

## Impact of economic growth, village funds, and poverty on human development in Indonesia: An analytical study from 2015 to 2022



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### ABSTRACT

This study evaluates how a country's development of human resources, an important measure of economic and policy progress, is affected by various factors. It focuses on the impact of Gross Regional Domestic Product (GRDP), village funds, and poverty levels on the Human Development Index (HDI) across 33 provinces in Indonesia from 2015 to 2022. The aim is to enhance understanding of how promoting human development goes beyond just economic growth, highlighting the importance of addressing poverty and empowering local communities through measures like the Village Fund. By employing panel regression methods, including both static (POLS, FEM, and REM) and dynamic (FMOLS and DOLS) approaches, the study examines the influence of economic growth, village funds, and poverty on human development. The findings from static panel analysis indicate that while economic growth has a negative and significant effect on HDI, village funds positively and significantly influence it. As expected, poverty significantly and negatively affects HDI. Dynamic panel data confirms the positive and significant effect of village funds on HDI and, consistent with static analysis, shows poverty's negative impact. The implications of this research are threefold: First, it suggests that economic expansion might negatively affect HDI. Second, it highlights the importance of village funds in developing human resources, underscoring their role in provincial development financing strategies. Third, it recommends that provincial policymakers focus on reducing poverty to prevent it from hindering human development.

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### 1. Introduction

The development of a country's human resources is a barometer of a country's or region's development progress and an indicator of the effectiveness of specific policies and economic development (Bloom et al., 2021; Pugno, 2019; Almutairi, 2023). The magnitude of human resource development can be quantified using the Human Development Index (HDI), which measures the success of a country's development and economic policies. According to UNDP (2022), HDI is a better indicator of development and is linked to a country's or region's level of development advancement. Human development is a multifaceted idea that extends beyond economic prosperity. This human development encompasses several aspects of well-

being, such as access to education, health care, and overall quality of life (Anowor et al., 2023; Sušnik and van der Zaag, 2017). Many factors influence human resource development, including development and economic advancement, social conditions and well-being, and development policies (Matarirano et al., 2020; Muhtar et al., 2023; Sofilda et al., 2023).

Economic expansion and human development are inextricably linked; economic growth is frequently used to boost human development (Haini, 2019; Almutairi, 2023). Economic development is critical to human development. Economic growth, which refers to expanding the production of goods and services, is a measure of the success of economic development (Hung and Thanh, 2022). High economic growth indicates that a country's economy is expanding due to more significant investment, increased productivity, technological advancement, and population growth (Mu et al., 2023; Glawe and Wagner, 2020). As a result, economic growth can be used to achieve human development since it can generate resources that can be used to promote well-being (Fan et al., 2016; Haini, 2019). A more robust

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economy can fund greater health care, education, and infrastructure, resulting in higher living standards. Apart from that, economic expansion boosts government money, raising funding for educational infrastructure and promoting total human development (Reyes and Useche, 2019; Telch and Appe, 2022; Sotarauta and Grillitsch, 2023).

Economic growth offers the resources and opportunity needed to fund human resource investments such as education, health care, and skill training (Ozturk and Suluk, 2020; Islam and Alam, 2023; Sofilda et al., 2023). This type of investment raises living standards, increases average life expectancy, and broadens prospects for individuals and society (Wegari et al., 2023; Chattopadhyay et al., 2022).

The availability of cash is another critical aspect of human growth (Anowor et al., 2023; Glawe and Wagner, 2020; Hung and Thanh, 2022). Because financial resources impact the availability of educational infrastructure, human development is intimately tied to financing availability (Rimawan et al., 2020; Cahyo et al., 2022). Because human development is a public need, financing investment in human development is essentially the responsibility of a country's government (Ito et al., 2018; Gachie, 2020). Village funds are one type of financial source that the provincial government in Indonesia might use (Pandiangan et al., 2021; Hartojo et al., 2022; Reyes and Useche, 2019). Village funds, which are utilized by the central government and regional governments in Indonesia to improve the population's welfare, have become a significant concern in talks about the development and progress of regional development in Indonesia (Saragi et al., 2021). Village funds are distributed to communities throughout Indonesia to support local development projects chosen by the local community, such as infrastructure development related to human development. Village funds can influence many elements of human development in Indonesia, including boosting access to education, health care, and rural quality of life (Marpaung et al., 2020).

According to empirical studies, human development and poverty levels have a close association (Ladi et al., 2021; Syofya, 2018; Asante, 2022). Income levels and availability of basic needs are used to determine poverty. High poverty negatively influences human development because people do not have adequate and fair access to education (Rammohan and Tohari, 2023; Asadullah et al., 2021; Moyo et al., 2022). Poverty levels in a region, including Indonesia, impact human development (Cahyo et al., 2022). Increasing access to quality education can reduce poverty or vice versa (Dita and Mahaendra, 2020; Abdulrahman, 2022.). Thus, improving access to education, which can lower poverty rates in the long run, is intimately tied to human development (Asadullah et al., 2021).

Indonesia, a populous developing nation, has witnessed substantial economic expansion in recent decades. Indonesia, as an archipelagic nation, exhibits significant regional disparities in terms of

human development. In mid-2023, Indonesia's population will be about 278 million dispersed over 38 regions. Meanwhile, Indonesia's economic growth in the second quarter of 2023 was 5.17% (year on year), an improvement from the previous quarter's growth of 5.04%. This increase has contributed to higher national income and lower poverty rates.

However, the impact can vary depending on how efficiently and honestly Village funds are managed. Transparency and accountability in Village Fund management positively impact poverty levels in rural communities (Abdulrahman, 2022). According to the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration 2023 data, 37.1 percent of all village funds in 2023 will advance human resources in villages. Meanwhile, the budget allocation for rural economic growth reaches 45.7 percent of the overall village funds. Village funds funding in the 2023 state budget plan attained IDR 70 trillion, a 3.09% increase above the IDR 67.9 trillion anticipated budget in 2022. It is critical to assess the efficacy of these monies and their impact on human development indices such as education, health care, and income distribution.

Meanwhile, poverty continues to be a severe impediment to human growth. This deprives people of valuable resources, limits their chances, and makes living satisfying lives difficult. Understanding the dynamics of poverty, including its origins and consequences, is critical in developing policies that can assist society's most vulnerable populations. Poverty remains a significant issue in many countries, including Indonesia.

To eliminate poverty in Indonesia, the government has launched several measures. According to BPS statistics (bps.go.id), the number of poor people in Indonesia reached 25.90 million in March 2023, a percentage decrease of 0.46 million people from September 2022. The poorest people in Indonesia are found mainly in rural areas (12.22 percent in March 2023), whereas the percentage of urban poor is 7.29 percent in March 2023. Extant literature indicates poverty and human growth are inextricably linked. When a country has a relatively high degree of poverty, it has a low HDI, which reduces the average value of the Development indicator (Fosu, 2007).

This study investigates the impact of regional economic growth, defined explicitly by GRDP growth, village funds, and poverty levels, on HDI in 33 provinces of Indonesia between 2015 and 2022. It also focuses on the village funding program, a new policy implemented by the Indonesian government in 2015. Therefore, this study offers a unique and valuable contribution to the field of research by conducting a comprehensive investigation into the impact of village finances on the development of human resources in 33 provinces of Indonesia. In addition, this study employs panel data analysis, incorporating both static and dynamic techniques, which serves as its novelty aspect. The results of this study enhance the comprehension of how nations might promote human development by

simultaneously addressing economic growth and poverty and empowering local communities through initiatives like village funds. The interconnectedness of these variables significantly influences the well-being of individuals and communities. Therefore, this study contributes to creating a more comprehensive and prosperous society, allowing individuals to achieve their maximum potential and experience an enhanced quality of life.

## 2. Literature review

### 2.1. The human development-economic growth relationship

The current development paradigm is based on economic growth, measured by human development and the level of human life quality in each country. HDI, which measures the level of quality in education, health, and the economy, is one of the benchmarks used to assess the quality of human life (spending power) (Syofya, 2018). Economic growth is a tool for analyzing the capacity of the region's economic developments (Karwahningrum and Triyanto, 2021). Economic growth is reflected in changes in GDP from one period to the next, which indicates genuine regional development, both directly and indirectly, and the success of regional policy implementation. The economy is strongly tied to the amount of goods and services produced in society; thus, the more goods and services produced, the greater the welfare of society, allowing it to improve the quality of its human resources (Maulana et al., 2022).

According to Khan et al. (2018), HDI refers to the environment in which society enjoys a healthy, prosperous, and long life; thus, it is critical to establish a situation where individuals can acquire a standard of living. According to Karwahningrum and Triyanto (2021), a high HDI can increase a region's economy, particularly the industrial sector. HDI will push the industry to enhance production to increase people's consumption levels. Human resources are a critical aspect of economic progress. High-quality human resources can boost economic performance; thus, social development is economic development.

Human development's role is determined by its effectiveness in generating growth (Oyinlola and Adedeji, 2020). According to Zhang and Danish (2019), human development is responsible for elevating economic growth because the higher the degree of education of workers, the higher the production level; a highly educated workforce produces more innovation and supports economic growth. An increase in HDI or a higher HDI value indicates that the quality of human life is improving in terms of health, education, and a decent standard of living so that the impact on meeting the basic needs of every human being can increase community productivity, which in turn can improve community welfare (Nurvita et al., 2022). According to the findings of Nurvita et al. (2022), Pekarcikova and

Pracharova (2023), and Oyinlola and Adedeji (2020), the GRDP growth rate has a favorable effect on HDI.

Nurvita et al. (2022) concluded that economic growth has a positive relationship and has a significant effect on HDI and that positive regional economic growth trends make achieving a higher level of human development possible. Better human development can lead to more prospects for long-term economic prosperity. Angin et al. (2023) obtained similar results using panel data analysis, concluding that Gross Regional Domestic Product positively influences HDI because the value of domestic products influences the standard of living of the economy and its people. The importance of human development is contingent upon its efficacy in facilitating growth (Oyinlola and Adedeji, 2020).

As stated by Zhang and Danish (2019), human development is responsible for elevating economic growth because the higher the degree of education of workers, the higher the production level; so, a highly educated workforce produces more innovation and supports economic growth. An increase in HDI or a higher HDI value indicates that the quality of human life is improving in terms of health, education, and a decent standard of living so that the impact on meeting the basic needs of every human being can increase community productivity, which in turn can improve community welfare (Nurvita et al., 2022). According to the findings of Nurvita et al. (2022), Pekarcikova and Pracharova (2023), and Oyinlola and Adedeji (2020), the GRDP growth rate has a favorable effect on HDI.

Nurvita et al. (2022) concluded that economic growth has a positive relationship and has a significant effect on HDI and that positive regional economic growth trends make it possible to achieve a higher level of human development. Enhanced human development can contribute to increased opportunities for sustained economic prosperity. Angin et al. (2023) obtained similar results using panel data analysis, concluding that Gross Regional Domestic Product positively influences the HDI because the value of domestic products influences the standard of living of the economy and its people.

Using the Pearson correlation coefficient, Pekarcikova and Pracharova (2023) discovered a high positive link between GRDP and HDI in 14 nations. From the panel data analysis, Hidayat and Woyanti (2021) found that increasing per capita income will affect growing HDI because as income rises, the standard of living that uses income as a measure of welfare rises as well; hence, HDI achievements increase.

Izzah and Hendarti (2021) discovered that the GRDP variable had a simultaneous positive and substantial influence on HDI using multiple linear regression with quantitative time series data from 2010 to 2019. Such facts suggest that the higher the GDP growth rate, the higher the people's quality of life, which affects the community's welfare. According to panel data regression models and MRA, GRDP has a strong and favorable influence on HDI. These findings are based on the new growth theory

(NGT) or endogenous growth theory, which states that investment in physical capital and human capital plays a role in determining long-term economic growth and encouraging public policy to play an active role in stimulating economic development through direct and indirect investment in human resource formation.

The analysis is based on secondary data from HDI, dependence ratio, GRDP, financial report, and IPG data from 2016 to 2020. Using the OLS approach, [Fahmi and Dalimunthe \(2018\)](#) determined that GRDP per capita positively and substantially affects HDI. A high GDP per capita increases people's purchasing power, which leads to improved welfare. The wealthier and more decent a country's citizens are the more significant the country's human development. Several of this research employed different measures but found the same conclusions, namely that there was a solid, beneficial effect between GRDP and HDI.

[Pitaloka and Prabowo \(2022\)](#) encountered different results using the panel regression analysis, with data from the 2016-2020 timeframe examined, indicating that Gross Regional Domestic Product (GRDP) hurt HDI. Economic expansion negatively influences HDI since it does not focus on increasing the quality of human life but rather on spending on gross fixed capital formation for infrastructure improvement. [Khan et al. \(2018\)](#) utilized the Autoregressive Distributive Lag Model (ARDL) to show that economic growth does not help human development since it cannot improve individual well-being because it is not accompanied by equality in Indonesia. Differences in outcomes are due to variations in research methodologies, regions, and periods.

Based on the preceding arguments on the association between human development and economic growth, the first hypothesis is defined as follows:

**H1:** GRDP growth has a positive impact on HDI.

## 2.2. Human development and village funds relationship

Village funds are stage budget funds obtained from district/city local government budget expenditures that are transferred to villages and can be used to finance government management, development, community development, and to improve rural welfare ([Badrudin et al., 2021](#); [Yusuf and Afendi, 2020](#)).

According to [Joetarto et al. \(2020\)](#), factors that encourage delays in village development include a lack of potential human resources, officials' mentality in carrying out their main tasks and obligations, a lack of service facilities and infrastructure, remote villages, and a lack of funds, because these conditions encourage the government to present village funds program to address village development problems. However, if village funds are allocated mainly for infrastructure development,

more than the goal of village funds is needed to reach out to underprivileged people ([Saragi et al., 2021](#)). Village funds must be administered holistically by considering several other factors or dimensions, such as education, hospitality (agricultural), village seed centers, and healthy and clean lifestyles, to avoid regional imbalances ([Manurung et al., 2022](#)). The disparity in human development between provinces is unavoidable in the HDI development process.

The disparity in human development between villages and cities results in disparities in welfare ([Pandiangan et al., 2021](#)). Village finances can increase welfare and equitable village development by increasing public services, developing the economy, closing development gaps between villages, and strengthening communities as development subjects ([Rimawan et al., 2020](#)). The findings are consistent with the remark of [Nawawi et al. \(2021\)](#), who indicated that village grants are aimed at increasing the welfare and quality of life of village communities and alleviating poverty.

In the study, [Rammohan and Tohari \(2023\)](#) identified the groups that benefited the most from the village funds program in terms of per capita consumption expenditure of agricultural and non-agricultural households, with agricultural households increasing their per capita consumption expenditure more than non-agricultural households. One of the government's tasks, according to [Angin et al. \(2023\)](#), is to build villages, which can be accomplished through community empowerment to increase the productivity and diversity of village businesses, the availability of facilities and services to support the village economy, the development, and strengthening of institutions that support the production and marketing chain, and resource optimization.

The greater the HDI, the more successful the village administration has been in improving human quality through village funding ([Badrudin et al., 2021](#)). The same study was carried out by [Badrudin et al. \(2021\)](#), [Yusuf and Afendi \(2020\)](#), [Nawawi et al. \(2021\)](#), [Joetarto et al. \(2020\)](#), and [Angin et al. \(2023\)](#), with the results indicating that village money allocation had a favorable influence on HDI. The higher the village funds, the wealthier the community.

[Rimawan et al. \(2020\)](#) concluded that village funds allocation has been able to HDI as seen from the development of village infrastructure, educational institutions, and health services built in each village, using quantitative research methods using the SEM-PLS statistical tool with statistical tests using WARP PLS 3.0 (Partial Least Square). The analysis is based on four years of data from 2015 to 2018, with saturated sampling being utilized as the sampling strategy. [Nawawi et al. \(2021\)](#) determined that village grants positively and substantially influence boosting HDI utilizing quantitative panel data methodologies with regression equations for all districts/cities in Indonesia. This is consistent with employing the village funds budget, which is

prioritized to support development and community empowerment aimed at improving the welfare and quality of life of village communities and eliminating poverty.

Using multiple linear regression, Yusuf and Afendi (2020) concluded that village funds-supporting components such as profit-sharing funds had a positive and significant effect on HDI, general allocation funds had a negative and significant effect, and special allocation funds had a positive but not significant effect.

To strengthen the capacity of local fund management authorities, regional governments must optimize the village assistance function (Nugraeni and Aji, 2021; Sofilda et al., 2023). Pandiangan et al. (2021) concluded that the village funds program negatively influences the gap in Indonesia's human development, using descriptive analysis and analysis of urban village panel data from 2015 to 2019. It is possible to interpret village funding as having a beneficial influence on boosting HDI in Indonesia, as reflected by life expectancy, the gap in average years of schooling, and the disparity per capita in rural and urban areas.

Marpaung et al. (2020) concluded that village funds were used to improve community welfare, development planning, and budgeting at the village level in community empowerment, as well as increase development infrastructure and services to the community in the context of developing social and economic activities in the community, using multiple regression analysis using secondary data and primary data obtained from filling out questionnaires with the community. Badrudin et al. (2021) obtained different results based on regression analysis, showing that village funds cannot influence the social welfare of district communities despite being accompanied by variable capital expenditure allocations and economic growth. The size of the village area in four provinces and the quality of human resources handling village money in the districts could be hurdles. Novita and Mahaendra (2021) found the same results using district/city panel data, concluding that village contributions had no positive and insignificant influence on community wellbeing.

Based on the preceding arguments about the relationship between human development and village funds, the second hypothesis is written as follows:

**H2:** Village funds have a positive impact on HDI.

### 2.3. The link between human development and poverty levels

In Indonesia, reducing stagnating poverty and high levels of inequality is a two-pronged social welfare challenge (Hasanah et al., 2021; Abdulrahman, 2022; Suryahadi and Izzati, 2018). A country's poverty level describes its people's quality of life based on the negative link between general well-being and poverty level (Machmud and

Sidharta, 2023). According to Wulandari et al. (2022) and Abdulrahman (2022), poor people, in general, are more focused on meeting basic needs and are less interested in activities that are not directly related to basic needs, so human resources will be limited because, with a high level of poverty, people cannot get a decent education, resulting in a population that is behind and less educated, resulting in a low quality of human resources.

A similar finding is also found in Maulana et al. (2022), who stated that if the poverty line continues to rise, the population will be unable to meet basic needs daily. Consequently, a vicious cycle of poverty occurs in which real income levels are low, causing market demand to be lower and reducing productivity, causing human resources to continue to decline.

However, investment in education and health care must be considered. After all, it will benefit poor people more than non-poor people because poor people's biggest asset is their misuse. The argument can be made that the optimal realization of human development has not yet been achieved, as the exclusive emphasis has been placed on poverty alleviation rather than the implementation of affordable educational and healthcare services, which have the potential to contribute significantly to productivity and subsequently, income (Syofya, 2018).

Given that a significant proportion of individuals experiencing financial hardship are concentrated in rural localities, it stands to reason that by implementing measures aimed at alleviating poverty in these specific regions, there is a potential to ameliorate poverty on a broader scale and consequently augment HDI. This assertion is supported by the scholarly works of Permatasari et al. (2021) and Machmud and Sidharta (2023). According to Dita and Mahaendra (2020), the most essential means and resources for a country to raise its HDI in the long term are poverty alleviation and education expenditure for human capital investment. The same study by Wulandari et al. (2022) and Syofya (2018) found that poverty has a detrimental effect on the HDI. The greater the level of poverty, the poorer the community will be. The lower the amount of poverty, the higher the welfare of society.

Wulandari et al. (2022) concluded using multiple linear regression analysis that poor people, in general, are more focused on fulfilling basic needs and are not interested in activities that are not directly related to basic needs, so it is becoming increasingly clear that the higher the poverty rate, the lower the level of human development where poor people tend to have low purchasing power (Nugraeni and Aji, 2021).

Using multiple linear regression analysis with t-test and f-test, Maulana et al. (2022) discovered that the HDI falls when the poverty severity index rises. Using panel data analysis for 2014-2019, Nugraeni and Aji (2021) revealed that poverty negatively affected HDI. In low-income neighborhoods, individuals will need help to achieve their

necessities, such as health and education. Thus, as the poverty level of a population increases in a specific location, it shows less prosperous living conditions and might impact people's quality of life.

Diba et al. (2018) discovered by utilizing panel data analysis that poverty has a negative and significant effect on HDI because the more extensive the population of poor people, the lower the level of human development because poor people have low purchasing power, lowering the level of human development. Aprilia and Cerya (2023) demonstrated that poverty significantly negatively influences HDI using a Random Effects model approach with linear regression analysis of panel data. Such a finding argues that the more people's basic needs are fulfilled, the more likely they will be able to improve the quality of their human resources.

Ladi et al. (2021) reported that the components of the water poverty index, namely resources, capacity, access, use, and environment, have a substantial influence on HDI adopting Ordinary Least Squares (OLS) regression modeling. Given the importance of water resources to human well-being and achieving the Sustainable Progress Goals (SDGs), the HDI is significant as a measure of a country's level of progress. As a result, using this index alongside research into the impact of WPI components on HDI is advantageous for planning and policymaking.

Senewe et al. (2021) obtained different results using multiple regression analysis. The partial analysis results show that poverty does not affect the HDI Index because if poverty levels rise, there will be a negative impact on HDI, such as closed access to education. After all, education costs are relatively high, preventing poor people from accessing education services.

Based on the preceding arguments about the relationship between human development and poverty rate, the third hypothesis might be given as follows:

**H3:** Poverty has a detrimental impact on HDI.

### 3. Empirical method

The study employed panel data analysis as a methodological approach to examine and evaluate three distinct research hypotheses. Panel data analysis involves the integration of cross-sectional data and time series data. Hsiao (2007) and Baltagi (2021) presented a range of justifications for the prevalence of panel data analysis. Panel data regression is a statistical technique that addresses the issue of heterogeneity in individual-level data over many periods. Furthermore, using panel data yields more comprehensive and diverse research findings while providing a higher level of flexibility. The benefits mentioned above imply that employing panel data regression can yield more robust statistical analysis outcomes and effectively address the issue of omitted variables. The static and

dynamic panel data regression analysis was performed utilizing the Eviews 12 software package.

This study's panel data regression model has the following basic equation.

$$HDI_{it} = \alpha_0 + \beta_1 GRDP_{it} + \beta_2 VFUNDS_{it} + \beta_3 POV_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where, HDI is the human development index, GRDP is GRDP growth, VFUNDS is the amount of village funds, POV is poverty level,  $i$  is Indonesia's provinces 1-33,  $t$  is the analysis period from 2015 to 2022,  $\alpha$  is a constant,  $\beta$  is the regression coefficient,  $\mu_i$  is the time-invariant provincial effects (1-33), and  $\varepsilon_i$  is the error term. Table 1 summarizes the descriptions of the variables used.

The analysis of static panel regression can be conducted using three distinct models, namely Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM) (Gujarati, 2004; Baltagi, 2021; Hsiao, 2007). Eq. 1 can be expressed in the form of Pooled Ordinary Least Squares (OLS) as follows:

$$Y_{it} = a + \beta_j X_{it}^j + \varepsilon_{it} \quad (2)$$

where,  $Y_{it}$  represents the dependent variable in the  $i^{\text{th}}$  cross-section unit in the  $i^{\text{th}}$  period, while  $X_{it}^j$  refers to the  $j^{\text{th}}$  variable in the  $i^{\text{th}}$  time series unit.  $\varepsilon_{it}$  refers to the error component that measures the extent to which the actual observed value of the dependent variable  $Y$  differs from the value predicted by the model. Eq. 1 is stated as follows in FEM and REM forms:

$$Y_{it} = \alpha + \beta_j X_{it}^j + j + \sum(i=2)^{naiDi} + \varepsilon_{it} \quad (3)$$

where,  $Y_{it}$  represents the  $i^{\text{th}}$  dependent variable in the  $i^{\text{th}}$  period.  $X_{it}^j$  is used as the  $j^{\text{th}}$  independent variable, which predicts the dependent variable  $Y$  in the  $i^{\text{th}}$  period. Dummy variables, represented by  $D_i$ , describe categorical variables or specific events that influence the outcome. Eq. 1 is expressed in REM form as follows:

$$Y_{it} = \alpha + \beta_j X_{it}^j + \dots \varepsilon_{it} = u_i + v_t + w_{it} \quad (4)$$

where,  $Y_{it}$  is the dependent variable in the  $i^{\text{th}}$  cross-section unit in the  $i^{\text{th}}$  period. At the same time,  $X_{it}^j$  is the  $j^{\text{th}}$  independent variable that influences the  $i^{\text{th}}$  variable in the  $i^{\text{th}}$  period. In this context,  $i$  refers to the cross-section unit, an individual observation unit, while  $j$  is a time series unit covering a specific period.  $\varepsilon_{it}$  is the error variable that measures the extent to which the actual observed value of the dependent variable  $Y$  differs from the value predicted by the model. In addition,  $\alpha$  is a constant representing the intersection of the regression line, and  $\beta_j$  is a parameter that describes the influence of the  $j^{\text{th}}$  variable on the dependent variable.

During the study, there are additional error components involving cross-section error ( $u_i$ ), time series error ( $v_t$ ), and combination error ( $w_{it}$ ), which

account for additional variability in the model. In addition to static panel estimation, dynamic panel models are used in this study. Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) techniques were utilized for dynamic panel data analysis. Eq. 1 is stated in DOLS form as follows:

$$Y_{it} = \phi_i + \delta_t + \beta_i z_{it} + \sum d_{ij} \Delta_{z_{i,t}} + j + \mu_{it} \quad (5)$$

where,  $\phi_i$  represents constant individual effect. In addition, the trend element or time effect, denoted by the symbol  $\delta_t$ , is considered in the model.  $Z_{it}$  is a vector of relevant explanatory variables in this model, with  $i$  being an estimate of their long-term impact.  $\sum$  denotes the usage of a first differentiated regressor, depending on its  $p$ -value, might involve a lead (ahead) or a lag (backward), and  $d_{ij}$  is the coefficient associated with the lead or lag of the explanatory variable that has undergone the first

differentiation. Finally,  $\mu_{it}$  refers to the error term in this analysis that should come after the I(0) procedure. Eq. 1 is written in FMOLS form as follows:

$$Y_{it} = \alpha_i + \alpha \beta_i X_{it} + \mu_{it} \text{ dengan } X_{it} = X_{it} - 1 + \varepsilon_{it} \quad (6)$$

where,  $\alpha_i$  denotes the intercept, which indicates a constant value in the regression model.  $\beta_i$  represents the cointegration coefficients that are necessary for the presence of cointegration between  $Y_{it}$  and  $X_{it}$ .  $\varepsilon_{it}$  denotes the error term, which represents sources of uncertainty or unexplained causes.  $Y_{it}$  represents the dependent variable for the  $i$ th nation and the  $t$ th year, whereas  $X_{it}$  represents the independent variables for the  $i$ th country and the  $t$ th year. Furthermore, in certain instances, the analysis additionally encompasses the  $X_{it-1}$  variable, which represents the independent variable for a particular province  $i$  in the preceding year, denoted as year  $t-1$ .

**Table 1: Variable description**

Variable	Code	Description	Units
Human development index	HDI	Comparison of life expectancy, literacy, education, and living standards	Index
GRDP growth rate	GRDP	Provincial economic growth rate (%)	Percent
Village funds	LOG_VFUNDS	The allocation of funds for rural areas, disbursed through the local budget known, supports various aspects of village governance, development, community empowerment, and social initiatives	Thousand Rupiah
Poverty rate	POVERTY	Log of village funds (Indonesia Rupiah, Log) Percentage of residents who are below the poverty line	Percent

**Table 2** presents the descriptive statistics derived from a comprehensive dataset of 231 observations. The mean HDI value is 70.38, while the average GRDP growth rate is 4.22. The average value of village funds is recorded as 1,941,894,146, while the average poverty level is reported at 10.87. In 2022, the province with the highest HDI was DIY Province, registering a value of 80.64. Conversely, in 2016, the province with the lowest HDI was Papua Province, recording a value of 58.08. In 2016, East Nusa Tenggara exhibited the highest GRDP growth rate of 22.94%, while Papua Province recorded the lowest growth rate of -15.74% in 2020. In 2015, Papua Province experienced the highest poverty rate,

reaching 28.4%. Bali Province recorded the lowest percentage of poverty, 3.61%, in 2019. In 2016, the Riau Islands Province recorded the lowest village finances, amounting to 177,766,079 thousand rupiah. Conversely, in 2020, the Central Java Province reported the most significant village funds, totaling 8,200,608,200 thousand rupiah. The observable variables evaluated exhibit varying fluctuation levels from their respective averages, as measured by the standard deviation. Among these variables, the poverty level demonstrates the highest variability, while the village funds display the most minor fluctuation.

**Table 2: Summary statistics of variables**

	HDI	GRDP	Village funds	Poverty
Mean	70.38	4.23	1.941.894.146	10.87
Maximum	80.64	22.94	8.200.608.200	28.40
Minimum	58.05	-15.74	177.766.079	3.61
Std. dev.	3.69	3.78	1.867.519.883	5.51
Observations	231	231	231	231

## 4. Results and discussion

### 4.1. Static linear panel estimates: POLS, FEM, and REM

The POLS estimation results, specifically in column 2 of **Table 3**, reveal a surprising finding: a substantial negative association between GRDP growth and HDI in 33 provinces across Indonesia from 2015 to 2022. The influence of provincial economic growth on HDI (-0.011) is statistically significant, as indicated in **Table 3**. At 5% significance levels, a 1% rise in province economic

growth reduces the HDI by 11.1% if all other factors remain unchanged. This negative impact of GRDP growth on HDI may partly reflect that economic development may not have been well planned, resulting in a negative impact on human development ([Chikalipah and Makina, 2019](#); [Islam and Shindaini, 2022](#); [Li et al., 2023](#)).

In another vein, according to the research conducted by [Uddin et al. \(2021\)](#), higher GRDP growth rates serve as a positive stimulus for enhancing human development. Nevertheless, several circumstances can result in economic expansion exerting an adverse influence on the

development of human resources. This condition may arise due to inadequate economic institutions in certain provinces of Indonesia, which impede the provision of sufficient money to develop human resources (Uddin et al., 2021). Income distribution is another factor that can explain the adverse effects of economic expansion on HDI. In line with the situation in developing nations, a significant income disparity remains. Consequently, GRDP growth may not result in equitable advantages for all income brackets or geographic regions of the population. Thus, the disparity in income distribution impedes holistic human development (Olawole and Abiodun, 2021).

The results of the POLS estimation indicate that the impact of village funds on HDI across the 33 provinces is found to be statistically insignificant. Poverty is also associated with a detrimental impact on HDI. Within the framework of this study, it is anticipated that the mitigation of poverty will provide a favorable effect on the augmentation of HDI. Poverty reduction frequently leads to enhanced opportunities for education and healthcare and an elevated quality of life, all of which contribute to the augmentation of HDI.

In the assessment for POLS, it was found that GRDP exhibits the largest absolute value for the regression coefficient of -0.111, followed by the village funds with a coefficient value of -0.192 and poverty with a coefficient value of -0.425. The results of the estimation using FEM and REM are displayed in columns 3 and 4 of Table 3, respectively. The findings obtained from the fixed effects estimator indicate that the model accounts for 97% of the variation in HDI. The findings of the village funds fixed effects estimator in this static model indicate a statistically significant and beneficial impact of village funds on HDI. A 1% increase in village funding leads to a substantial 3,629% improvement in HDI. The findings above align with the conclusions drawn by Rimawan et al. (2020), which indicated that allocating village funds has effectively contributed to enhancing HDI. Therefore, the allocation of the village funds is demonstrated by establishing diverse village infrastructure, educational amenities, and healthcare provisions in various villages within the examined provinces.

These findings are congruent with what has been reported in the literature. Furthermore, the scholarly work conducted by Nawawi et al. (2021) employed quantitative panel data methodologies, employing regression equations to analyze the entire districts and cities within Indonesia. Their findings unequivocally demonstrate that village funds exhibit a noteworthy and constructive impact on the augmentation of HDI. Angin et al. (2023) employed panel data to examine the impact of various factors on the village fund outcomes. They found that population size, area, and poverty levels have a statistically significant positive relationship with HDI.

The study conducted by Yusuf and Afendi (2020) employed the method of multiple linear regression

to derive their findings. Their research findings indicate that the supporting components of village funds, specifically profit-sharing funds, exhibit a noteworthy positive impact on HDI. Pandiangan et al. (2021) employed descriptive analysis and analytical panel data techniques to investigate the impact of the village fund program on the human development gap in urban villages across Indonesia from 2015 to 2019. Their findings revealed a detrimental association between the village fund program and Indonesia's human development gap.

Marpaung et al. (2020) conducted a comprehensive study employing multiple regression analyses to examine the impact of village funds on various aspects of community welfare and development. The researchers utilized secondary and primary data collected by administering questionnaires within the community. The study's findings revealed that the utilization of village funds has significantly contributed to the enhancement of community welfare, as well as the facilitation of development planning and budgeting at the village level. Moreover, the study demonstrated that allocating these funds has played a pivotal role in empowering the community, fostering the growth of social and economic activities, and promoting the development of essential infrastructure and services for the benefit of the community.

The deleterious impact of poverty on HDI is statistically significant at a 5% significance level. Moreover, a marginal increase of one percent in poverty is associated with a corresponding decrease in HDI by 0.521%. The findings presented herein align with the research conducted by Wulandari et al. (2022), wherein a comprehensive examination employing multiple linear regression analysis revealed that individuals of limited economic means tend to prioritize the satisfaction of fundamental necessities, exhibiting a diminished inclination towards pursuits unrelated to such essentials. Consequently, it becomes increasingly apparent that heightened poverty rates correspond to diminished levels of human development, as impoverished individuals commonly exhibit constrained purchasing capabilities.

The studies conducted by Maulana et al. (2022) and Nugraeni and Aji (2021) further emphasized the inverse relationship between the poverty rate and HDI, whereby an escalation in the former leads to a decline in the latter. Socioeconomically disadvantaged neighborhoods provide significant challenges for individuals in fulfilling their fundamental necessities, including healthcare and education. The research conducted by Diba et al. (2018) and Aprilia and Cerya (2023), which utilized panel data analysis, demonstrates that poverty has a harmful and statistically significant effect on the HDI. Poverty hurts HDI because an increase in the number of poor people leads to a decrease in the overall level of human development. As a result, increasing poverty leads to impoverished persons needing more purchasing power, which impedes



poverty alleviation efforts and, as a result, reduces human development.

Two of the three explanatory variables are statistically significant at the 5% significance level in the RE estimation, and this estimator is nearly consistent with the FE estimation. The findings reveal that village funds have a considerable positive impact on HDI, indicating a raising in HDI by providing villages with resources and cash to support economic development, health, and education. The favorable and considerable impact of Village funds on HDI demonstrates that investment in village development can result in actual improvements to rural inhabitants' welfare. Meanwhile, poverty is one of the adverse drivers of a province's HDI, with a 1% increase in poverty level reducing or worsening HDI conditions by 0.6176%

at a 5% significance level, implying that efforts to eliminate poverty can have a positive impact on boosting HDI. The percentage of the variance in HDI that can be anticipated based on the explanatory variables is 43.9% for the POLS regression model, 97.9% for FEM, and 58.7% for REM.

As a result, policies and programs focused on eliminating poverty in the province can make a substantial contribution to enhancing the population's quality of life and human development. In this setting, the province may need to prioritize poverty-reduction measures such as job and training programs, improved access to education, inexpensive health care, and social support for individuals at risk of poverty. In this way, the provincial government can improve HDI and the quality of life of the society.

**Table 3:** Static panel regression result

Variable	POLS		FEM		REM	
	$\beta$	t-statistics	$\beta$	t-statistics	$\beta$	t-statistics
Provincial economic growth rate (%)	-0.111	-2.293	0.007	0.592	-0.006	-0.461
Log of village funds (Indonesia Rupiah, Log)	-0.193	-0.871	3.630	11.634	2.828	11.370
Poverty rate (%)	-0.426	-12.017	-0.522	-6.478	-0.618	-10.959
Observations		231		231		231
R-squared		0.439		0.979		0.587

The dependent variable is HDI

**4.2. Dynamic panel: FMOLS and DOLS estimation results**

The dynamic panel results are reported in Table 4. The estimation findings obtained by FMOLS estimation point out that the coefficient of the village funds is estimated to be 3.95. Thus, a 1% increase in village funds is associated with a 3.95% increase in HDI, given that the other independent variables remain constant. The coefficient for poverty is -0.50, suggesting that a 1% rise in poverty is associated with a fall in HDI by 0.51% while holding other independent variables constant. At the same time, DMOLS estimation reveals that the regression coefficient associated with the village funds variable is 3.62. This coefficient suggests that a 1% increase in village funds is associated with a 3.63% rise in HDI, assuming that the other independent variables remain constant. The coefficient for poverty is -0.52,

suggesting that a 1% increase in poverty is associated with a 0.52% decrease in HDI while keeping all other independent variables constant.

The FMOLS estimation provides several intriguing conclusions regarding the relationship between village fund characteristics, poverty, and the rise of Indonesia's HDI. According to the findings, the village funds variable has a positive and significant impact on HDI increase. If all other independent variables remain constant, the regression coefficient of 3.95 suggests that a 1% increase in village fund allocation results in a 3.95% increase in HDI. However, the statistics show that the Poverty rate has a significant negative impact on HDI. According to the regression coefficient of -0.50, a 1% increase in poverty produces a 0.51% decrease in HDI, assuming that all other factors impacting HDI remain constant.

**Table 4:** Panel fully modified least squares panel dynamic least squares results

Variable	DOLS		FMOLS	
	$\beta$	t-statistics	$\beta$	t-statistics
Provincial economic growth rate (%)	0.007	0.540	0.010	0.914
Log of village funds (Indonesia Rupiah, Log)	3.630	0.541	3.951	10.287
Poverty rate (%)	-0.522	10.627	-0.510	-6.020
Observations		231		231
R-squared		0.978		0.974

The dependent variable is HDI

In other words, the FMOLS analysis provides empirical evidence that a higher village funds allocation can positively contribute to increasing the quality of life and human development in Indonesia at the provincial level. The outcome is consistent with the findings of other studies, which reveal a positive relationship between village funds and HDI.

Meanwhile, rising levels of poverty might have a negative influence on HDI because these factors are interrelated in their impact on the population's quality of life.

From a policy standpoint, the findings of this study underscore the importance of optimizing the allocation of village money to enhance human well-

being and promote development. In addition, it is imperative to prioritize the reduction of poverty levels as a strategic approach towards augmenting HDI. Policies aimed at supporting poverty alleviation activities, which contribute to the enhancement of income levels and the facilitation of access to health and education services, play a crucial role in enhancing the overall quality of life for residents at the provincial level. The DMOLS technique offers outcomes comparable to the FMOLS method, confirming and strengthening findings about the impact of village funds and poverty factors on the growth of the HDI in Indonesia. These findings have significant implications for regional and national development policies. The village funds variable had a strong positive impact on HDI in the DMOLS analysis, with a regression coefficient of 3.62. Assuming all other factors impacting HDI remain constant, the conclusion implies that a 1% increase in village funds allocation might result in a 3.63% increase in HDI.

These results reinforce prior research that found village fund allocations can favorably influence human development at the provincial level in Indonesia. Poverty, on the other hand, has a strong negative impact on HDI, with a regression coefficient of -0.52. The result implies that a 1% rise in poverty can result in a 0.52% fall in HDI, provided that other factors influencing HDI remain constant. Therefore, these outcomes emphasize the significance of significant initiatives to reduce poverty as components of local human development plans. Based on the dynamic panel technique, it is seen that the percentage of the variance in HDI that can be anticipated from the GRDP, village funds, and the poverty rate is 97.8% and 97.4%, respectively.

Reduced poverty levels can improve the population's quality of life and HDI. DMOLS and FMOLS estimation constantly highlight the relevance of efficient and effective Village funds allocation in promoting provincial quality of life and human development. Policies that support poverty alleviation initiatives, economic growth, and improved access to health and education services are critical in efforts to raise HDI. In this context, the government's role in administering Village funds allocations and supporting poverty alleviation programs is critical to accomplishing Indonesia's sustainable development goals. To summarize, comprehensive and coordinated policies are critical to improving human development and the quality of life in all Indonesian provinces.

## 5. Conclusion

The study investigates the factors that determine the HDI using static and dynamic panel data models, which encompass 33 provinces in Indonesia from 2015 to 2022. This study investigates the influence of provincial economic growth, allocation of Village funds, and poverty levels (HDI) among the investigated provinces. The estimation process involved the utilization of panel regression

techniques, encompassing both static approaches, such as POLS, FEM, and REM, as well as dynamic methods, including DOLS and FMOLS. The analysis results indicate that the estimation outcomes from the different estimators exhibit a high degree of consistency in their conclusions. The findings derived from the static analysis reveal a discernible correlation between economic growth, as measured by GRDP, and the HDI of Indonesia.

Specifically, the study indicates that economic expansion exerts a detrimental influence on the HDI, underscoring the necessity for a more equitable distribution of the advantages stemming from economic progress. Village funds play a significant role in HDI at the village level, underscoring the significance of effective distribution of funds. Poverty has been found to exert a detrimental influence on HDI, underscoring the significance of poverty reduction efforts in enhancing both the standard of living and overall human development. The results obtained from the dynamic analysis consistently indicate that Village funds exhibit a positive and statistically significant influence on the rise of HDI. Conversely, poverty demonstrates a negative and statistically significant effect.

This study possesses three significant implications. The findings above emphasize the significance of implementing fair and inclusive economic policies to effectively steer provincial economic growth toward enhancing HDI. Furthermore, the effective and transparent allocation of Village funds holds promise in fostering good contributions to human development in rural regions, therefore warranting consideration in policy formulation and strategizing. Moreover, the implementation of proactive measures aimed at mitigating poverty rates constitutes a crucial stride towards enhancing the overall standard of living and fostering human growth. This conclusion demonstrates that integrating three key components, specifically inclusive economic growth, prudent distribution of the Village Fund, and poverty alleviation, can contribute to enhanced human development across diverse regions in Indonesia. The findings, as mentioned above, hold substantial significance within the realm of development policy formulation and the promotion of community well-being at the provincial level.

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## Compliance with ethical standards

## Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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