

Table 4.
***Fixed Effect Model* (FEM) Estimation Model**

POV_{it}= 64,47005 − 0,0372 PKH_{it} − 1,4873LOG$BPJS_{it}$ − 2,7477LOGPIP_{it} + 0,0032$BPNT_{it}$
(0,0812)*** (0,0144)** (0,000)* (0,8009)
− 0,2893LOGKKS_{it}
(0,2847)
R^2 = 0,9927; DW = 2,4204; F. = 229,5875; Prob. F = 0,0000

Source: BPS, processed data. Notes: * Significant at α = 0.01; ** Significant at α = 0.05; *** Significant at α = 0.10. Figures in parentheses represent the probability values of the t-statistics.

Table 5.
Regional Effects and Constants

No	Regency/City	Area Effect	Area Constant
1	Cilacap Regency	3.951041	68.421091
2	Banyumas Regency	5.920424	70.390474
3	Purbalingga Regency	6.112326	70.582376
4	Banjarnegara Regency	5.455314	69.925364
5	Kebumen Regency	8.498053	72.968103
6	Purworejo Regency	0.792054	65.262104
7	Wonosobo Regency	5.835749	70.305799
8	Magelang Regency	2.239456	66.709506
9	Boyolali Regency	-0.781911	63.688139
10	Klaten Regency	3.449639	67.919689
11	Sukoharjo Regency	-4.034041	60.436009
12	Wonogiri Regency	0.519764	64.989814
13	Karanganyar Regency	-1.508178	62.961872
14	Sragen Regency	2.663884	67.133934
15	Grobogan Regency	3.206360	67.676410
16	Blora Regency	0.589982	65.060032
17	Rembang Regency	2.978465	67.448515
18	Pati Regency	-0.394117	64.075933
19	Kudus Regency	-4.881132	59.588918
20	Jepara Regency	-2.857264	61.612786
21	Demak Regency	3.074897	67.544947
22	Semarang Regency	-3.811234	60.658816
23	Temanggung Regency	-1.870569	62.599481
24	Kendal Regency	-0.582077	63.887973
25	Batang Regency	-1.911640	62.558410
26	Pekalongan Regency	0.280620	64.750670

27	Pemalang Regency	7.814683	72.284733
28	Tegal Regency	-0.075728	64.394322
29	Brebes Regency	10.46562	74.935670
30	Magelang City	-11.78346	52.686590
31	Surakarta City	-3.774086	60.695964
32	Salatiga City	-13.63273	50.837320
33	Semarang City	-5.354596	59.115454
34	City Pekalongan	-9.049350	55.420700
35	Tegal City	-7.546214	56.923836

Source: BPS, Processed

Table 3 indicates overall model validity because the *Fixed Effect* specification satisfies the joint significance criterion, evidenced by an F-test probability of 0.0000, which is below the 1% significance threshold. An R^2 value reaching 0.9927 reflects that the estimated equation accounts for nearly all observed cross-sectional and temporal variation in poverty among regencies and municipalities throughout Central Java Province. Accordingly, 99.27% of fluctuations in poverty incidence are attributable to the combined contribution of *Program Keluarga Harapan* (PKH), BPJS, *Program Indonesia Pintar* (PIP), *Bantuan Pangan Non-Tunai* (BPNT), and *Kartu Keluarga Sejahtera* (KKS), whereas the unexplained proportion remaining outside the estimated specification equals only 0.73%. Despite this exceptionally high goodness-of-fit, substantive interpretation requires prudence since statistical evidence confirms significant parameter estimates exclusively for PKH, BPJS, and PIP, whose respective probability values are 0.0812, 0.0144, and 0.0000, thereby satisfying the 10%, 5%, and 1% significance levels, while the remaining explanatory variables fail to demonstrate statistically meaningful effects.

Estimated coefficients demonstrate that greater participation in social assistance programs corresponds with lower poverty incidence. Within the linear-linear specification, the PKH coefficient equals -0.0372, signifying that every 1% expansion in beneficiary coverage corresponds to a 0.0372% decline in poverty, whereas an equivalent contraction predicts a 0.0372% increase. Under the linear-log specification, BPJS records an estimated coefficient of -1.4873, implying that a 1% rise in enrollment produces a 1.4873% reduction in poverty, while a 1% decline in enrollment generates an identical increase. Comparable evidence appears for the *Program Indonesia Pintar* (PIP), whose coefficient reaches -2.7477 in the same functional specification, indicating that each 1% increase in participation corresponds with a 2.7477% decrease in poverty, whereas a 1% reduction yields a proportional 2.7477% increase.

After controlling for the influences of PKH, BPJS, PIP, BPNT, and KKS, fixed-effect estimation indicates that Brebes Regency possesses the largest regional intercept, reaching 74.935670. Relative to every other regency and municipality across Central Java Province, this coefficient reflects a comparatively greater underlying poverty level. Kebumen Regency and Pemalang Regency subsequently occupy the second and third highest intercept positions. Conversely, the smallest estimated regional intercept, measuring 50.837320, is associated with Salatiga City. This indicates that, after controlling for the effects of PKH, BPJS, PIP, BPNT, and KKS, Salatiga City tends to have a lower poverty level than other regions in

Central Java Province. Following Salatiga City, the regions with the next lowest constants are Magelang City and Pekalongan City.

Economic Interpretation

Based on the results of the *t-test* in the *Fixed Effect Model* (FEM), three out of the five variables included in the study significantly affect poverty levels in Central Java Province, namely *Program Keluarga Harapan* (PKH), BPJS, and *Program Indonesia Pintar* (PIP). All three variables exhibit a negative relationship with poverty, indicating that improvements in these social assistance programs contribute to poverty reduction. Meanwhile, *Bantuan Pangan Non-Tunai* (BPNT) and *Kartu Keluarga Sejahtera* (KKS) do not have a statistically significant effect on poverty levels.

The negative effect of PKH on poverty, under a linear-linear relationship, suggests that increasing social assistance through PKH helps reduce poverty in Central Java. This finding indicates that the assistance received by poor households contributes to meeting basic educational and healthcare needs, thereby alleviating economic burdens. This result is consistent with the theory of absolute poverty, which argues that poverty occurs when individuals are unable to meet minimum basic needs. Furthermore, the *social safety net* theory explains that social assistance serves as a protection mechanism for vulnerable groups, preventing them from falling into lower levels of welfare. This finding is in line with the study by Swandriano & Arif (2023), which found a negative effect of PKH on poverty, and is further supported by Light et al. (2024), who demonstrated that conditional cash transfer programs improve welfare through better educational and health outcomes.

BPJS also has a negative effect on poverty under a linear-log specification. This result indicates that increased participation in health insurance programs contributes to poverty reduction. Healthcare expenses remain a major source of economic pressure for many households; therefore, access to health insurance reduces the risk of falling into poverty due to high medical costs. This finding is consistent with *social safety net* theory, which emphasizes the role of social protection in reducing economic vulnerability. In addition, *Human Capital Theory*, as proposed by Becker, suggests that improved access to healthcare enhances human capital quality, leading to higher productivity and welfare in the long run. The finding is also supported by Brydon et al. (2024), who reported positive effects of social transfer programs on health outcomes and overall well-being.

PIP has a negative and significant effect on poverty under a linear-log relationship. This finding suggests that educational assistance contributes to poverty reduction in Central Java. Increased access to education enhances opportunities for individuals to acquire better skills and qualifications, thereby improving future employment prospects and earning potential. This result is consistent with *Human Capital Theory*, which argues that investment in education increases individual productivity. Moreover, Amartya Sen's *Capability Approach* emphasizes that education expands individuals' capabilities and opportunities to achieve a higher standard of living. This finding is consistent with Mirda & Mohammad (2025), who found that PIP significantly reduces poverty, and is supported by Magalhães et al. (2024), who highlighted the positive contribution of education-based social assistance programs to welfare improvement and poverty alleviation.

In contrast, BPNT does not significantly affect poverty levels. This result suggests that food assistance programs primarily help maintain short-term household consumption but are insufficient to improve productivity or generate sustainable income growth. Although

BPNT may reduce the expenditure burden of poor households, its aggregate impact on poverty reduction remains limited. This finding is consistent with Pratiwi & Imsar (2022) and Rahayu & Fitriani (2023), who concluded that BPNT has not been fully effective in reducing poverty.

The statistical estimation revealed no meaningful relationship between KKS participation and poverty reduction. These results imply that distributing welfare cards, by itself, does not generate measurable improvements in poverty conditions across Central Java. Instead, successful outcomes rely on accurate beneficiary identification, efficient allocation mechanisms, and the performance of complementary social protection initiatives delivered through the KKS system. Consequently, ownership of the card cannot be interpreted as an immediate determinant of declining poverty levels when implementation quality remains inadequate. This empirical evidence contrasts with the conclusions reported by Trisna et al. (2025), which identified KKS as exerting a positive contribution to community welfare.

The variation in regional constants indicates the presence of economic characteristics across regencies and municipalities that cannot be explained by PKH, BPJS, PIP, BPNT, and KKS. Brebes Regency, Kebumen Regency, and Pemalang Regency, which have the highest regional constants, tend to exhibit higher baseline poverty levels than other regions. This condition suggests that structural factors such as human capital quality, employment opportunities, economic productivity, and geographical conditions remain major challenges to poverty reduction.

Conversely, Salatiga City, Magelang City, and Pekalongan City, which have the lowest regional constants, tend to have lower baseline poverty levels than other regencies and municipalities in Central Java. This phenomenon indicates that urban areas generally benefit from more diversified economic activities, better infrastructure access, and broader employment opportunities, which contribute to relatively higher levels of community welfare.

CONCLUSION

Selection of the panel regression specification identified the *Fixed Effect Model* (FEM) as the most suitable analytical framework for evaluating how *Program Keluarga Harapan* (PKH), BPJS, *Program Indonesia Pintar* (PIP), *Bantuan Pangan Non-Tunai* (BPNT), and *Kartu Keluarga Sejahtera* (KKS) are associated with poverty across regencies and municipalities in Central Java Province. Statistical estimation demonstrated that participation in *Program Keluarga Harapan*, BPJS, and *Program Indonesia Pintar* corresponded to significant reductions in poverty incidence, while the estimated coefficients for *Bantuan Pangan Non-Tunai* and *Kartu Keluarga Sejahtera* failed to achieve statistical significance. Consequently, interventions emphasizing educational opportunities and healthcare accessibility appear to generate greater poverty alleviation outcomes than assistance schemes designed primarily to strengthen household consumption. Therefore, the government is encouraged to enhance the effectiveness, targeting accuracy, and coverage of PKH, BPJS, and PIP, while also evaluating the implementation of BPNT and KKS to maximize their contribution to poverty alleviation. This study is limited by the inclusion of only five independent variables and its focus on regencies and municipalities within Central Java Province. Future research is therefore recommended to incorporate additional variables,

such as economic growth, unemployment, income inequality, and human capital quality, in order to provide a more comprehensive explanation of the factors influencing poverty.

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