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INCOME'S MODERATING ROLE IN INDONESIAN POVERTY DYNAMICS: POPULATION, HUMAN DEVELOPMENT AND UNEMPLOYMENT IN AN ISLAMIC ECONOMICS PERSPECTIVE

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Abstract

This study investigates whether income moderates the effects of population size, the Human Development Index (HDI), and the open unemployment rate (OUR) on interprovincial poverty in Indonesia, and interprets the results within an Islamic economics framework emphasizing justice ('adl) and well-being (falah). Motivated by the recurrent disconnect between poverty reduction and rising average income particularly when economic growth is not employment-intensive and access to basic services remains unequal the analysis positions income as a conditioning factor in poverty dynamics. Using panel data for 19 provinces over the period 2016–2023, the study employs fixed-effects regressions, selected on the basis of Chow and Hausman tests, and incorporates interaction terms between income and each core covariate to capture moderating effects while controlling for time-invariant provincial heterogeneity. The empirical findings indicate that population size, HDI, and OUR are significant determinants of poverty, whereas income is not statistically significant either as a direct predictor or as a moderating variable. These results suggest that increases in aggregate income alone are insufficient to modify the structural relationships linking demographic pressures, human development, labor market conditions, and poverty. From an Islamic economics perspective, effective poverty alleviation therefore requires policies that foster job-rich and inclusive growth, broaden equitable access to education and health (supporting the maqasid al-shariah of protecting life, intellect, and wealth), and reinforce labor market and social protection institutions, rather than relying solely on higher average income.

Key Words: Poverty, Population, Human Development, Unemployment

INTRODUCTION

Poverty in Indonesia is a complex, multidimensional phenomenon shaped not only by aggregate economic growth, but also by the quality of human development, labour market conditions, and demographic structures (Purwono et al., 2021). Despite sustained improvements in macroeconomic indicators, household vulnerability to economic shocks such as fluctuations in staple food prices, employment disruptions, and business cycle volatility remains substantial (Akita & Alisjahbana, 2023). Persistent disparities across regions and socio economic groups indicate that national development gains have not been evenly transmitted to the subnational level, resulting in heterogeneous trajectories of poverty reduction across provinces (Santoso & Sriyuna, 2020). In a Muslim majority country such as Indonesia, this persistent and uneven deprivation also signifies an unfinished agenda from the perspective of Islamic economics, in which poverty eradication is intrinsically linked to the objectives of the sharia (*maqasid al-shariah*), particularly the protection of life (*hifz al-nafs*) and wealth (*hifz al-mal*) (Rohim & Yetty, 2025).

From a human development perspective, improvements in the Human Development Index (HDI) encapsulate advances in health, education, and living standards (Pedro Conceição, 2024). However, the accumulation of such capabilities does not automatically translate into lower poverty if individuals lack access to decent and productive employment (Watekhi et al., 2024). Labour market dynamics reflected, inter alia, in movements in the Open Unemployment Rate (OUR) and shifts in sectoral employment are critical in shaping job prospects and productivity. The quality of employment, as indicated by income stability, predictable working hours, and the presence of effective social protection, constitutes the principal transmission channel through which higher human development and lower open unemployment can be converted into sustained poverty reduction (Ayu Setiyani et al., 2024). In Islamic economics, strengthening human capabilities and ensuring access to dignified work is not merely instrumental to economic growth, but also an ethical imperative closely linked to the protection of intellect (*hifz al-'aql*) and the preservation of human dignity within society (Abdulhameed, 2008).

Demographic factors also play a pivotal role in shaping Indonesia's poverty landscape (Dörflinger & Loichinger, 2024). Population size, density, age structure, and spatial distribution influence the capacity of regions to provide essential services, infrastructure, and local employment opportunities. In densely populated areas with limited economic opportunities, demographic pressures may intensify competition for jobs and reduce households' prospects of escaping poverty (Malmberg et al., 2023). By contrast, provinces with stronger economic bases and more developed public services are better positioned to manage demographic challenges through higher productivity and greater labour mobility. Consequently, the interaction between demographic characteristics, human capital, and labour market conditions produces heterogeneous poverty outcomes across provinces (Arif et al., 2025). From a *maqasid* perspective, these disparities raise concerns regarding distributive justice (*'adl*) and balanced regional development, as unequal access to basic rights and opportunities undermines the collective realisation of *falah* (Baidhawy, 2012).

A substantial body of empirical research has analysed the effects of population size, HDI, and unemployment on poverty at both national and regional levels. However, most of this literature treats income either as a direct determinant of poverty or as a broad proxy for economic growth, without explicitly examining whether income conditions or moderates the strength of the relationships between these structural factors and poverty outcomes (Jumain & Basuki, 2014). Yet the role of income as a moderating variable is theoretically salient: adequate income enhances purchasing power, broadens access to education and health services, and strengthens households' capacity to absorb shocks (Ochoa, 2007). In principle, higher income can attenuate the adverse effects of demographic pressures and magnify the poverty reducing impact of investments in human capital and improvements in labour market performance. Conversely, in low income or highly unequal regions, gains in human development or reductions in unemployment may not translate into substantial poverty reduction if they are not accompanied by inclusive income growth (Septian & Suharianto, 2025). This gap is particularly pertinent in Islamic economics, where the quality and distribution of income rather than its aggregate level alone are central to the pursuit of justice and the protection of wealth (*hifz al-mal*).

Against this backdrop, the study addresses two closely related research questions: to what extent do population size, the Human Development Index (HDI), and the Open Unemployment Rate (OUR) influence provincial poverty in Indonesia, and whether income significantly moderates these relationships, or whether these structural factors shape poverty largely independently of income levels. By exploiting interprovincial panel data for the period 2016–2023, the analysis provides an empirical test of whether income alters the strength and direction of the links between demographic pressures, human development, labour market conditions, and poverty. The findings are interpreted within an Islamic economics framework that employs *maqasid al-shariah* particularly the protection of life, intellect, and wealth as the normative benchmark for evaluating poverty dynamics and development policy.

This study makes three principal academic contributions. First, it enriches the empirical literature on the determinants of poverty by explicitly modelling income as a moderating variable in the relationships between population, HDI, unemployment, and poverty at the provincial level. Second, it provides evidence on whether increases in income are sufficient to attenuate or amplify the effects of these structural factors on poverty, thereby contributing to ongoing debates on inclusive and pro poor growth in Indonesia. Third, it bridges technical panel data analysis with Islamic economics by interpreting the results through a *maqasid* based lens, and in doing so, highlights policy implications for designing integrated interventions that address demographic pressures, strengthen human development, improve job quality, and promote a more just and inclusive distribution of income in line with Islamic principles of social welfare.

LITERATURE REVIEW

1. Poverty, Human Development and Labor Market Outcomes

Poverty is widely recognised as a multidimensional condition encompassing deprivations in income, education, health, and access to basic services. In the development economics literature, monetary poverty indicators are often employed as tractable proxies for broader capability failures, whereas composite indices such as the Human Development Index (HDI) capture average achievements in health, knowledge, and living standards (Alkire & Santos, 2010). At the same time, labour market outcomes employment, unemployment, job quality, and wage structures constitute the primary transmission mechanism through which macroeconomic growth and human development gains are converted into welfare improvements at the household level (Paci & Serneels, 2007). Where labour markets are segmented, dominated by informal and low-productivity employment, or characterised by high underemployment, economic growth and improvements in human development may be insufficient to lift vulnerable groups out of poverty in a sustained manner (Alkire, 2007).

From an Islamic economics standpoint, poverty is understood not merely as an economic shortfall but as an ethical and institutional failure, reflecting the inability of existing arrangements to realise the core objectives of the sharia (*maqasid al-shariah*) (Karimullah, 2023). Persistent deprivation signals shortcomings in fulfilling key maqasid, particularly the preservation of life (*hifz al-nafs*), intellect (*hifz al-'aql*), and wealth (*hifz al-mal*), which are central to the design of Islamic economic policy (Albab, 2022; (Fadilah, 2025). Adequate and stable income, equitable access to education and healthcare, and opportunities for dignified and productive work are therefore regarded as necessary conditions for attaining these objectives and enabling individuals to pursue *falah* comprehensive well-being in both worldly and spiritual dimensions (Karimullah, 2023; Albab, 2022). This normative lens underscores the importance of examining how structural factors such as population dynamics, human development, and unemployment shape poverty outcomes, and whether income plays a meaningful role in moderating these relationships within a maqasid consistent development framework (Rohim & Yetty, 2025).

2. Population and Poverty

Demographic characteristics, including population size, density, age structure, and spatial distribution, have long been recognised as important determinants of poverty and development outcomes. A large or rapidly growing population can place substantial pressure on local labour markets, public services, and natural resources, potentially intensifying competition for jobs and constraining access to essential services; in contexts where job creation and infrastructure expansion do not keep pace with demographic change, population growth is frequently associated with higher poverty incidence (Klasen & Lawson, 2007). Conversely, a well-managed demographic transition characterised by adequate employment opportunities, sustained investments in education and health, and productive urbanisation can generate a "demographic dividend" that supports faster growth and accelerates poverty reduction (Abdul, 2011).

The relationship between population dynamics and poverty is therefore context-dependent and mediated by institutional and economic conditions: in provinces with stronger economic bases and more effective governance, larger populations may support larger markets and economies of scale, whereas in weaker regions similar demographic pressures can exacerbate vulnerability and deprivation (Harnani, 2023). Within an Islamic framework, demographic pressures that lead to unmet basic needs and social exclusion constitute a failure to uphold distributive justice ('adl) and to guarantee every individual access to the means of survival and dignity as required by hifz al-nafs (Baidhawy, 2012).

3. Human Development Index (HDI) and Poverty

The Human Development Index (HDI) is a composite indicator that summarises average achievements in three fundamental dimensions of human development health (life expectancy at birth), education (mean and expected years of schooling), and standard of living (GNI per capita adjusted by purchasing power parity) (Friedman et al., 2015). Empirically, numerous studies at national and sub national levels find that higher HDI is generally associated with lower poverty rates, as improvements in education and health enhance productivity and employability, while higher incomes relax liquidity constraints for meeting basic needs and investing in human and physical capital (Hidayat et al., 2020). In the Indonesian context, for example, panel and path analysis evidence shows that HDI exerts a significant negative effect on poverty both directly and indirectly through its impact on economic growth and unemployment, reinforcing the view that human capital accumulation is a key transmission channel for poverty reduction (Mirantika et al., 2025).

Within Islamic economics, the core components of HDI resonate closely with the objectives of the sharia (*maqasid al-shariah*). Health improvements contribute to *hifz al-nafs* (protection of life), education and knowledge accumulation underpin *hifz al-'aql* (protection of intellect), and income and purchasing power are directly related to *hifz al-mal* (protection of wealth). Recent Islamic development literature explicitly maps HDI's health, education, and income dimensions to these maqasid, and proposes Islamic or maqasid-based human development indices as more value consistent extensions of the conventional HDI in Muslim-majority contexts (Muttaqin, 2021). From this perspective, the commonly observed negative association between HDI and poverty is not only supported by empirical evidence, but also normatively grounded in the obligation to enhance human capabilities as part of achieving *falah* (holistic well-being). When HDI indicators improve while poverty remains high or declines slowly, this suggests an incomplete or unequal realisation of these maqasid pointing to the need to scrutinise intervening mechanisms such as labour-market functioning, the inclusiveness of income distribution, and the design of social protection systems (Mirantika et al., 2025).

4. Unemployment and Poverty

Unemployment is widely recognised as one of the most direct risk factors for income poverty because joblessness immediately reduces household earnings, heightens income volatility, and often pushes workers into informal or precarious forms of employment with low productivity and limited access to social protection. Global evidence shows that looking only at the open unemployment rate understates labour market stress, since many workers are trapped in time related underemployment and low-quality jobs that expose them to working poverty (Ryder, 2020). In Indonesia, the poverty labour market nexus is well documented: periods of robust employment and real wage growth have coincided with substantial reductions in consumption poverty, whereas downturns and job losses have reversed these gains (Islam, *Poverty, Employment and Wages*) (Islam, 2002). Recent national evidence further confirms a strong positive relationship between the open unemployment rate and poverty, indicating that increases in open unemployment significantly raise the number of people living below the poverty line (Gozali et al., 2025). Even when headline unemployment is moderate, high levels of underemployment, informality, and low wages leave many workers income-insecure and vulnerable to falling into poverty when shocks occur (Ohnsorge & Yu, 2023). At the macro level, persistent unemployment and widespread informality typically reflect structural mismatches between labour supply and demand, weak job creation, and uneven industrial and regional development, all of which undermine the prospects for inclusive, poverty-reducing growth (Ryder, 2020).

From an Islamic economics perspective, access to dignified and productive work is central to the protection of wealth (*hifz al-mal*) and to the preservation of human dignity. Maqasid-based analyses of Islamic work ethics emphasise that work is not merely a means of earning income, but also a form of worship, social participation, and responsibility towards one's family and community (Zulaifah, 2019). Ensuring fair treatment, safety, and welfare for workers is therefore framed as a moral and legal obligation within Islamic law, reflecting the requirement that economic arrangements safeguard basic rights and prevent exploitation (N. R. Azizah, 2023). High unemployment and poor job quality weaken households' ability to meet essential needs, support dependants, and participate in instruments of social solidarity such as zakat, thereby impeding the realisation of *hifz al-mal* and broader distributive justice (*'adl*) in society (Musthofin et al., 2024). In this sense, the empirically observed positive association between unemployment and poverty is fully consistent with both conventional development theory and Islamic ethical principles, which converge on the imperative to expand opportunities for decent, stable work as a cornerstone of poverty alleviation.

5. Income, Inclusive Growth and Poverty Growth Inequality Nexus

Income is a central determinant of household consumption, saving, and investment decisions, and a key aggregate indicator of economic performance. In conventional poverty analysis, income measures such as GDP per capita or regional income per capita are typically treated as direct determinants of poverty, on the assumption that higher average income raises earnings and expands access to goods and services. However, the extensive literature on the poverty growth inequality nexus shows that the effect of growth on poverty critically depends on the distribution of its benefits: growth that is accompanied by rising inequality, or that is concentrated in enclave sectors with limited employment of the poor, tends to deliver much weaker poverty reduction than headline income trends would suggest (Kraay, 2004; Amini & Bianco, 2017; Marrero & Servén, 2021).

Within this framework, income can be conceptualised not only as a direct determinant of poverty but also as a moderating factor that conditions the influence of other structural variables. Improvements in human development may have a stronger poverty reducing impact in higher income regions, where households are better able to convert capabilities into productive employment and investment, while demographic pressures or unemployment may be less poverty inducing in provinces with higher average income, more developed social protection systems, and stronger labour demand (Kraay, 2006; Amini & Bianco, 2017). This moderating role of income is closely aligned with broader concerns about inclusive and pro poor growth, which emphasise that growth must be broad based, employment intensive, and distributionally favourable in order to weaken the transmission of structural vulnerabilities into persistent poverty (Kakwani & Son, 2006; Marrero & Servén, 2021).

Islamic economics further underscores the normative importance of a just and equitable distribution of income and wealth. Income that is highly concentrated or generated through exploitative practices is regarded as inconsistent with the ethical requirements of *'adl* (justice) and *ihsan* (benevolence), and with the Qur'anic injunction that wealth should not "circulate only among the rich" (Qur'an 59:7) (Ahmad, 1991; Baidhawy, 2012). Instruments of Islamic social finance such as *zakat*, *infaq*, *sadaqah*, and *waqf* are explicitly designed to correct imbalances in income and wealth distribution and to ensure that increases in income contribute to social welfare, particularly for the poor and vulnerable (Mulyany & Furqani, 2019; Ahmed, 2011). Analysing income as a moderating variable is therefore consistent with this Islamic concern that the effectiveness of structural improvements in human development, employment, and demographic management depends not only on the level of income generated, but also on how that income is distributed across society.

5. Poverty, Maqasid al-Sharia and Islamic Economics

The *maqasid al-shariah* framework provides a comprehensive normative lens for evaluating development and poverty. By prioritising the protection of religion (*hifz al-din*), life (*hifz al-nafs*), intellect (*hifz al-'aql*), progeny (*hifz al-nasl*), and wealth (*hifz al-mal*), it offers a set of criteria for assessing whether economic systems and public policies advance or undermine human well being (Purwanto & Miyasto, 2021; Suliswanto et al., 2025). Within this perspective, the persistence of poverty is interpreted as a systematic failure to safeguard these essential interests, as it restricts access to adequate food, shelter, healthcare, education, and economic opportunities and exposes individuals to heightened social exclusion and vulnerability (Musaddad et al., 2025; Isman & Kaltsum, 2022).

In empirical poverty research, conventional variables such as the Human Development Index (HDI), unemployment, and income can be reinterpreted through this *maqasid* lens. HDI, for example, reflects progress in protecting life and intellect, and has been extended in Islamic economics into Islamic Human Development Index (I-HDI) and other *maqasid*-based indices that explicitly embed dimensions of *hifz al-din*, *hifz al-nafs*, *hifz al-'aql*, *hifz al-nasl*, and *hifz al-mal* (Suliswanto et al., 2025). Unemployment and income capture the protection and utilisation of wealth, while population dynamics relate to the sustainability of social and economic structures across generations, which is integral to long term *maqasid* consistent development (Haidar & Rachmad, 2022). An Islamic economics approach to poverty therefore moves beyond measuring income shortfalls to ask whether the institutional arrangements governing human development, labour markets, and income distribution are aligned with the objectives of the sharia.

This perspective underpins the present study's attempt to integrate panel data analysis with a *maqasid* based interpretation of poverty determinants and their interactions (Azzam, 2024).

RESEARCH METHODS

This study adopts a quantitative explanatory approach using panel data econometrics to examine how income moderates the effects of population size, the Human Development Index, and the open unemployment rate on poverty in Indonesia. The panel data method allows for the simultaneous analysis of both time series and cross-sectional data. The population includes all 34 Indonesian provinces. A purposive sampling technique was used to select provinces with reliable and consistent data from 2016 to 2023, resulting in a sample of 19 provinces. The analysis employs panel data regression with the Fixed Effect Model (FEM). Data analysis is performed using Eviews 13, based on the following equation model.

The variables used in the model are defined as follows:

1. KMS_it (Poverty): Headcount poverty rate in province i at year t, expressed as a percentage of the population living below the national poverty line (dependent variable).
2. JPC_it (Total Population): Total population in province i at year t (independent variable X1), capturing demographic pressure.
3. IPM_it (Human Development Index): Provincial HDI in province i at year t (independent variable X2), representing accumulated human capabilities in health, education, and income.
4. OUR_it (Open Unemployment Rate): Open unemployment rate in province i at year t (independent variable X3), reflecting labor market stress.
5. PDRB_it (Income): Real GRDP per capita in province i at year t (moderating variable Z), interpreted as average economic capacity and a proxy for inclusive growth conditions.

Consistent with the conceptual framework, PDRB_it is treated both as a direct determinant of poverty and as a moderator that conditions the strength of the relationships between population, HDI, unemployment, and poverty through interaction terms. The empirical strategy proceeds in two steps. First, a baseline model is estimated to assess the direct effects of population size, HDI, and the open unemployment rate on poverty. Second, an extended model is estimated that includes income both as a direct predictor and as a moderating variable through interaction terms with each of the structural determinants. Let i denote province (i = 1, …, 19) and t denote year (t = 2016, …, 2023). The baseline fixed-effects model (Model 1) is specified as:

$$KMS\_it = \alpha\_i + \beta 1\ JPC\_it + \beta 2\ IPM\_it + \beta 3\ OUR\_it + u\_it,$$

where α_i captures time-invariant, province specific effects and u it is the idiosyncratic error term.
To test the moderating role of income, the extended model (Model 2) is formulated as:

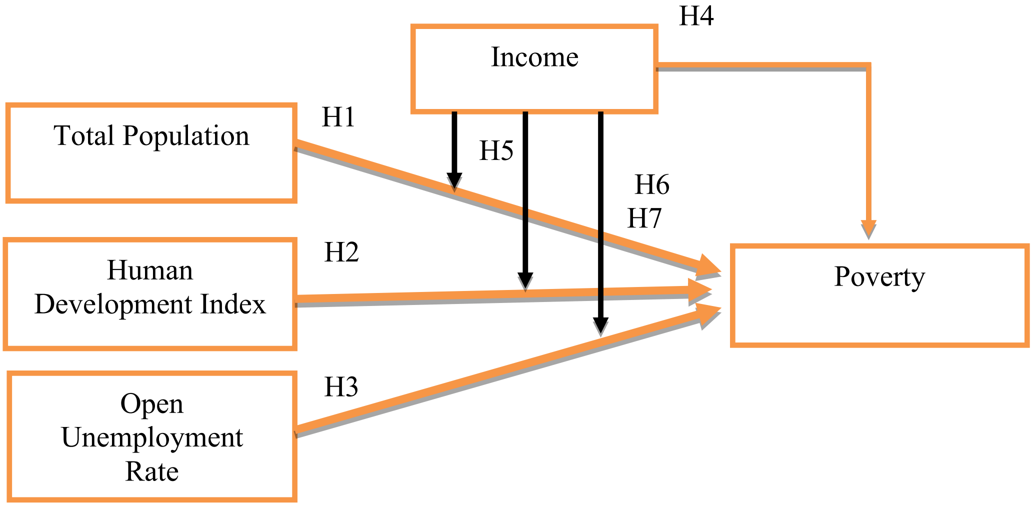
$$KMS\_it = \alpha\_i + \beta 1\ JPC\_it + \beta 2\ IPM\_it + \beta 3\ OUR\_it + \beta 4\ PDRB\_it + \beta 5\ (JPC\_it \times PDRB\_it) + \beta 6\ (IPM\_it \times PDRB\_it) + \beta 7\ (OUR\_it \times PDRB\_it) + u\_it.$$

In this specification, β4 measures the direct effect of income on poverty, while β5, β6, and β7 capture the moderating effects of income on the relationships between population, HDI, unemployment, and poverty, respectively.

The models are estimated using the Fixed Effect Model (FEM) for panel data. A Chow test is applied to compare the Common Effect Model with FEM, and a Hausman test is used to choose between FEM and the Random Effect Model. The tests support the use of FEM, indicating that province specific effects are correlated with the regressors and should be treated as fixed. Estimation is carried out using EViews, and standard diagnostic checks (such as overall model significance, adjusted R-squared, and the plausibility of coefficient signs) are reported to assess model fit and reliability.

The moderating role of income is evaluated through the significance and signs of the interaction terms. A statistically significant β5, β6, or β7 would indicate that the effect of the corresponding structural variable on poverty depends on the level of income. The coefficients on the main effects and interaction terms are interpreted jointly as conditional relationships, and the results are discussed in light of Islamic economics and maqasid al-shariah.

Following the subsequent Model and Hypothesis:



Hypothesis

H1: The population exerts a beneficial influence on poverty in Indonesia.
H2: The Human Development Index positively influences poverty levels in Indonesia.
H3: The Open Unemployment Rate positively influences Poverty in Indonesia.
H4: Income positively influences poverty levels in Indonesia.
H5: Population is influenced by Income in relation to Poverty in Indonesia.
H6: The Human Development Index can be influenced by income levels related to poverty in Indonesia.
H7: The Open Unemployment Rate in Indonesia can be mitigated by Income on Poverty.

RESULTS AND DISCUSSION

To perform panel data regression, three models can be used: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). The Chow test acts as the first indicator test, guiding the choice between the CEM and FEM before selecting the appropriate model.

Table 1.
Outcomes of the Chow Test Model

Effects Test	Statistic	d.f.	Prob.
Cross-section F	74.266323	(18,129)	0.0000

The results of the Chow test in Table 1 show a Cross-section Chi-Square Prob. value of 0.0000, below the 0.05 threshold, indicating that the FEM model is preferred. Afterwards, the Hausman test is used to determine whether the FEM or REM model is more appropriate.

Table 2.
Outcomes of the Hausman Test Model

Test Summary	Chi-Sq.Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	106.639189	4	0.0000

Table 2 shows that the Hausman test produces a random cross-section probability of 0.0000, which is below 0.05. Based on the results from both the Chow and Hausman tests, the Fixed Effect Model (FEM) is identified as the most appropriate model. Since both tests agree, the FEM is confirmed as the best choice. As a result, the Lagrange Multiplier (LM) test is deemed unnecessary, and the study will utilize the FEM.

Table 3.
Outcomes of the FEM Regression Model for Equation I

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1408.438	301.6871	4.668540	0.0000
Total Population	-0.124864	0.022292	-5.601338	0.0000
HDI	10.55433	5.001855	2.110083	0.0368
OUR	20.35923	9.421467	2.160941	0.0325
Cross-section fixed (dummy variables)				
Adjusted R-squared	0.995169	S.D. dependent var	1146.105	

The findings from testing the FEM regression model in equation I, shown in Table 3, are summarized below:s:

1. The FEM regression model test results for the Population Number variable show a coefficient of -5.601338 and a p-value of 0.0000, which is below 0.05. This confirms that the population variable has a significant impact on poverty in Indonesia.a.
2. The FEM regression model test on the Human Development Index statistics shows a coefficient of 2.110083 and a p-value of 0.0368, which is below 0.05. This indicates that the Human Development Index has a significant impact on poverty in Indonesia.a.
3. The FEM regression model test results for the Open Unemployment Rate variable show a value of 2.160941 with a p-value of 0.0325, below the 0.05 threshold. This indicates that the Open Unemployment Rate significantly impacts poverty in Indonesia.a.
4. The Adjusted R Square value is 0.995841, showing that Population, Human Development Index, and Open Unemployment Rate together explain 99.5% of the variation in the Poverty variable.

Table 4.
Outcomes of the FEM Regression Model Equation II

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Income	0.000464	0.000548	0.845945	0.3991
Cross-section fixed (dummy variables)				
Adjusted R-squared	0.995159	S.D. dependent var	1146.105	

The M (Moderation) Income variable has a t-Statistic of 0.846 and a Prob. of 0.3991 (>0.05), indicating it does not significantly affect the Poverty variable. Additionally, the Adjusted R Square of 0.995159 shows that Population, Human Development Index, Open Unemployment Rate, and Income (Moderation variables) only minimally contribute to Poverty, explaining just 0.5% of its variance.

Tabel 5.
Outcomes of the FEM Regression Model Equation III

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Total Population (M)	-2.48E-09	1.74E-08	-0.142663	0.8868
HDI (M)	0.000103	8.85E-05	1.167870	0.2451
OUR (M)	5.23E-05	0.000101	0.518084	0.6053
Cross-section fixed (dummy variables)				
Adjusted R-squared	0.995144	S.D. dependent var		1146.105

The results from testing the FEM regression model described in equation III, shown in Table 5, are summarized below:s:

1. The FEM regression model results for the Population variable show a coefficient of -0.142663 and a p-value of 0.8868, which is above 0.05. This indicates that the Income variable does not significantly influence the relationship between Population and Poverty.y.
2. The FEM regression model test on the Human Development Index data shows a value of 1.167870 with a p-value of 0.2451, which exceeds 0.05. This indicates that the Income variable does not have a significant moderating effect on the Human Development Index in relation to Poverty.y.
3. The FEM regression model's results for the Open Unemployment Rate show a value of 0.518084 and a p-value of 0.6053, which is above the 0.05 threshold. This indicates that the Income variable does not significantly influence the relationship between the Open Unemployment Rate and Poverty.y.
4. The Adjusted R Square of 0.995144 shows that the combined effect of Population, Human Development Index, Open Unemployment Rate, their interactions, and Income as a Moderator explains 99.5% of the variance in the Poverty variable.

Once the moderating variable is included, Income influences the independent variables Population, Human Development Index, and Open Unemployment Rate regarding Poverty, with a magnitude of 99.5% both before and after adding the moderating variable.

1. The Impact of Population on Poverty

This study shows that the population variable is at 0.0000, with a positive coefficient of -5.601338. This probability is below the 5% significance level. The results suggest that population size has a significant effect on poverty. This finding aligns with theories such as the demographic pressure (neo-Malthusian), dependency theory, and the Lewis Harris Todaro labor market dualism model (Pangestuty & Prasetyia, 2021). In theory, when the population size and structure especially the non-productive age groups exceed the capacity for labor absorption, capital accumulation, and public service delivery, resource dilution occurs. This leads to a decline in per capita income, higher living costs and congestion, and reduced social spending per person. An excess supply of labor lowers wages and expands the informal sector, increasing the risk of households falling into poverty. On a micro level, higher dependency burdens limit essential consumption and investments in education and health, making it harder to escape poverty. Therefore, population growth generally worsens poverty unless it is offset by creating productive jobs, improving human capital quality, and expanding economic infrastructure and inclusive public services. (Darwin Lie et al., 2022).

These results align with previous research Rezki et al., (2024), Faruq & Yuliana, (2023), Sita & Nafidatul, (2022), Ginting et al., (2020) Empirical evidence shows that population dynamics, such as growth and age structure indicated by the dependency ratio, are generally linked to higher poverty levels unless countered by productive employment, human capital development, and expanded public services. Consistent with the significant findings of this study at $\alpha = 5\%$ ($p < 0.05$), the relationship can be explained through two main mechanisms. First, resource dilution: population growth without adequate fiscal resources and infrastructure reduces per capita social spending, limits access to health and education, and hampers household asset accumulation. Second, labor oversupply: an excess of labor relative to the capacity of the formal sector to absorb workers leads to lower wages, a larger informal sector, and poorer job quality, increasing the risk of ongoing poverty. These findings, observed across various national and regional levels, suggest demographic pressures influence labor markets and public service capacity. Therefore, effective population management should be paired with strategies to improve productivity and labor market inclusion to lessen the negative impact of demographic changes on poverty.

2. The Impact of the Human Development Index on Poverty

This study shows that the human development index is 0.0368, with a positive coefficient of 2.110083. This probability is below the $\alpha = 5\%$ level, indicating statistical significance. These results imply that the human development index greatly influences poverty, consistent with alternatives like the capability approach (Sen) and human capital theory (Becker). Improvements in health, education, and living standards key components of the index expand personal capabilities and increase labor productivity, which helps people access formal jobs, stabilize incomes, and strengthen household resilience to economic shocks. This mechanism links higher human development to lower poverty levels by reducing social burdens per person, improving economic participation, and encouraging mobility in value-added sectors. Thus, the significance of the human development index in our model confirms that investing in human capital and expanding access to services are crucial strategies for reducing poverty. (Richardson, 1973).

This result is consistent with the research carried out by Fitrah Hitayah et al., (2024), Angelia & Anitasari, (2025), Apriyanti & Rospida, (2025), Kurniawan S. et al., (2024), Oktavian et al., (2023) This indicates that increases in the Human Development Index, which reflect improvements in education, health, and living standards, are negatively and significantly linked to poverty levels across various analytical dimensions, both nationally and locally. In line with the capability approach and human capital theory, boosting quality human resources enhances productivity, connects individuals to the formal labor market, stabilizes income, and strengthens household resilience against shocks, thereby reducing both the occurrence and severity of poverty. Even when overall economic growth isn't consistently significant, strengthening human capital remains the key strategy for poverty reduction, though unemployment can weaken this effect. Therefore, sustained investment in essential services such as education and health, along with expanding access to decent employment, are the most effective policies to break the structural link between economic vulnerability and poverty.

3. The Impact of the Open Unemployment Rate on Poverty

This study shows that the open unemployment rate is 0.0325, with a positive coefficient of 2.160941. This probability is below the 5% significance level. The results indicate that the open unemployment rate has a significant effect on poverty. This supports Lewis Harris Todaro's dual labor market theory and the Keynesian perspective on inadequate effective demand. Excess labor beyond the formal sector's capacity to absorb it reduces real wages and encourages informality and underemployment, resulting in low, unstable household incomes (Günther & Launov, 2012). Unemployment also causes long-term negative effects, such as skill loss, fewer job opportunities, and lower bargaining power, which can worsen poverty. As a result, an increase in the unemployment rate raises the chances and severity of poverty, especially through impacts on wages, working hours, and job quality, particularly when social safety nets and employment policies are inadequate (Sacchi & Samuel, 2024).

This result is consistent with the research carried out by Ngubane et al., (2023), Tope et al., (2025), Ulya Syafitri.J et al., (2025), Maryam et all., (2023), Luqiana Putri & Eviana Hutabarat, (2024) The distribution mechanism works by lowering real wages due to excess labor supply, increasing informality and underemployment, causing household income to become more volatile, and leaving lasting scars that reduce skills, hinder job transitions, and weaken bargaining power. On a macroeconomic level, income losses lead to decreased aggregate demand and create negative multiplier effects in the local economy. Generally, economic growth can lessen the effect of open unemployment on poverty, while higher inequality boosts human capital, as shown by the human development index. Investing in education provides a buffer, making poverty less sensitive to labor market shocks. Wide differences still exist across regions, shaped by sectoral composition and institutional quality. Therefore, poverty reduction should emphasize job-rich growth, skills development, job placement services, flexible social protection, and policies to decrease inequality.

4. The Impact of Income on Poverty

This study finds that the income variable is 0.3991, with a positive coefficient of 0.995159. This probability surpasses the α = 5% significance level. The results indicate that income has a significant impact on poverty. The link between income and poverty can be explained through the basic needs approach, the inclusive growth paradigm (pro-poor growth), and Sen's capability theory. Higher income relieves household budget limitations, supports essential spending on food, housing, and energy, and expands investment in education and health. This leads to increased productivity and employment opportunities, while reducing vulnerability to shocks like illness, layoffs, or price changes. On a macroeconomic scale, a widespread rise in per capita income reduces both the extent and depth of poverty, thanks to the typically negative elasticity of poverty relative to economic growth especially when income distribution improves, financial access broadens, and the labor market effectively absorbs workers. Thus, income is theoretically a direct predictor of poverty: higher income, all else equal, lowers both the likelihood and severity of poverty through consumption, human capital development, and risk reduction. (Sacchi & Samuel, 2024).

This result aligns with previous research by Fitriana & Gravitiani, (2022), Ochi et al., (2024), Sipahutar S. R, (2023) Increases in average income, often measured by GRDP per capita or overall economic growth, have a significant negative effect on both the level and depth of poverty. This is because higher income helps households overcome budget constraints, increases essential consumption, and promotes human capital development, which together improve productivity and create more employment opportunities. At the macroeconomic level, this relationship is reflected in the generally negative elasticity of poverty relative to growth. However, the effectiveness of income increases depends on the structural environment: inequality and unemployment can weaken the poverty-reducing impact of growth, while good institutions, better access to finance, and a strong labor market can strengthen it. Policy recommendations highlight the need for inclusive growth that prioritizes job creation, along with efforts to reduce inequality, improve human capital, expand financial access for households and MSMEs, and develop adaptable social protection measures to ensure income gains effectively reduce poverty.

5. The Impact of Income on the Moderation of Population Size and Poverty

This study shows that income has a coefficient of -0.142663 with a p-value of 0.8868, which is above the 0.05 threshold. This means the probability exceeds the α = 5% level. Therefore, these findings indicate that income does not significantly influence the relationship between the population variable and poverty. The observation that income does not moderate the effect of population on poverty aligns with established literature on inclusive (pro-poor) growth and Sen's capabilities approach, which emphasizes that while income is important, it alone is insufficient without equity, access to basic services, and strong institutions. According to Lewis Harris Todaro's theories on labor surplus and market segmentation, as well as neo-Malthusian demographic pressures, increases in average income, often measured by GRDP per capita, typically do not translate into disposable income for vulnerable populations. This limitation hampers efforts to alleviate population growth effects through wages, working hours, or the prices of essential goods. Moreover, the moderating role of income is often threshold-based and nonlinear; until a certain income level and distribution are achieved, effects like dependency burdens, service congestion, and high living costs tend to reduce any benefits. Consequently, the lack of significance of income as a moderating factor aligns with theory, as without inclusive growth, expanded employment, and improved public services, income alone cannot effectively reduce demographic pressures on poverty.

These results align with those of Septa et al., (2025), Cerra et al., (2021) Empirical evidence shows that rising average income alone does not automatically reduce the impact of demographic pressures on poverty. The success of income-related strategies depends on structural factors like inequality levels, institutional quality, the strength of job-rich growth, and access to vital services. Therefore, the lack of a significant moderating effect of income (p= 0.8868) supports existing research: without inclusive growth, adequate labor absorption, and effective public services, higher average income does not serve as a buffer against population growth's influence on poverty.

6. The Influence of Income on the Moderation of the Human Development Index in Relation to Poverty

This study shows that the income variable has a value of 1.167870 with a p-value of 0.2451, which is above the 0.05 threshold. This indicates that the probability exceeds the $\alpha = 5\%$ level. Therefore, these results imply that income does not significantly influence the relationship between the human development index and poverty. The finding that income does not moderate this effect aligns with concepts like Sen's capability approach, Becker's human capital theory, and research on inclusive growth. Essentially, improvements in health and education only help reduce poverty if these capabilities can be converted into stable income via a strong labor market. According to Lewis, Harris, and Todaro's segmentation theory, coupled with a large informal sector, high inequality, and weak public institutions, increases in average income such as GRDP per capita do not necessarily translate the human development index into greater welfare. Additionally, thresholds and nonlinear effects, including low educational wage premiums, rising living costs, and ongoing risks like illness, layoffs, and inflation, complicate this relationship. In summary, the lack of significant moderation suggests that without inclusive, job-rich growth and effective social governance, income alone cannot reinforce the human development index's role in reducing poverty.

This result aligns with the research of Azizah & Asiyah, (2022), Anu et al., (2022) The observed data indicates that an increase in average income does not automatically enhance the role of the capability dimension (HDI) in reducing poverty. The effect of income growth depends heavily on structural factors such as inequality levels, institutional quality, and the effectiveness of job-rich growth transmission. In settings with high inequality, labor markets segmented by the informal sector, and limited public services, rising average income often has little impact on poverty, thereby limiting its moderating effect on the HDI. This finding of insignificant income moderation ($p = 0.2451$) supports existing research, implying that to strengthen HDI influence, foundational conditions are essential: inclusive, labor-intensive growth, strong governance and services, and reduced inequality. These conditions help ensure that educational and health capabilities genuinely translate into household welfare.

7. The Impact of Income on the Moderation of the Open Unemployment Rate and Its Relationship with Poverty

This study shows that the income variable has a value of 0.518084, with a probability of 0.6053, which is above the 0.05 threshold. This means the probability exceeds the $\alpha = 5\%$ level, indicating that income does not significantly influence the relationship between the open unemployment rate and poverty. The finding that income does not moderate the impact of the open unemployment rate on poverty aligns with frameworks like pro-poor inclusive growth, Keynes's effective demand theory, Lewis's labor market dualism, Harris-Todaro's model, and the wage curve concept. Essentially, increases in average income, especially as measured by GRDP per capita, do not necessarily help unemployed households when growth does not create jobs, the labor market remains segmented and mostly informal, and inequality persists (Maloney, 2004). Under such conditions, the route from unemployment to poverty remains strong, driven by real wage decline, underemployment, and long-term effects like skill loss and fewer job opportunities. Average income has little impact because of unequal wealth distribution and small wage premiums. Additionally, income's moderating influence is often threshold-based and nonlinear; before reaching certain income levels, higher living costs and dependent expenses reduce its benefits. Thus, the limited moderating role makes sense scientifically: without inclusive growth, effective employment, and robust public services, income alone cannot offset the poverty effects caused by unemployment.

This result is consistent with the research of Butkus et al., (2024), Iqbal Albani & Author, (2025) Conceptually, average income does not necessarily diminish the link between the open unemployment rate and poverty. The transmission of income is heavily affected by factors like inclusive growth (job-rich growth), inequality levels, labor market segmentation marked by a large informal sector, and the effectiveness of governance and public services. Within this structural context, unemployment impacts poverty through the suppression of real wages, aligning with the wage curve theory. Additionally, the rise of underemployment and its long-term effects such as skill erosion and fewer job opportunities are still widespread. Meanwhile, increases in overall income do not sufficiently benefit unemployed households and vulnerable populations. As a result, poverty's incidence and severity remain highly responsive to changes in unemployment rates, even when average income rises. Empirical evidence supports this, showing that income does not moderate this relationship. Therefore, growth strategies should focus on promoting employment, reducing inequality, improving governance and basic services, and implementing active labor market policies to develop skills, ensuring income effectively lessens the impact of unemployment on poverty.

8. The Ineffectiveness of Income as a Moderator of Poverty's Structural Determinants

The extended model that incorporates three interaction terms between population size and income, between human development and income, and between the open unemployment rate and income shows that income does not significantly moderate the effects of these structural variables on poverty. Although the coefficient signs are broadly consistent with theoretical expectations, none of the interaction terms is statistically significant. The negative but insignificant coefficient for the interaction between population size and income indicates that higher income does not reliably weaken the positive relationship between population size and poverty. Similarly, the interaction between human development and income does not provide evidence that higher income strengthens the poverty-reducing role of human development, and the interaction between the open unemployment rate and income does not show that income systematically mitigates the poverty increasing effect of unemployment. Overall, these findings suggest that, over the study period and across the 19 provinces, the influence of demographic, human capital, and labour market factors on poverty remains largely similar regardless of income levels, thereby challenging the common assumption that income growth automatically enhances or reshapes these structural relationships (Arianto & Cahyono, 2025).

9. Interpretation of the Non-Significant Moderating Role of Income

The absence of significant moderating effects from income can be interpreted in several mutually reinforcing ways. First, it may reflect the limited inclusiveness of income growth across Indonesian provinces. When increases in gross regional domestic product per capita are concentrated in particular sectors, regions, or population groups, average income can rise without substantially altering the living conditions of poor households. Under such circumstances, improvements in human development may remain constrained by weak job creation, low job quality, and persistent spatial disparities, so their impact on poverty does not vary meaningfully with differences in income levels (Trimurti, 2025).

Second, this finding points to the possibility of jobless or non inclusive growth at the provincial level. If economic expansion is driven predominantly by capital intensive activities or confined to urban enclaves, it may generate limited employment opportunities for low-skilled workers. As a result, the poverty reducing effects of higher human development and the poverty increasing effects of unemployment remain largely unchanged across provinces with different income levels. This pattern is consistent with the statistically significant coefficients on human development and unemployment, alongside the non significant interaction terms involving income (Butkus et al., 2024b).

Third, the non significant moderating role of income may also be shaped by institutional and policy constraints. Even in relatively high income provinces, the absence of robust social protection systems, effective labour market policies, and well targeted poverty reduction programmes can restrict the extent to which income growth mitigates the effects of demographic pressures and unemployment on poverty. When fiscal resources are not effectively channelled towards pro poor expenditure, or when governance quality is uneven, income growth has limited capacity to transform the underlying structural drivers of poverty (Suryahadi et al., 2021).

10. Islamic Economics Perspective and Policy Implications

From the standpoint of Islamic economics, these findings carry important normative and policy implications. The absence of a significant moderating effect of income suggests that provincial income growth has not been sufficiently aligned with the objectives of *maqasid al-shariah*, particularly the protection of life (*hifz al-nafs*), intellect (*hifz al-'aql*), and wealth (*hifz al-mal*). When increases in income do not meaningfully alter the poverty impact of demographic pressures, low human development, and unemployment, this indicates that growth is failing to realise the ethical goals of distributive justice (*'adl*) and shared prosperity (*falah*).

In practical terms, the results imply that policies oriented solely toward raising gross regional domestic product per capita are unlikely to be adequate for achieving poverty reduction consistent with Islamic principles. Provincial and national policymakers need to adopt strategies that directly strengthen human development outcomes, expand access to decent and stable employment, and address demographic challenges through inclusive spatial and social planning. This entails sustained investment in education and health systems accessible to the poor, the promotion of labour intensive and regionally dispersed economic activities, and the development of social protection schemes and zakat based programmes that are effectively targeted to the most vulnerable groups (Pradita & Darwanto, 2025).

Furthermore, the limited moderating role of income underscores the importance of improving the *distribution* and *quality* of income rather than focusing on its aggregate level alone. Islamic social finance instruments such as zakat, infaq, sadaqah, and waqf can play a complementary role in redistributing resources, supporting the formation of human capabilities, and cushioning poor households against shocks when market-based and conventional fiscal mechanisms are insufficient. Aligning provincial development strategies with *maqasid al-shariah* therefore requires not only expanding income-generating activities, but also ensuring that income gains translate into concrete improvements in living standards, enhance human capabilities, and reduce vulnerability to demographic and labour market risks.

Overall, the empirical evidence confirms that population size, human development, and unemployment are robust structural determinants of provincial poverty in Indonesia, while income neither exerts a strong direct effect nor moderates the relationships between these factors and poverty. This pattern highlights the centrality of demographic management, capability formation, and labour market performance in poverty reduction, and exposes the limitations of relying on income growth alone as a policy lever. Interpreted through an Islamic economics lens, the findings point to the need for a development strategy explicitly oriented toward *maqasid al-shariah* one that integrates economic growth with justice, capability expansion, and effective protection for vulnerable households.

CONSLUSION

This study has examined how population size, human development, and unemployment shape provincial poverty in Indonesia, and whether income moderates these relationships. Using panel data for 19 provinces over the period 2016–2023 and a fixed effects estimation strategy, the results indicate that population size and the open unemployment rate exert a positive and statistically significant effect on poverty, whereas the Human Development Index exerts a negative and statistically significant effect. By contrast, income (proxied by GRDP per capita) is not statistically significant either as a direct determinant of poverty or as a moderating variable in the relationships between population, human development, unemployment, and poverty.

These findings give rise to three principal academic contributions. First, the study reaffirms the centrality of demographic pressures, human capabilities, and labour market conditions as structural determinants of poverty at the provincial level in Indonesia. Second, by explicitly incorporating interaction terms, the analysis demonstrates that higher income does not systematically alter the magnitude of these structural effects, thereby challenging the common assumption that income growth automatically enhances the poverty reducing impact of human development or cushions the adverse effects of unemployment. Third, by interpreting the empirical results through the lens of Islamic economics and *maqasid al-shariah*, the study links technical panel data evidence with a normative framework that emphasises the protection of life, intellect, and wealth and the pursuit of distributive justice.

The policy implications are correspondingly clear. Strategies that rely primarily on increasing GRDP per capita are unlikely to generate strong and sustained reductions in poverty if they are not complemented by deliberate efforts to expand human development, improve job quality, and manage demographic pressures. Provincial and national policymakers need to prioritise investments in education and health, promote employment intensive and regionally inclusive growth, and strengthen social protection and Islamic social finance instruments so that income gains are translated into tangible improvements in the living conditions of the poor. Future research could extend this analysis by incorporating explicit measures of income distribution and job quality, and by employing dynamic or non linear panel approaches to explore more fully how growth, inequality, and institutional capacity interact in shaping poverty outcomes in line with *maqasid* based development objectives.

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