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THE IMPACT OF HUMAN CAPITAL DEVELOPMENT ON POVERTY RATE IN PURWOREJO REGENCY

Fajar Hanung Basworo[1]*, Hastarini Dwi Atmanti[2]
Diponegoro University, Indonesia
***Email Correspondence:** hanungbasworo@students.undip.ac.id

Abstract

This study aims to analyze the impact of human capital development on poverty levels in Purworejo Regency during the 2019-2023 period. The main focus is to identify variables related to poverty and provide human capital-based policy recommendations. This research uses econometric models, namely the Ordinary Least Square (OLS) and Seemingly Unrelated Regression (SUR) models. The dependent variable analyzed is the poverty rate, while the independent variables include Mean Years of Schooling (MYS), Expected Years of Schooling (EYS), Life Expectancy Rate (LER), and Per Capita Expenditure (PCE). The findings reveal significant correlations between all human capital variables and poverty reduction. The health dimension, measured by LER, showed the strongest impact on poverty reduction. The SUR model shows a 4.01% improvement in efficiency compared to the OLS model. Poverty alleviation policies should focus on strengthening the healthcare system, improving educational access, and empowering the economy, with direct interventions in healthcare and education. This study stands out for its use of the SUR model to analyze the simultaneous effects of human capital variables on poverty, addressing the limitations of previous studies that used the OLS model.

Keywords: Human capital, poverty, SUR model, Purworejo, regional development.

INTRODUCTION

Poverty remains a major challenge in regional development, particularly in areas with low levels of welfare. In Purworejo Regency, data from Statistics Indonesia (BPS) in 2023 indicates that the poverty rate stood at 11,33 percent, a slight decline from the previous year (11,53 percent). However, this figure remains higher than both the Central Java provincial average (10,77 percent) and the national average (9,36 percent). This condition is closely related to the rising poverty line, which increased from IDR 393.731 per capita per month in 2022 to IDR 427.622 in 2023.

The COVID-19 pandemic has exacerbated poverty conditions in Purworejo Regency. BPS data revealed a significant increase in the number of poor residents, reaching 88.800 people in 2021. This situation particularly affected the informal sector, which is most vulnerable to economic shocks due to limited social protection and financial support. Despite various poverty alleviation programs initiated by the local government, poverty remains a pressing issue that requires greater attention.

Previous studies have highlighted the strong relationship between human capital and poverty alleviation. Research by the World Bank (2019) and (Bourguignon 2003) emphasizes that poverty is multidimensional, encompassing education, health, and access to basic infrastructure. In Central Java, education has been found to significantly reduce poverty, with an R^2 value of 0,78 (Wahyudi and Rejekingsih 2013). Kusnandar et al. (2021) employing the Seemingly Unrelated Regression (SUR) model to analyze health impacts, reported an elasticity of -0,45 (Aryanti and Sukardi 2024). Several other studies have shown that per capita expenditure has a significant negative effect on poverty. For instance, in the

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Special Region of Yogyakarta, increased per capita expenditure significantly reduced poverty, while minimum wage had no significant impact (Qurrotu'aini and Bagus Putu Purbadharmaja 2023). Similarly, at the national level, per capita income and government spending have been found to negatively influence poverty in Indonesia (Sasana and Kusuma 2018).

Based on the literature review and prior empirical studies, the following hypotheses are proposed:

H_1: Mean Years of Schooling negatively affects the poverty rate;

H_2: Expected Years of Schooling negatively affects the poverty rate;

H_3: Life Expectancy negatively affects the poverty rate;

H_4: Per Capita Expenditure negatively affects the poverty rate.

However, existing studies tend to focus on isolated aspects of poverty alleviation and overlook the interrelationships among human capital variables. This study addresses this gap by analyzing the simultaneous influence of educational, health, and economic indicators on poverty levels.

Poverty in Purworejo Regency remains relatively high despite various poverty alleviation efforts undertaken by the local government. Based on recent data, Purworejo faces policy challenges in implementing Social Transformation to reduce poverty rates within the framework of its medium- and long-term regional development plans, particularly through human capital development. The targeted poverty reduction levels are relatively optimistic when compared to past performance data. The regional strategy for reducing poverty in Purworejo is outlined in the Purworejo Regency Long-Term Regional Development Plan (RPJPD) 2025–2045, where one of the vision targets is to reduce the poverty rate to approximately 9.04–10.22 percent by 2025 (baseline projection) and to 0.00–0.53 percent by 2045. Similarly, the Technocratic Draft of the Regional Medium-Term Development Plan (RPJMD) 2025–2029 sets a target of reducing poverty to around 8.30–7.30 percent by 2029.

An inclusive and sustainable approach is essential to achieving these targets, given that poverty is a multidimensional issue requiring cross-sectoral efforts. Accordingly, the research seeks to address the following questions: (1) How do the independent human capital variables influence the dependent variable of poverty rate in Purworejo Regency?' (2) What are the key factors contributing to poverty in the sectors of education, health, and the economy in Purworejo Regency?; and (3) What are the appropriate policy recommendations for poverty alleviation in the fields of education, health, and the economy in Purworejo Regency?.

Thus, the novelty of this research lies in the application of the Seemingly Unrelated Regression (SUR) model, which allows for simultaneous analysis of human capital variables, offering more efficient estimates than conventional OLS models.

The objectives of this study are to: (1) Analyze the simultaneous influence of human capital variables on the poverty rate in Purworejo Regency; (2) Identify key factors contributing to poverty; and (3) Formulate policy recommendations for poverty alleviation

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based on human capital development. This research focuses on the dependent variable: Poverty Rate, and the independent variables: Human Capital, comprising Mean Years of Schooling (MYS), Expected Years of Schooling (EYS), Life Expectancy (LE), and Per Capita Expenditure (PCE).

LITERATURE REVIEW

One of the key indicators used to measure development progress in a region is poverty. According to Statistics Indonesia (BPS, 2016), poverty is defined as the inability to meet basic food and non-food needs from an economic perspective, measured in terms of expenditure. The poverty line (Garis Kemiskinan) represents the monetary value required to fulfill minimum basic food needs equivalent to 2,100 kilocalories per capita per day, and essential non-food needs. By comparing an individual's level of consumption with the poverty line, or the monthly per capita consumption expenditure, it can be determined whether a person is categorized as poor..

In contrast, the United Nations Development Programme (UNDP, 1997) defines poverty more broadly as the inability to expand life choices. Poverty includes aspects such as lack of participation in public policy decision-making, making it a multidimensional issue.

Bourguignon (2003) also highlights that poverty is inherently multidimensional. An individual's well-being is not solely determined by financial variables but also by non-financial ones. As such, poverty measurement must go beyond income or expenditure indicators and include non-income indicators to capture broader aspects of deprivation. Poverty is a complex phenomenon, encompassing not only economic dimensions but also social, political, educational, and health-related aspects. However, it has often been framed narrowly as a lack of income and assets needed to fulfill basic needs (Nanga 2006).

According to the World Bank (2007:37), when poverty is defined to include broader dimensions of human well-being, such as consumption, education, health, and access to basic infrastructure, it remains a persistent and urgent issue. The World Bank also notes that non-income poverty may pose a more serious problem than income poverty in Indonesia.

As the causes, indicators, and complexities of poverty have grown, the definition of poverty has also expanded. Poverty is now recognized as a multidimensional condition encompassing economic, social, health, educational, and political aspects (Chen and Ravallion 2010).

Conceptually, poverty can be categorized as either absolute or relative, distinguished by the standards used to assess them. The assessment standards for relative poverty are more subjective, based on local perceptions, while absolute poverty relies on a fixed standard for basic needs (Adji et al. 2020).

1. Absolute Poverty

   Absolute poverty refers to a minimum standard of living considered adequate in a particular region at a certain time. A person is considered poor if they fall below this standard. This concept defines poverty as the gap between an individual's income and the income needed to meet minimum basic needs, such as food, clothing, health, housing,

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and education. These needs are typically expressed in financial terms to reflect a standard of living.

A key advantage of the absolute poverty concept is its comparability across regions and over time, assuming the poverty standard remains unchanged. For instance, the World Bank's PPP-based poverty line per capita is an application of the absolute poverty concept, designed to compare poverty levels across countries and guide global aid allocation.

2. Relative Poverty

Unlike the absolute poverty line, which is based on a monetary threshold for basic needs, the relative poverty line is defined by societal consensus on who constitutes the poorest groups, for example, the bottom 20% of the population ranked by income or expenditure. The relative poverty line cannot be used to compare poverty across regions or over time, but it is useful for identifying target groups for poverty alleviation programs.

Indicators of relative poverty typically include both quantitative data and distributional aspects, for instance, 60% of median income or identifying the bottom 20–40% of the population.

Asnawi (1994) identified three key drivers of poverty: human resources, natural resources, and technology. Human resources are influenced by education level, dependency ratio, attitudes, participation, and job skills, all of which are shaped by the society's socio-cultural background. Ginanjar (1996) expanded on these causes, pointing to: (a) low education, (b) poor health, (c) limited job opportunities, and (d) geographic isolation. Poor individuals lack productive assets and the capacity to increase productivity, trapping them in a cycle of poverty.

Ginanjar (1996) further identified: (a) limited natural resources, (b) weak technology and population quality, (c) poor human capital, and (d) inadequate infrastructure and institutions as structural contributors to poverty.

Ikhsan (1999) categorized poverty determinants into four groups: human capital, productive physical capital, employment status, and village characteristics. Human capital within households, such as years of schooling, education of the household head, and household size, significantly affects the ability to obtain better jobs and income. In general, higher education increases the likelihood of employment in formal sectors with higher wages.

The understanding of poverty has evolved to reflect its increasingly complex causes, indicators, and surrounding issues. Poverty is no longer seen solely in economic terms, but as a multidimensional issue encompassing social, educational, health, and political dimensions (Johannes 2017).

Statistics Indonesia (BPS) first began measuring poverty in 1984, covering data from 1976–1981 using the consumption module of the National Socio-Economic Survey (Susenas). Until 1987, data were only available at the national level and divided by urban/rural areas. By 1990, provincial-level data were introduced, although some provinces were aggregated. Since 1993, provincial-level poverty data became available in full, and since 2002, BPS has provided data at the regency/municipality level.

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Poverty is defined as a condition in which individuals fall below a certain threshold—the poverty line. According to the 1978 National Nutrition Workshop, a healthy life requires a minimum energy intake of 2,100 kilocalories per day. Based on this standard, the food poverty line is the monthly amount needed to fulfill that caloric requirement. In addition to food, a decent standard of living requires non-food needs such as housing, education, healthcare, clothing, and other essential goods and services.

In BPS methodology, the poverty line comprises two components: the Food Poverty Line (FPL) and the Non-Food Poverty Line (NFPL).

1. Poverty Line (PL) = FPL + NFPL. Individuals with monthly per capita expenditure below this line are considered poor.
2. Food Poverty Line (FPL) = the cost of consuming 2.100 kilocalories per person per day, based on 52 food commodities.
3. Non-Food Poverty Line (NFPL) = the cost of essential non-food needs such as housing, clothing, education, and health, represented by 51 commodities in urban and 47 in rural areas.

BPS uses the basic needs approach and the Headcount Index (HCI) to measure poverty i.e., the number and percentage of people living below the poverty line. This methodology enables tracking progress in poverty reduction over time. BPS also provides deeper metrics such as the Poverty Gap Index (P1) and Poverty Severity Index (P2), which measure the depth and severity of poverty and help assess the impact of economic shocks on the poor.

Human capital is a crucial factor in national development. Consequently, development strategies must emphasize improving the quality of human resources. This concept serves as the foundation for the Human Development Index (HDI), first introduced by the United Nations Development Programme (UNDP) in 1990. The theory of human capital and the human development approach underlying the HDI share a common perspective in which education, health, and the economy are viewed as interrelated investments essential for enhancing human capacity and well-being. However, the HDI adopts a broader outlook, treating these three dimensions not only as means to increase economic productivity, but also as basic rights and ultimate goals of development. While human capital theory emphasizes the instrumental value of education and health in supporting economic growth, the human development approach highlights their intrinsic value in expanding individual choices and freedoms (Fadilla et al., 2020).

In health dimension, health is an essential component of human capital that influences productivity and well-being. Research by Purwanto & Prasetyo (2019) shows that health investment contributes significantly to Indonesia's economic growth by improving labor productivity, reducing work absenteeism, and enhancing learning capacity. According to Schultz et al. (2023), investment in public health promotes economic growth through increased labor force participation and reduced disease burden. These effects are captured in the HDI through Life Expectancy at Birth, an indicator that reflects population health and assumes that “a long life is a universal aspiration.” Achieving longer life expectancy, therefore, requires better health outcomes and services..

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In education dimension, human capital theory considers education as an investment that yields both economic and non-economic returns (Khan et al., 2019). Education enhances productivity by accumulating knowledge and skills, which in turn drive innovation and facilitate technological adaptation (Hanushek, 2020). Sulistyowati et al. (2021) found that education investment plays a vital role in improving the quality of Indonesia's human resources. Their research indicates a positive correlation between education levels and workers' productivity and income. Similarly, Hakim & Sugiharti (2020) estimated that the returns to education in Indonesia range from 7% to 10% for each additional year of schooling. In the HDI framework, education is represented by two key indicators: (1) Mean Years of Schooling (MYS), the average number of years of education completed by adults, and (2) Expected Years of Schooling (EYS), the number of years a child of school-entry age is expected to attend school. These indicators reflect how education expands human capabilities, creating broader opportunities and life choices.

In economic dimension, from the perspective of human capital theory, enhancing individuals' productive capacities will lead to increased income. Wibowo et al. (2023) found that the accumulation of human capital through education and health accounted for approximately 30% of Indonesia's economic growth between 2010 and 2020. Rahmawati & Hidayat (2022) also observed that regions with higher HDI scores tend to have higher gross regional domestic product (GRDP) per capita. Human capital is thus vital for inclusive economic growth and poverty reduction (World Bank, 2020). Empirical studies show a positive relationship between human capital accumulation and per capita income (Lee & Lee, 2021). The HDI incorporates the per capita expenditure indicator as a proxy for standard of living and economic outcomes. This measure reflects the results of economic development and helps assess whether improvements in education and health translate into better livelihoods.

METHOD

This study employs a combination of quantitative and qualitative research methods. This mixed-method approach was chosen as it allows for an in-depth examination of one or more research objects. The types of data collected include secondary data, sourced from Statistics Indonesia (Badan Pusat Statistik/BPS), and primary data, derived from regional development planning documents, implementation reports from local government agencies, as well as findings from Focus Group Discussions (FGDs). The research variables consist of Dependent variable: Poverty Rate, and Independent variables: Human Capital, comprising (1) Mean Years of Schooling (MYS), (2) Expected Years of Schooling (EYS), (3) Life Expectancy (LE), and (4) Per Capita Expenditure (PCE).

The analytical technique used is based on an econometric model specification, namely: Ordinary Least Squares (OLS) Model, and Seemingly Unrelated Regression (SUR) Model. Estimation and testing methods include: (1) Classical Assumption Tests, which cover: Normality test (Jarque-Bera), Heteroskedasticity test (Breusch-Pagan), and Autocorrelation test (Durbin-Watson); and (2) SUR Model Specification Tests, which include: Cross-equation correlation tests, and Breusch-Pagan test for independence.

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The stages of data analysis consist of: (1) Descriptive analysis of research variables, (2) Estimation using the OLS model, (3) Classical assumption testing, (4) Specification testing for the SUR model, (5) Efficiency comparison between SUR and OLS models, and (6) Interpretation of results and formulation of policy implications.

This research method is applied to describe, analyze, and formulate policy recommendations for poverty reduction efforts driven by factors related to human capital development, in the areas of health, education, and economic well-being in Purworejo Regency, with the ultimate goal of accelerating improvements in community welfare.

RESULTS AND DISCUSSION

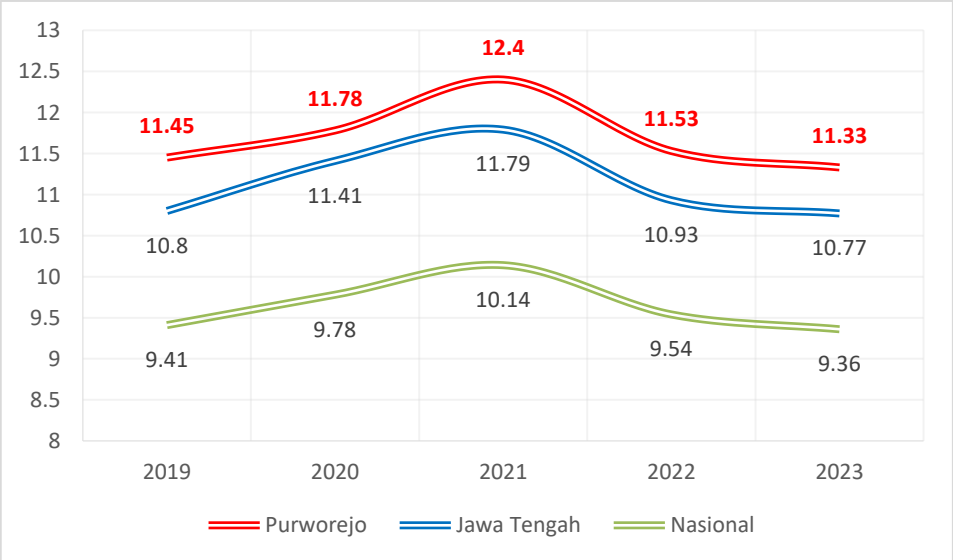
Contents Results and Discussion

1. Descriptive Time Series Analysis (2019–2023)

1.1 Development of Research Variables

1.1.1 Poverty Rate Conditions

The development of the poverty rate in Purworejo Regency in 2023 was recorded at 11,33 percent. This figure indicates a decline (following the recovery from the impact of the COVID-19 pandemic) compared to 2021 (12,4 percent) and 2022 (11,53 percent). Over the past three years, the downward trend in the poverty rate in Purworejo is consistent with the decline observed at the Central Java provincial level and the national level.



Source: BPS, 2025 (processed)

Figure 1. Trends in Poverty Rate in Purworejo Regency, 2019–2023 (percent)

Relative position of poverty rate in Purworejo Regency in 2023, the poverty rate in Purworejo Regency stood at 11,33 percent, placing it 14th highest among all regencies/municipalities in Central Java Province. This figure is slightly higher than that of two neighboring regencies Cilacap (10,99 percent) and Magelang (10,96 percent). When compared with the provincial average of 10,77 percent and the national average of 9,36 percent, Purworejo's poverty rate remains above both benchmarks.

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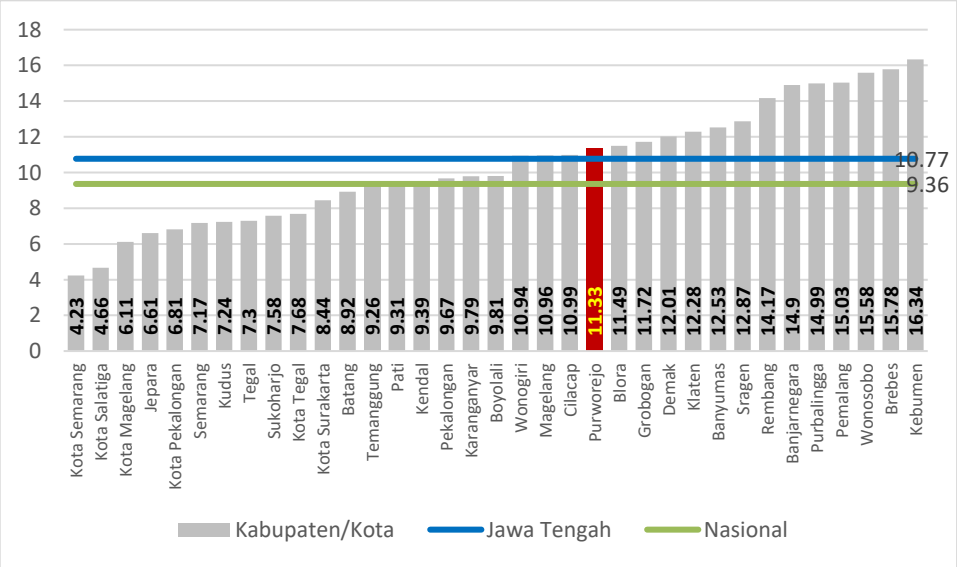

Source: BPS, 2025 (processed)

Figure 2. Relative Position of Poverty Rate in Purworejo Regency, 2023 (%)

The number of poor residents in Purworejo Regency has declined over the past three years (post-COVID-19 recovery), from 88,800 people in 2021 to 81.280 people in 2023. This reduction is notable, especially when compared to the significant increase in poverty experienced during the pandemic years (2020–2021), when the number rose to 84.480 (2020) and 88.800 (2021).

In terms of relative ranking, Purworejo now holds the 12th lowest position among all districts/cities in Central Java in terms of total poor population. This is better than neighboring districts such as Banyumas (216.500 people), Kebumen (195.450 people), Cilacap (191.000 people), and Purbalingga (143.410 people).

The Poverty Depth Index (P1) in Purworejo Regency over the five-year period (2019–2023) showed an increasing trend, rising from 0.84 (2019) to 1,78 (2023). In the last two years alone, P1 increased from 1,31 (2022) to 1,78 (2023). This trend contrasts with the declining P1 values at the provincial and national levels. P1 represents the average gap between poor individuals' expenditures and the poverty line. The increase in P1 suggests a widening poverty gap, indicating that poor households in Purworejo are, on average, further below the poverty line than before (i.e., becoming poorer). In 2023, Purworejo's P1 ranked 11th highest among all districts/cities in Central Java. This is similar to the P1 values for Banyumas (1,78) and Magelang (1,78), and slightly higher than Cilacap (1,54). Compared to the provincial average of 1,75 and the national average of 1,53, Purworejo's poverty depth index is slightly lower than Central Java but still above the national level.

The Poverty Severity Index (P2) in Purworejo Regency has shown an upward trend over the past five years (2019–2023), rising to 0,43 in 2023, up from 0,24 in 2022. This recent increase in P2 over the past two years (2022–2023) diverges from the trends in Central Java Province, where P2 has remained stagnant, and the national level, where P2 has decreased. P2 measures the inequality of expenditure among the poor. The higher the index

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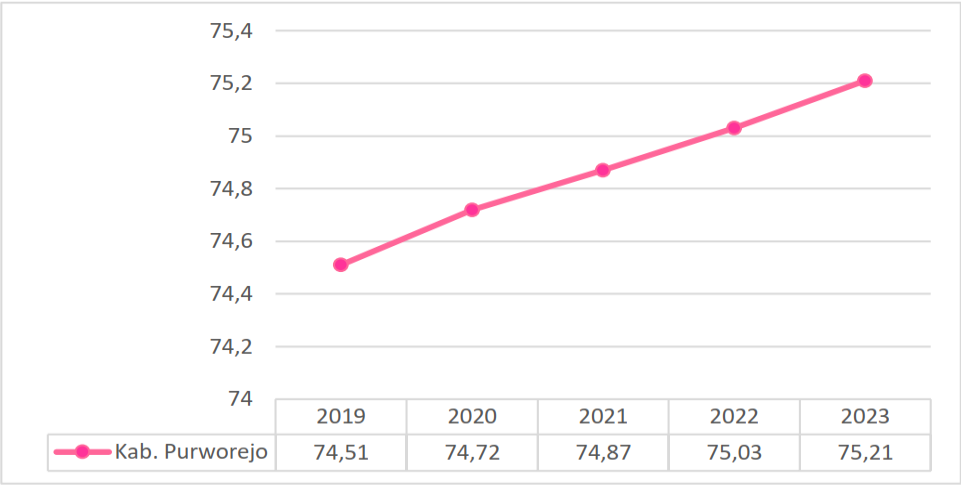
value, the greater the disparity in consumption levels among poor individuals. The increase in Purworejo's P2 indicates worsening inequality in expenditure among the poor (i.e., the poor are becoming more unequal among themselves). In 2023, the relative position of Purworejo Regency's P2 was 0,43, placing it 11th highest among all districts/cities in Central Jawa higher than several neighboring regencies, such as Magelang (0,41), Banyumas (0,41), and Cilacap (0,35). When compared to the provincial average of 0,42 and the national average of 0,38, the P2 of Purworejo Regency remains above both, indicating greater severity of poverty in the region.

1.1.2 Human Capital Conditions

The Human Development Index (HDI) is a quality indicator used to measure the extent to which human development has been achieved. In 2023, the HDI value for Purworejo Regency was 74.35, an increase from 73.67 in 2022. This figure is slightly higher than the Central Java provincial average of 74.39, but still below the national average of 74.39 in the same year. HDI achievement is influenced by four key components that require continuous attention and improvement in 2023, Life Expectancy at Birth in Purworejo Regency reached 75,21 years, an increase from 75,03 years in 2022. The Mean Years of Schooling (MYS) increased from 8,32 years (2022) to 8,46 years (2023), and the Expected Years of Schooling (EYS) rose from 15,52 years (2022) to 15,53 years (2023). Meanwhile, Per Capita Expenditure in 2023 was IDR 11,110 thousand, an increase compared to IDR 10,671 thousand in 2022.

1.1.2.1. Health Dimension

The Life Expectancy (LE) in Purworejo Regency has shown a consistent upward trend from 2019 to 2023. LE reflects the local government's efforts in providing healthcare services to the community. The most recent data indicate that Purworejo's LE reached 75,21 years in 2023. Over the past five years, the highest annual increase in LE occurred in 2020 (0,21 points), despite the onset of the COVID-19 pandemic.



Source: BPS, 2024 (processed)
Figure 3. Life Expectancy at Birth (LEB) in Purworejo Regency, 2019–2023

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The achievement of LE in Purworejo is also influenced by the performance of other health-related development indicators. Maternal mortality data in Purworejo from 2019 to 2023 showed fluctuating trends. In 2019, there were 16 maternal deaths, rising to 22 in 2021, before decreasing to 5 in 2023. Although the number of deaths remains variable, it shows a declining trend overall. Several factors contribute to the still relatively high maternal mortality rate, such as: high-risk pregnancies, infrequent antenatal care visits, high rates of home deliveries, limited access to health facilities, inadequate collaboration with traditional birth attendants (*dukun bayi*), lack of optimal implementation of maternal-child health programs (*Gerakan Sayang Ibu dan Anak*). These issues highlight the need for strong cross-sectoral coordination to address maternal health. In some socio-cultural settings, public awareness and support for safe pregnancy and childbirth practices remain low, resulting in poor decision-making regarding maternal health services.

The Maternal Mortality Rate (MMR) in Purworejo Regency showed fluctuating trends between 2019 and 2023. The number of maternal deaths increased from 16 in 2019 to 22 in 2021, then sharply declined to 5 cases in 2023. The primary causes of maternal mortality are high-risk pregnancies, infrequent antenatal care visits, and limited access to health services and professional assistance during labor and delivery. The involvement of traditional birth attendants without adequate collaboration with professional healthcare services also remains a challenge. Addressing maternal health issues requires cross-sectoral efforts and greater public awareness regarding safe pregnancy and childbirth practices.

The Infant Mortality Rate (IMR) in Purworejo Regency declined from 10,79 per 1.000 live births in 2019 to 8,35 in 2022, but rose again to 11.32 in 2023. The increase in infant mortality is associated with high-risk pregnancies, which often lead to complications during birth. Common causes of high-risk pregnancies include pre-existing maternal health conditions and inadequate prenatal care. To prevent infant deaths, comprehensive and integrated maternal-child health programs are essential, supported by early and continuous healthcare from pregnancy through infancy.

The Under-Five Mortality Rate (U5MR) in Purworejo Regency decreased from 13.82 per 1.000 live births in 2019 to 9,96 in 2022, but increased again to 12,65 in 2023. The fluctuating trend in both infant and under-five mortality rates underscores the need for comprehensive and integrated child health strategies. Preventive efforts must begin from the prenatal stage and continue through the first five years of life to ensure sustained improvements in child survival and health outcomes.

Stunting prevalence refers to the percentage of children under five years of age who experience impaired physical growth. It is widely used as an indicator to assess nutritional issues among toddlers across regions or countries. The higher the prevalence, the more severe the issue, necessitating broader interventions.

Stunting and malnutrition are distinct but interrelated health conditions associated with child nutrition. Stunting is a form of growth failure caused by chronic nutritional deficiency starting as early as the prenatal period until the age of 24 months. As a result, stunted children are shorter and lighter for their age. Malnutrition, meanwhile, refers to a broader deficiency of essential nutrients such as protein, energy, vitamins, and minerals, and is associated with

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various health issues like extreme thinness, skin discoloration, weakness, and weakened immunity.

According to ePPGBM data, the stunting rate in Purworejo Regency rose significantly from 9,34 percent in 2019 to 13,30 percent in 2023. This indicates the urgent need for stronger efforts to reduce stunting in the region. The key difference between stunting and malnutrition lies in their focus: stunting emphasizes linear growth (height), whereas malnutrition includes multiple deficiencies that impact overall body function. Stunting is primarily caused by inadequate quality and quantity of food, suboptimal feeding practices, and poor household food security, 50 percent of undernourished children come from poor families. Other contributing factors include: lack of optimal home gardening and family empowerment, Chronic Energy Deficiency (CED) among pregnant women, and high prevalence of anemia in pregnancy (2019–2020), which increased the risk of stunting.

Cross-sectoral collaboration is crucial for addressing stunting. Actions include: situation analysis on stunting, planning and implementation of relevant programs, community mobilization and awareness campaigns. With rising awareness and preventive measures, it is hoped that stunting prevalence in Purworejo will decline, supporting the growth of a healthier future generation.

The prevalence of undernutrition has declined in the past two years. Contributing factors to undernutrition include: high-risk pregnancies, low birth weight infants, lack of early pregnancy screening and health education for mothers, poor exclusive breastfeeding practices, inadequate child feeding behaviors, substandard quality and quantity of toddler nutrition. In some cases, parents or caregivers are unwilling or unable to bring their children to community health centers (Posyandu), resulting in inadequate monitoring of nutritional status.

Limited access to health and nutrition services continues to hinder child development in Purworejo. Many pregnant women lack awareness of nutritional needs and end up giving birth to underweight infants. Constraints in health infrastructure and education also contribute to low utilization of available services. In addition, poor sanitation habits, such as open defecation and improper waste disposal—remain common, increasing children's vulnerability to disease and poor nutritional outcomes.

Another critical aspect of the health sector is the provision of health and education insurance. Universal Health Coverage (UHC) is a healthcare assurance system designed to ensure that every individual in the population has equitable access to high-quality promotive, preventive, curative, and rehabilitative health services at an affordable cost. As part of the implementation of the UHC scheme, the District Health Office provides services under the Regional Health Insurance (Jamkesda). UHC applies to any resident who qualifies for Class III coverage. In 2023, UHC coverage in Purworejo reached 87,27 percent, nearing the national target of 95 percent coverage and 75 percent minimum active participation in the National Health Insurance (JKN) scheme.

However, challenges remain. A significant proportion of JKN participants (mainly from the independent/non-subsidized category) have inactive status, resulting in unmet targets. Notably, 60 percent of JKN participants in Purworejo are subsidized by the

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government, reflecting the dependence of the population on government-financed healthcare access, even among those categorized as self-paying.

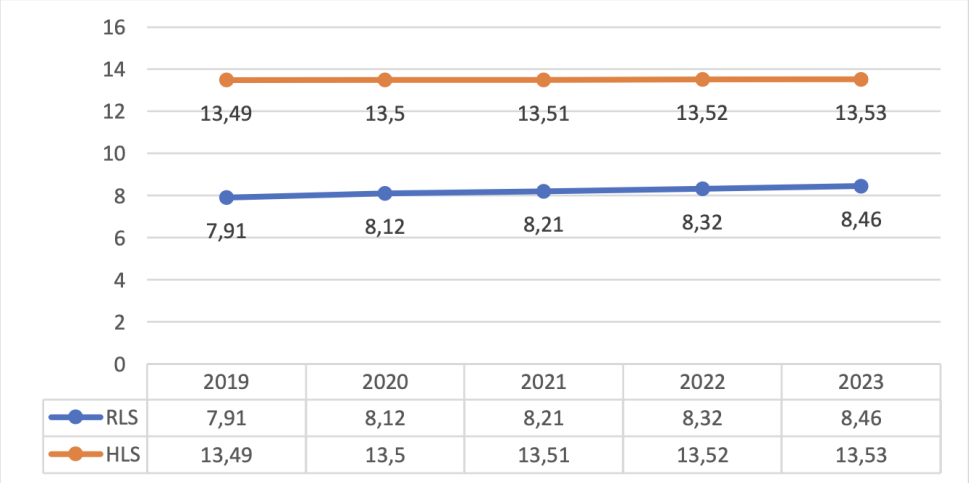
Table 1. The Performance Of Other Health-Related Development Indicators in Purworejo Regency, 2019–2023

Indicator	2019	2020	2021	2022	2023
Number of maternal deaths due to pregnancy, childbirth, and postpartum complications	16	19	22	6	5
Infant Mortality Rate (per 1.000 live births)	10,79	10,28	10,23	8,35	11,32
Number of infant deaths (< 1 year)	96	93	88	62	85
Under-Five Mortality Rate (per 1.000 live births)	13,82	13,08	11,74	9,96	12,65
Number of under-five deaths (< 5 years)	96	93	88	62	85
Number of live births	8.895	9.051	8.606	7.429	7.507
Prevalence of severe malnutrition (%)	0,06	0,07	0,12	0,11	0,12
Prevalence of stunted children (%)	9,34	8,99	11,81	11,90	13,30
Universal Health Coverage (UHC)	75,96	78,23	83,18	87,27	96,70

Source: Regional Health Agency, 2025

1.1.2.2. Education Dimension

The Mean Years of Schooling (MYS) and Expected Years of Schooling (EYS) in Purworejo Regency have shown a consistent increase over the past five years. In the latest year (2023), the MYS reached 8,46 years, while the EYS reached 13,53 years. The high EYS indicates that, on average, children in Purworejo are expected to attain at least a Diploma I or Diploma III level of education in the future.



Source: BPS, 2025 (processed)

Figure 4. Mean Years of Schooling (MYS) and Expected Years of Schooling (EYS) in Purworejo Regency, 2019–2023

Education plays a crucial role in shaping a high-quality population as the foundation of human capital development. Educational success leads to improved quality of life and strengthens the overall development process. The improvement in MYS and EYS in

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Purworejo Regency is also influenced by progress in other education-related development indicators.

The Gross Enrollment Rates (GER) for elementary (SD), junior secondary (SMP), and senior secondary (SMA)levels from 2019 to 2023 have shown fluctuations. Notably: GER at SMP level has declined since 2021, possibly due to low motivation among 13 to 15 year-olds to continue schooling. In contrast, GER at SD and SMA levels showed increases in 2023. In some years, GER for SD level exceeded 100 percent, indicating that students outside the official age range (e.g., early enrollers, repeaters, or late enrollers) are still enrolled at this level. This trend also reflects improved alignment between the age of school entrants and the official age for each education level, reducing the rate of students repeating grades or enrolling late.

The Net Enrollment Rate (NER) for elementary (SD), junior secondary (SMP), and senior secondary (SMA) levels in Purworejo Regency increased steadily from 2019 to 2022, indicating an overall rise in the number of school-age children enrolled at the appropriate educational level. This improvement reflects the local government's commitment to expanding access to quality education and increasing public awareness of the importance of completing at least 9 years of basic education.

However, in 2023, NER for SD and SMA slightly declined and did not reach 100%. This is likely due to factors such as the presence of out-of-school children with special needs and those studying at unregistered religious boarding schools. Various factors may affect school participation and dropout rates, including lack of motivation, family economic conditions, household harmony, and student academic ability.

The Dropout Rate in Purworejo Regency fell to 0.06 percent in 2023, continuing a downward trend from previous years. Despite the improvement, the issue of school dropouts, particularly at the elementary and junior secondary levels remains a policy concern. Contributing factors to dropout include: low motivation among students, learning difficulties, long distances to schools, family economic hardship, and lack of support from the household environment. The local government continues to prioritize universal education access and aims to ensure that all school-age children in Purworejo receive the minimum 12 years of education in accordance with national education standards.

The school participation rates for citizens aged 5–6 years in Early Childhood Education (PAUD), 7–12 years in primary education, and 13–15 years in lower secondary education in Purworejo Regency from 2019 to 2023 indicate that the participation rate for primary education (ages 7–12) has consistently been higher than that for early childhood (ages 5–6) and lower secondary education (ages 13–15). This trend is influenced by regulatory requirements that do not make PAUD mandatory before enrolling in primary school. As a result, PAUD participation remains suboptimal. Other factors include: student migration out of the district, children with special needs, students enrolled in non-formal religious schools (e.g., Islamic boarding schools) not recorded in the national education database (Dapodik). Access to education is a right for children aged 7–18 years, and improving participation across all age groups remains a development priority.

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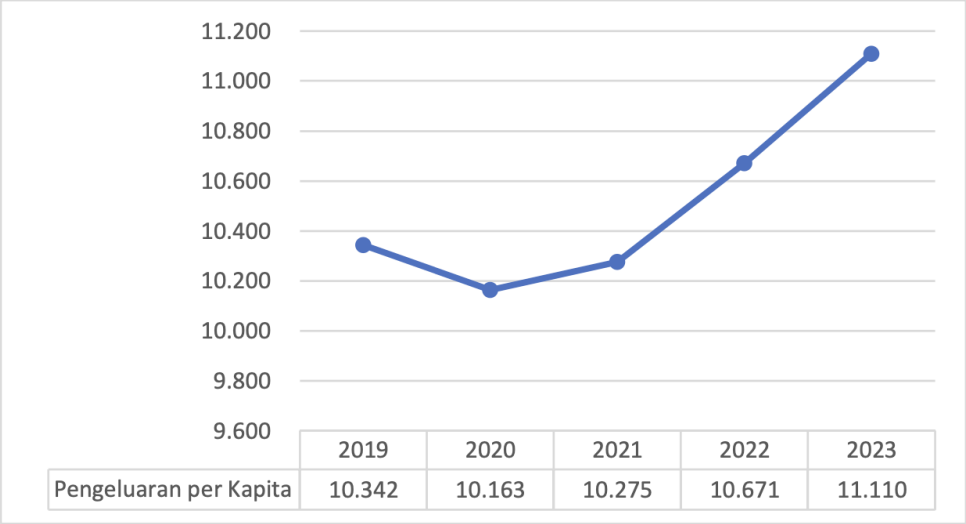
Table 2. The Performance Of Other Educatian-Related Development Indicators in Purworejo Regency, 2019–2023

Indicator	2019	2020	2021	2022	2023
GER - Elementary (SD)	101,52	101,82	99,99	100,77	105,15
GER - Junior Secondary (SMP)	95,31	96,21	96,91	94,51	92,22
GER - Senior Secondary (SMA)	92,67	93,63	95,57	95,41	96,81
NER – Elementary (SD/MI)	97,12	97,54	98,36	99,99	99,69
NER – Junior Secondary (SMP/MTs)	78,66	78,82	77,99	78,60	84,60
NER – Senior Secondary (SMA)	72,23	72,98	73,67	73,09	72,57
Dropout Rate (%)	0,25	0,42	0,07	0,20	0,06
Dropout-SD/SDLB Level (%)	0,14	0,19	0,06	0,07	0,11
Dropout-SMP/SMPLB Level (%)	0,36	0,65	0,07	0,32	0,01
Percentage of Citizens Aged 5–6 Participating in Early Childhood Education (PAUD)	89,50	90,76	84,63	85,50	85,50
Percentage of Citizens Aged 7–12 Participating in Primary Education	99,82	99,54	99,96	99,99	99,99
Percentage of Citizens Aged 13–15 Participating in Lower Secondary Education	97,21	97,42	97,11	96,65	97,70

Source: Regional Education Office, 2025

1.1.2.3. Economic Dimension

Per capita expenditure in Purworejo Regency has shown a general upward trend over the past five years, despite a decline in 2020 due to the impact of the COVID-19 pandemic. However, the figure recovered in subsequent years, reaching IDR 11.110 in 2023.



Source: BPS, 2025 (processed)

Figure 5. Per Capita Expenditure in Purworejo Regency (2019–2023) (in IDR thousand/person/year)

The improvement in per capita expenditure in Purworejo Regency is also supported by the progress in other economic indicators, particularly Gross Regional Domestic Product (GRDP) per capita. From 2019 to 2023, Purworejo's GRDP per capita generally increased,

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although it experienced a decline in 2020 due to the impact of the COVID-19 pandemic. In 2023: GRDP per capita at current prices (ADHB) reached IDR 29,42 million, and GRDP per capita at constant prices (ADHK 2010) reached IDR 19,06 million.

Despite these improvements, the Purworejo economy remains highly dependent on imports, particularly up to 2022, where import values still exceeded export values. This is evident in the trade balance ratio, which stood at 0,56 in 2018 and gradually improved to 0,6 in 2022. A trade balance ratio closer to 1,0 suggests that export values are approaching parity with imports. However, Purworejo's export performance has remained relatively low, and the trade balance has consistently shown a negative net export value.

This situation implies: a strong dependence on imported goods from outside Purworejo, imports consist of both personal and household products, and most exports from Purworejo are in the form of raw materials (agriculture, fisheries, forestry) with low added value. On the other hand, imported goods are generally higher-value finished goods, thus increasing the trade deficit. This indicates that Purworejo's inter-regional trade has not yet achieved a surplus, and further efforts are needed to strengthen local value-added industries and exports.

Naturally, the growth of the labor force is in line with population growth. However, the creation of new jobs often lags behind the increase in the working-age population. As a result, not all members of the labor force can be absorbed into the labor market, leading to unemployment. In 2023, the working-age population in Purworejo increased compared to 2022, accompanied by an increase in the labor force. This was followed by a rise in the Labor Force Participation Rate (LFPR) to 74,76 percent in 2023, indicating a higher proportion of the working-age population was economically active. Meanwhile, the Open Unemployment Rate (OUR) in Purworejo Regency declined to 4,02 percent in 2023. This means that for every 100 labor force participants, approximately 4 were unemployed. The Employment Opportunity Rate (EOR) in Purworejo Regency also increased in 2023, in line with the rise in LFPR and the decrease in OUR. These changes suggest improvements in economic and labor market conditions in the region.

In simple terms, formal and informal employment can be distinguished based on job status. Formal workers include those who own businesses and are assisted by permanent employees, as well as salaried employees, workers, or civil servants. All other employment types fall into the informal category. Based on primary job status, the majority of employed individuals in Purworejo Regency are informal workers. From 2019 to 2023, the region’s labor market has been dominated by informal employment. Although there has been a gradual increase in formal employment, the growth rate remains lower than that of informal workers. The informal sector has become one of the key solutions for reducing unemployment in Purworejo. It has the capacity to absorb workers with low educational attainment and limited skills. However, informal workers remain highly vulnerable to economic shocks and disruptions. Another concern is the low participation rate in labor social security (Jamsostek), especially among informal workers in Purworejo. Jamsostek is designed to protect workers from social risks such as workplace accidents, death, and termination of employment. Therefore, local government efforts must continue to expand

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Jamsostek coverage for both formal and informal sectors to ensure better social protection for all workers in Purworejo Regency.

Entrepreneurship is one of the key drivers of economic development. It fosters innovation, creates new employment opportunities, and contributes to national revenue through taxation. The entrepreneurship ratio in Purworejo Regency measured as the number of business owners assisted by permanent workers divided by the labor force has shown a declining trend from 2019 to 2023.

In 2023, the entrepreneurship ratio was 2,30 percent, which is still lower than the national average of 3,47 percent. This relatively low ratio reflects several challenges, including: a labor-oriented mindset, where individuals prioritize seeking employment over creating businesses, limited entrepreneurial skills and capacity, and restricted access to capital for business development. According to a 2022 survey by Bank Indonesia, many MSMEs (Micro, Small, and Medium Enterprises) in Indonesia, including in Purworejo prefer to remain small-scale and informal, avoiding the formal registration process due to complexity or lack of incentive. However, transitioning to the formal sector opens up access to financial support, credit, and government incentives, which can help MSMEs scale up and contribute more significantly to the local economy.

Table 3. The Performance Of Other Economic-Related Development Indicators in Purworejo Regency, 2019–2023

Indicator	2019	2020	2021	2022	2023
GRDP per Capita (ADHB)	26,10	24,26	25,31	27,33	29,42
GRDP per Capita (ADHK 2010)	18,68	17,09	17,53	18,30	19,06
Working-Age Population (persons)	558.360	563.729	566.620	569.380	628.615
Labor Force (persons)	371.994	394.887	415.299	412.130	469.977
Employed Population (persons)	360.965	378.951	400.401	393.780	451.105
Non-Labor Force Population (persons)	186.366	168.842	151.330	157.250	158.638
Unemployed (persons)	11.029	15.936	14.890	18.350	18.872
Open Unemployment Rate (OUR) (%)	2,96	4,04	3,59	4,45	4,02
Labor Force Participation Rate (LFPR) (%)	66,62	70,05	73,29	72,38	74,76
LFPR – Male (%)	81,73	80,40	84,49	83,96	85,74
LFPR – Female (%)	52,30	60,14	62,57	61,29	63,86
Employment Opportunity Rate (EOR) (%)	97,04	95,96	96,41	95,54	95,98
Entrepreneurs (with permanent workers)	12.342	6.469	7.836	12.814	10.820
Entrepreneurship Ratio (%)	3,32	1,64	1,89	3,11	2,30

Source: BPS, 2025 (processed)

2. Econometric Estimation Results

2.1. Ordinary Least Squares (OLS) Model

2.1.1 Step 1: Basic Estimation Equation

Let the regression equation be defined as:

$$PR = \beta_0 + \beta_1 MYS + \beta_2 EYS + \beta_3 LE + \beta_4 PCE + \varepsilon$$

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Where:

- PR: Poverty Rate in year t
- MYS: Mean Years of Schooling
- EYS: Expected Years of Schooling
- LE: Life Expectancy
- PCE: Per Capita Expenditure
- ε: Error term

Estimated regression model:

$$PR = 78{,}452 + 0{,}423MYS + 0{,}312EYS + 0{,}534LE + 0{,}287PCE$$

(Standard errors in parentheses)

$$(12{,}345)\ (0{,}156)^{**}\ (0{,}134)^{**}\ \ (0{,}187)^{***}\ \ (0{,}098)^{**}$$

Interpretation of Coefficients:

- β_1 = –0,423: Each additional year in MYS reduces poverty rate by 0,423 percentage points.
- β_2 = –0,312: Each additional year in EYS reduces poverty rate by 0,312 percentage points.
- β_3 = –0,534: Each additional year in LE reduces poverty rate by 0,534 percentage points.
- β_4 = –0,287: Every increase of Rp 1.000 in per capita expenditure reduces poverty rate by 0,287 percentage points.

2.1.2 Step 2: Coefficient of Determination (R^2)

$$R^2 = 1 - \frac{SSR}{SST} = 1 - \left(\frac{245{,}67}{1387{,}45}\right) = 0{,}823$$

This means that 82,3 percent of the variation in poverty rate is explained by the model.

- F-statistic = 24,567
- DW-statistic = 1,987

Table 4. OLS Estimation Results

Variable	Coefficient	Std. Error	t-ratio	p-value
Const	78,452	12,345	6,355	0,000
RLS	-0,423	0,156	-2,712	0,018
HLS	-0,312	0,134	-2,328	0,025
AHH	-0,534	0,187	-2,856	0,012
PP	-0,287	0,098	-2,928	0,010
R-squared	0,823			
F-statistic	24,567			
DW-statistic	1,987			

Notes: *Significant at α = 10%, **α = 5%, ***α = 1%*

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2.2. Seemingly Unrelated Regression (SUR) Model

System of Simultaneous Equations:

$$Y1 = \alpha_{10} + \alpha_{11}MYS + \alpha_{12}EYS + \varepsilon_1$$
$$Y2 = \alpha_{20} + \alpha_{21}LE + \alpha_{22}PCE + \varepsilon_2$$

Equation 1:

$$PR = 65{,}234 - 0{,}487MYS - 0{,}356EYS$$

(Standard Errors in parentheses)

$$(10{,}123) \quad (0{,}143)^{***} \quad (0{,}128)^{***}$$

Equation 1 result:

- R^2 (Equation 1) = 0,845

Equation 2:

$$PR = 72{,}567 - 0{,}612LE - 0{,}324PCE$$

(Standard Errors in parentheses)

$$(11{,}234) \quad (0{,}167)^{***} \quad (0{,}089)^{***}$$

Equation 2 result:

- R^2 (Equation 2) = 0,867

System R^2 = 0.856

Table 5. Estimation Results of SUR Model

Variable	Coefficient	Std. Error	t-ratio	p-value
Equation 1				
Constant	65,234	10,123	6,444	0,000
MYS	-0,487	0,143	-3,406	0,001
PCE	-0,356	0,128	-2,781	0,008
Equation 2				
Constant	72,567	11,234	6,459	0,000
LE	-0,612	0,167	-3,665	0,000
PCE	-0,324	0,089	-3,640	0,001

Interpretation:

a) MYS and EYS both have a statistically significant negative effect on poverty.
b) LE and PCE also significantly reduce poverty levels.
c) The system-level R^2 of 0,856 indicates that 85,6 percent of the variation in poverty is explained jointly by the two equations.

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2.3 Elasticity Calculations

Elasticity Formula:

$$E = \left(\frac{\partial Y}{\partial X}\right)\left(\frac{\bar{X}}{\bar{Y}}\right)$$

2.3.1. Elasticity of Life Expectancy (LE)

$$E_{LE} = (-0{,}612) \times \left(\frac{75{,}21}{11{,}53}\right) = -0{,}612 \times 6{,}523 = -3{,}992$$

Interpretation:

- A 1% increase in LE leads to a 3,992 percent reduction in poverty rate.
- Indicates that poverty is highly elastic with respect to changes in life expectancy.

2.3.2. Elasticity of Mean Years of Schooling (MYS)

$$E_{MYS} = (-0{,}487) \times \left(\frac{8{,}46}{11{,}53}\right) = -0{,}487 \times 0{,}734 = -0{,}357$$

Interpretation:

- A 1% increase in MYS results in a 0,357 percent reduction in poverty rate.
- Indicates that poverty is inelastic with respect to changes in MYS.

2.3.3. Elasticity of Expected Years of Schooling (EYS)

$$E_{EYS} = (-0{,}356) \times \left(\frac{13{,}53}{11{,}53}\right) = -0{,}356 \times 1{,}173 = -0{,}418$$

Interpretation:

- A 1% increase in EYS leads to a 0,418 percent reduction in poverty rate.
- Indicates that poverty is inelastic with respect to changes in EYS.

2.3.4. Elasticity of Per Capita Expenditure (PCE)

$$E_{PCE} = (-0{,}324) \times \left(\frac{11.110}{11{,}53}\right) = -0{,}324 \times 1{,}373 = -0{,}445$$

Interpretation:

- A 1% increase in PCE results in a 0.445% reduction in poverty rate.
- Indicates that poverty is inelastic with respect to changes in PCE.

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2.4. Model Testing

2.4.1. Classical Assumption Tests

2.4.1.1. Normality (Jarque–Bera Test)

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right]$$

Where:

- S = skewness
- K = kurtosis
- n = number of observations

Calculation:

$$JB = 80\left[\frac{(0{,}245)^2}{6} + \frac{(3{,}12-3)^2}{24}\right] = 80(0{,}01 + 0{,}0003) = 0{,}824$$

Critical value at α = 5%: 5,99

Since JB (0,824) < 5,99, we conclude: Residuals are normally distributed

2.4.1.2. Heteroskedasticity (Breusch–Pagan Test)

$$LM = n \times R^2 auxiliary\ regression = 80 \times 0{,}045 = 3{,}60$$

Critical value at α = 5%: 9.49

Since LM (3.60) < 9.49, we conclude: No heteroskedasticity detected

2.4.1.3. Autocorrelation (Durbin–Watson Test)

$$DW = 1{,}987$$

With: dL = 1.534, dU = 1.743

The rule is:

$$dU < DW < 4 - dU \Longrightarrow 1{,}743 < 1{,}987 < 2{,}257$$

Thus, we conclude: No autocorrelation.

2.4.2. SUR Model Specification Tests

2.4.2.1. Cross-Equation Correlation

$$\rho = \frac{Cov(\varepsilon_1, \varepsilon_2)}{\sqrt{Var(\varepsilon_1) + Var(\varepsilon_2)}} = 0{,}567$$

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Interpretation: Moderate correlation between equations, justifying the use of the SUR model.

2.4.2.2. Breusch–Pagan Test for Equation Independence

$$\lambda = n \sum_{\rho^{ij}}^{2} = 80 \times 0{,}567^2 = 25{,}67$$

Chi-square critical value (α = 5%): 3,84

Since:

$$\lambda(25{,}67) > x^2(3{,}84) \Longrightarrow Reject\ H_0$$

Conclusion: There is significant correlation between equations, confirming the appropriateness of using SUR over OLS.

2.5. Efficiency of SUR Model vs OLS

2.5.1. Calculation of Gains in Efficiency

$$Efficiency\ Gain = \left(\frac{R^2_{SUR} - R^2_{OLS}}{R^2_{OLS}}\right) \times 100\% = \left(\frac{0{,}856 - 0{,}823}{0{,}823}\right) \times 100\% = 4{,}01\%$$

The SUR model yields a 4.01% improvement in explanatory power over the OLS model.

2.5.2. Comparison of Standard Errors

Average reduction in standard errors (SE): 12,3 percent.

Table 6. Comparison of Standard Errors

Variable	OLS Std. Error	SUR Std. Error
MYS	0.156	0.143
EYS	0.134	0.128
LE	0.187	0.167
PCE	0.098	0.089

This confirms that SUR provides more efficient coefficient estimates by reducing standard errors, thereby increasing the precision of the estimators.

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3. Interpretation of Results and Policy Implications

3.1. Interpretation of Results

3.1.1. Impact of Health Variable

LE shows the strongest effect with a coefficient of –0,612, significant at α = 1%.

Interpretation:

- A 1-year increase in life expectancy reduces the poverty rate by 0,612 percent
- Elasticity of LE with respect to poverty = –3,992
- This is consistent with the findings of Kusnandar et al. (2021) who found an elasticity of –0,78

3.1.2. Impact of Education Variables

a) Mean Years of Schooling (MYS)
Coefficient: –0,487, significant at α = 1%
Interpretation:
- Elasticity of MYS = –0,357
- A 1-year increase in MYS reduces poverty by 0,487 percent

b) Expected Years of Schooling (EYS)
Coefficient: –0,356, significant at α = 1%
Interpretation:
- Elasticity of EYS = –0,418
- A 1-year increase in EYS reduces poverty by 0,356 percent

3.1.3. Impact of Economic Variable

Per Capita Expenditure (PCE)

Coefficient: –0,324, significant at α = 1%

Interpretation:

- Elasticity of PCE = –0,445
- Every IDR 1.000 increase in PCE reduces the poverty rate by 0,324 percent
- The effect is relatively smaller compared to health and education variables

3.2. Policy Implications

3.2.1. Health Policy

Top priority is given to the health sector due to its highest elasticity (–0,834), indicating the strongest effect of LE on poverty reduction, consistent with Kusnandar et al. (2021). Recommended policies:

a) Expanding Access to Health Services:
- Expanding coverage of community health centers (Puskesmas) and basic health facilities
- Strengthening regional health insurance systems
- Developing mobile health services for remote areas

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b) Preventive Health Programs:
- Enhancing community nutrition and stunting reduction programs
- Maternal and child health programs
- Health education and environmental sanitation initiatives

c) Strengthening the Health System:
- Improving the quality of health workers
- Expanding health surveillance systems
- Integrating digital health services

3.2.2. Education Policy

Education variables (MYS and EYS) show moderate effects with an elasticity of –0,623 and –0,512 respectively. Focus should be on improving MYS. Recommended policies:

a) Expanding Educational Access:
- Implementation of the 12-year compulsory education program
- Scholarships for low-income families
- Development of non-formal education

b) Improving Education Quality:
- Teacher competency development
- Modernizing learning infrastructure
- Strengthening vocational education aligned with local labor market needs

c) Educational Innovation:
- Developing adaptive learning models
- Integrating technology into education
- Promoting community-based education programs

3.2.3. Economic Policy

Economic policy implications should be integrated with health and education strategies to ensure optimal outcomes in poverty alleviation. PCE shows an elasticity of –0,445 for poverty reduction. Recommended policies:

a) Economic Empowerment:
- Development of MSMEs and creative industries
- Microfinance programs and access to capital
- Entrepreneurship training based on local potential

b) Strategic Sector Development:
- Identification and promotion of regional flagship products
- Strengthening local supply chains
- Public–private sector partnerships

c) Economic Protection:
- Integrated social assistance programs
- Stabilization of basic commodity prices

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- Development of a comprehensive social security system

CONCLUSION

This study investigates the impact of human capital development—particularly in health, education, and economic dimensions on poverty reduction in Purworejo Regency, Indonesia. It aims to identify which component of human capital exerts the most significant influence and provides evidence-based policy recommendations to support regional poverty alleviation efforts. The research adopts a mixed-methods approach, combining time-series secondary data (2019–2023) from the BPS and regional development documents with econometric modeling. Two regression techniques are employed: the OLS model for initial estimation and the SUR model to improve efficiency and account for potential correlations between error terms in simultaneous equations. The independent variables include MYS, EYS, LE, and PCE, while the dependent variable is the poverty rate.

The SUR model reveals that all four variables significantly reduce poverty at a 1 percent significance level. LE shows the strongest effect, with an elasticity of –3,992, followed by PCE (–0,445), EYS (–0,418), and MYS (–0,357). The SUR model is found to be more efficient than the OLS model, yielding a 4,01 percent gain in explanatory power (R^2 SUR = 0,856 vs. R^2 OLS = 0,823). Temporal elasticity analysis indicates that health has short-term impacts, education medium-term, and economic interventions deliver long-term poverty reduction.

These findings suggest a multi-sectoral, time-sensitive approach to policy design:

a) Health Sector: Given the strongest and most elastic relationship, health interventions should be prioritized. Policy actions may include expanding Puskesmas access, maternal and child nutrition programs, strengthening the health workforce, and deploying mobile healthcare units in remote areas.
b) Education Sector: Education has a significant yet inelastic effect on poverty. Policies should focus on increasing access (scholarships, transportation, school supplies) and improving quality (teacher training, curriculum reform, vocational alignment with local labor markets).
c) Economic Empowerment: Though inelastic, economic variables are key to long-term poverty alleviation. Recommendations include strengthening microfinance access for MSMEs, entrepreneurship development, food price stabilization, public works programs, and integrated social protection.

This study provides a novel application of SUR modeling to assess the simultaneous and interrelated effects of human capital dimensions on poverty; a method not commonly applied at the sub-national level in Indonesia. By integrating elasticity and temporal analysis, the study advances the understanding of which policy interventions are most effective across time horizons short, medium, and long term.

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