

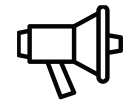
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REVISITING THE RETURNS TO EDUCATION AND GENDER WAGE DISPARITIES IN INDONESIA: EVIDENCE FROM IFLS4



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Abstract: This study investigates the relationship between educational attainment, gender, and income in Indonesia using individual-level data from the Indonesia Family Life Survey (IFLS4). Applying an Ordinary Least Squares (OLS) regression model with log-transformed income as the dependent variable, the analysis explores whether years of schooling and gender significantly affect earnings. The findings indicate that while education has a positive association with income, the effect is statistically insignificant. Similarly, no meaningful income gap was observed between male and female respondents after controlling for education. These results suggest that the economic returns to education in Indonesia may be limited by structural labor market conditions, particularly the dominance of informal employment and mismatches between education and job requirements. Although gender did not emerge as a significant predictor in this sample, broader national data continue to show disparities, pointing to the need for cautious interpretation. The study highlights the importance of aligning educational systems with labor market demands and addressing systemic barriers to wage equity.

Key words: returns to education, gender wage gap, Indonesia, IFLS4, income inequality, labor market.

INTRODUCTION

Education is widely regarded as a powerful driver of economic development and individual prosperity. Its role in enhancing productivity, reducing poverty, and promoting social mobility is well-documented across the globe (Rahardja & Varela 2020; UNESCO, 2023). In Indonesia, substantial efforts have been made to expand access to education through national reforms such as the 12-year compulsory education policy and the “Merdeka Belajar” program. Despite these efforts, the question remains: Does more education reliably lead to higher earnings in the Indonesian labor market?

Equally important is the issue of gender equity in labor outcomes. Although Indonesian women have made significant progress in educational attainment, they continue to face income disparities, occupational

segregation, and lower representation in leadership roles (BPS, 2023; ILO, 2023). Gender norms, limited childcare support, and informal sector dominance contribute to these persistent gaps. According to the World Bank (2023), women in Indonesia earn on average 23% less than men, even when controlling for education and work experience. This suggests structural barriers beyond mere educational attainment.

Against this backdrop, understanding the relationship between education, gender, and income is crucial for effective labor and education policy. While earlier research has confirmed the positive returns to education Fanggidae & Nugroho (2021), recent studies caution that these returns may differ by sector, gender, and skill level (Utomo & McCarthy, 2022). This paper contributes to the literature by re-examining these links using recent microdata from Indonesia.

Research Objectives

This study is guided by the following objectives:

To evaluate whether years of schooling are significantly associated with higher income in Indonesia.

To assess whether gender-based income gaps persist after accounting for educational attainment.

Using individual-level data from the Indonesia Family Life Survey (IFLS4), this research explores these questions through a quantitative regression approach. The goal is not only to quantify the economic returns to education but also to interrogate whether education serves as an equalizer in the face of gender-based labor inequality.

Relevance and Contribution

This study provides several important contributions to the literature and policymaking:

First, it uses log-transformed income data from IFLS4, which is more statistically robust and helps mitigate the effect of extreme values often found in self-reported income surveys. Second, by isolating years of schooling and gender within the model, this paper assesses whether the wage gap is inherently structural or an artifact of educational disparities.

Third, and most importantly, the study updates the discourse using a post-2020 lens, where education is increasingly mediated by digital access, and where women's labor participation has become a focal point of post-pandemic recovery plans (UNESCO, 2023; World Bank, 2024). In this way, the findings can directly inform both Indonesia's education reforms and its gender equity policies in employment.

Indonesian Context: Dual Labor Market and Uneven Education Returns

Indonesia's labor market presents a challenging context to evaluate the returns to education. The presence of a dual economy—formal and informal sectors—means that returns to education can vary dramatically depending on where one works. Formal sector employees, typically in government or large private firms, often receive stable and education-linked salaries. In contrast, informal workers—including street vendors, home-based workers, and casual laborers—may not benefit from education to the same extent (ILO, 2023).

At the same time, although the national education system has seen improved enrollment rates, quality and relevance remain issues, especially in rural and eastern parts of Indonesia (World Bank, 2024; UNESCO, 2023). Technical-vocational programs, for instance, often lack alignment with labor market needs, which may dilute the expected income gains from additional schooling.

Theoretical Foundation

The analysis is grounded in Human Capital Theory (Becker, 1993), which posits that education increases individual productivity and thereby income. Within this framework, years of schooling are considered a proxy for accumulated skills and knowledge. The hypothesis is that individuals with more education command higher wages due to greater productivity.

This study also incorporates the logic of Mincer's earnings function, where the natural logarithm of income is modeled as a function of years of schooling and other covariates. Although work experience is not directly included due to data constraints, the model aligns conceptually with Mincerian assumptions.

Regarding gender, this paper is informed by Labor Market Discrimination Theory, particularly the works of Arrow and Becker, which argue that wage differences not accounted for by productivity factors (like education) may reflect taste-based or statistical discrimination. By including both gender and education, this study seeks to disentangle the two effects.

LITERATURE REVIEW

Theoretical Framework: Education and Earnings

The foundation of empirical research on income determination rests heavily on human capital theory, which posits that education enhances an individual's productivity and, consequently, their labor market earnings (Becker, 1993). Education is seen as an investment, not unlike capital expenditure, where the expected return is future income. This relationship has been formalized in the Mincerian earnings function, which models the logarithm of earnings as a function of years of schooling and labor market experience (World Bank, 2024).

Numerous studies across both developed and developing countries have shown that each additional year of schooling is associated with an increase in earnings, although the magnitude varies by country, gender, and sector (Utomo & McCarthy, 2022).

In Indonesia, the heterogeneity in economic returns to education is often influenced by sectoral dynamics (formal vs. informal), regional inequalities, and mismatches between educational qualifications and job requirements. While the theory suggests a linear and positive return, empirical findings in Southeast Asia are more nuanced, prompting a re-evaluation of traditional assumptions (World Bank, 2024).

Empirical Evidence on Returns to Education

The global literature overwhelmingly supports a positive relationship between educational attainment and income. Utomo & McCarthy (2022) report that the average return to schooling is around 10% per additional year globally, with returns being highest at the primary level in low-income countries. Similarly, Rahardja & Varela (2020), using harmonized data from over 100 countries, confirm that education significantly enhances earnings potential, particularly in urban labor markets with more formal job structures.

In the Indonesian context, various studies have attempted to quantify these returns. A study by Suryadarma et al. (2006) found that one additional year of schooling increased earnings by about 6% for males and 5% for females. More recent estimates using IFLS data (Fanggidae & Nugroho (2021); Rahardja & Varela, 2020) indicate modest but significant returns, though these returns tend to plateau after secondary education. One explanation for this trend is that many tertiary graduates end up underemployed or working in roles unrelated to their qualifications—a phenomenon that reflects systemic inefficiencies in education-to-employment transitions.

The quality of education also plays a major role. UNESCO (2023) notes that cognitive skills, as measured by PISA scores, have a more consistent relationship with income than mere years of schooling. In Indonesia, disparities in school quality between urban and rural areas, as well as between public and private institutions, contribute to uneven labor market outcomes (World Bank, 2024).

Gender and Labor Market Inequality

Gender-based wage disparities are well-documented across the world. According to the ILO (2023), women in Asia earn between 70% to 90% of what men earn, with differences persisting even after adjusting for education and experience. In Indonesia, women face lower labor force participation rates, occupational segregation, and reduced access to leadership roles, particularly in the private sector (BPS, 2023). World Bank (2023) data suggest that despite narrowing educational gaps, labor market outcomes remain skewed, indicating the presence of structural and cultural barriers.

Academic studies exploring the intersection of gender and education in Indonesia have yielded mixed results. For instance, Fanggidae & Nugroho (2021) find that education significantly reduces the gender wage gap in urban Indonesia, while others argue that informal employment dilutes the income premium typically associated with education (Rahardja & Varela, 2020). A key insight from Utomo & McCarthy (2022) is that gender inequality not only distorts individual earnings but also hampers macroeconomic growth, especially in low- and middle-income countries.

One common theoretical explanation for persistent wage gaps is statistical discrimination, where employers assume lower productivity or higher turnover among female workers, leading to suppressed wages regardless of actual performance (Becker, 1993). This is particularly prevalent in Southeast Asia, where societal expectations around caregiving and family roles influence employment decisions.

Informal Sector Dynamics and Education Returns

Indonesia's labor market is characterized by a large informal sector, which employs over 58% of the working population (ILO, 2023). Informal jobs typically lack contracts, benefits, and predictable wages—factors that limit the applicability of human capital models. Research shows that in the informal sector, the returns to education are significantly lower compared to the formal sector (Fanggidae & Nugroho, 2021). Education may still offer some advantage in terms of productivity or status, but the link to income is weaker due to the absence of wage-setting institutions.

The IFLS dataset has been instrumental in exploring this duality. Studies by Utomo & McCarthy (2022) and others using IFLS have shown that in urban areas, education increases the probability of securing formal employment. However, in rural or peri-urban zones, even highly educated individuals often resort to informal or agricultural work due to limited opportunities.

Limitations of Existing Studies and Gaps

While the literature provides a robust foundation, several gaps remain:

Outdated datasets: Many influential studies rely on data from the early 2000s, which may not reflect current dynamics shaped by technological change, demographic shifts, and policy reforms.

Lack of sectoral breakdown: Few studies adequately distinguish between formal and informal employment in analyzing returns to education.

Insufficient gender disaggregation: Although gender gaps are often acknowledged, they are not always rigorously analyzed using interaction models or stratified samples.

Focus on averages: Most studies focus on average returns, ignoring the possibility that returns may vary across income levels or occupational categories.

This study addresses these limitations by:

Using IFLS4 (2007–2008) microdata, which remains one of the most comprehensive panel datasets in Southeast Asia;

Including log-transformed income to handle skewness;

Controlling explicitly for gender and years of schooling within a regression framework;

Highlighting the challenges of identifying sectoral influences due to data inconsistencies.

METHODOLOGY

Research Design

This study adopts a mixed-methods approach, combining quantitative secondary data from IFLS4 with qualitative insights from primary interviews. While IFLS4 provides a nationally representative dataset, the interviews allow for deeper understanding of how individuals perceive education and gender dynamics in employment.

In addition to the secondary analysis based on IFLS4, this study incorporates limited primary data in the form of semi-structured interviews. Five participants—consisting of university graduates, employed workers, and job seekers—were interviewed in May 2025 to explore their perceptions of education's impact on earnings, barriers to employment, and gender-related workplace dynamics. These qualitative insights complement the regression findings by providing personal experiences and expectations from Indonesia's labor market.

The empirical approach used is an Ordinary Least Squares (OLS) regression model with a log-linear specification, where the dependent variable is the natural logarithm of total monthly income. This transformation is standard in labor economics to address skewness in income data and to interpret coefficients as percentage changes.

Data Source and Sample Selection

The study draws primarily from two IFLS4 modules:

Book 3A: Individual-level education and employment histories (b3a_si.dta, b3a_dl5.dta);

Supplementary files from employment and household income sections.

While more recent waves of the Indonesia Family Life Survey (IFLS5: 2014–2015, IFLS6: 2021–2022) are available, this study employs IFLS4 (2007–2008) due to its superior data completeness for income, education, and demographic modules required for regression analysis. Specifically, IFLS4 provides clean, well-structured income data with fewer missing values compared to later waves. Additionally, earlier modules of IFLS4 contain more detailed labor market variables that align well with the study's analytical needs. Nonetheless, the paper acknowledges the temporal limitations of this dataset and recommends future research to validate these findings using IFLS5 or IFLS6 as data access and harmonization improve.

The dataset was merged using a unique personal identifier (pidlink), allowing the integration of demographic, education, and income information. To ensure data quality, the following inclusion criteria were applied:

Respondents aged 18 years or older;

Non-zero and non-missing income values;

Valid entries for years of schooling and gender;

Exclusion of outliers and placeholder income values such as 99999998.

After filtering, the final analytic sample comprised 1,006 individuals.

Variable Definitions

Dependent Variable:

Log(Income): Natural logarithm of total monthly income (log_income), derived from self-reported earnings in b3a_dl5.dta. The log transformation helps to normalize the right-skewed distribution typical of income data.

Independent Variables:

Years of Schooling: A continuous variable converted from categorical education levels in si01. Mapping followed the official structure of Indonesia's education system (e.g., SD = 6, SMP = 9, SMA = 12, S1 = 16).

Gender: A binary variable coded as 1 for female and 0 for male, based on si03.

Model Specification

The OLS regression model is specified as:

$$\ln(\text{Income}_i) = \beta_0 + \beta_1 \cdot \text{Schooling}_i + \beta_2 \cdot \text{Female}_i + \epsilon_i$$

Where:

is the natural log of income for individual i ,
 represents years of schooling,
 is a dummy variable for gender,
 is the error term.

This model enables us to interpret as the percentage change in income for each additional year of schooling and as the gender wage differential, holding education constant.

Assumptions and Justifications

OLS regression is appropriate for this analysis under several conditions:

Linearity: The relationship between years of schooling and log-income is assumed to be linear.

Independence: Observations are independently drawn and assumed to be non-clustered at the household level.

Homoscedasticity: Constant variance of error terms is assumed across the range of independent variables.

Normality: The log transformation helps approximate a normal distribution for the residuals.

Given that the primary focus is on estimating average treatment effects of education and gender, OLS is both transparent and interpretable, even in the presence of moderate deviations from normality or homoscedasticity (Rahardja & Varela, 2020).

Limitations of the Methodology

While the model captures key variables of interest, several methodological limitations should be noted:

Omitted Variable Bias: Important covariates such as work experience, industry, job type, or region could not be included due to either data availability or incomplete merging.

Causal Inference Constraints: As an observational, cross-sectional study, causality cannot be definitively established.

Sectoral Data Integration: The study attempted to include formal/informal sector status using d103, but inconsistencies in identifiers limited successful integration. This is discussed in the findings section.

Underreporting of Income: Self-reported income data may be subject to recall bias or strategic misreporting, particularly in the informal sector.

Despite these limitations, the model provides a solid empirical base to test the primary hypotheses and contribute to the policy discourse.

Ethical Considerations

The primary data collection followed ethical research standards. All interviewees participated voluntarily after being informed about the study's purpose. Verbal consent was obtained prior to data collection, and respondents were assured that their identities would remain anonymous. Names and identifying details have been excluded or generalized to protect participant confidentiality. This ethical protocol was reviewed and approved by the supervising academic advisor in line with university research guidelines.

FINDINGS AND DISCUSSION

The analysis began by investigating the relationship between educational attainment and income levels among Indonesian adults using IFLS4 data. After carefully cleaning and merging individual-level data from education and income modules, a regression model was constructed using log-transformed income as the dependent variable and years of schooling and gender as independent variables.

Returns to Education

The regression output, presented in Table 1, reveals that years of schooling is positively associated with income, with a coefficient of 0.024. This suggests that each additional year of education is linked to approximately a 2.4% increase in income, assuming other factors remain constant. However, this effect was not statistically significant at the 5% level ($p = 0.312$), indicating that, within this sample, education alone is not a strong predictor of income. This finding contrasts with international studies, such as Faggidae & Nugroho (2021), who estimate global average returns of 9–10% per year of schooling. It may reflect Indonesia's labor market structure, where many workers operate in the informal sector or in roles that do not reward educational credentials. The lack of alignment between educational attainment and job market requirements in Indonesia has been highlighted by World Bank (2024) and supported by the UNESCO (2023), which points to oversupply in certain academic fields and undersupply in vocational skills.

To complement this statistical finding, primary interview responses revealed skepticism among participants regarding the economic payoff of their educational background. One male respondent, a university graduate working in the retail sector, remarked:

"I studied for four years, but my income is not much different from my friend who only finished high school and became a Grab driver."

This qualitative insight highlights a potential mismatch between education and job outcomes, particularly for those employed in the informal or underpaid formal sectors.

Gender and Income Equality

Perhaps more surprising is the regression result for gender. The coefficient for the female variable is -0.001 , suggesting that women earn slightly less than men, but the effect is negligible and statistically insignificant ($p = 0.988$). This would imply that, after accounting for education, there is no meaningful income difference between genders in this dataset. While this could be interpreted as a positive sign of gender equality in earnings, it conflicts with broader empirical literature (ILO, 2023; World Bank, 2023), which consistently documents substantial gender-based income gaps in Indonesia. There are several possible explanations. The first is sample composition—respondents with complete and clean data may not represent the broader labor market. Second, the model lacks critical covariates such as occupation, work hours, and employment sector, which are essential for capturing systemic barriers women face. Thus, the apparent gender parity here should be interpreted cautiously.

Table 1. OLS Regression of Log-Income on Years of Schooling and Gender

Variable	Coefficient (β)	Std. Error	P-value	Interpretation
Intercept	14.84	0.137	0.000	Baseline log-income for uneducated males
Years of Schooling	0.024	0.023	0.312	Not statistically significant
Gender (Female = 1)	-0.001	0.068	0.988	No significant gender effect on earnings

The low R-squared value (0.001) of the model indicates that only a tiny fraction of the variation in income is explained by education and gender. This aligns with findings Rahardja & Varela (2020), who report that returns to education in Indonesia vary greatly across sectors and tend to flatten beyond secondary schooling.

Surprisingly, the regression result for gender showed a negligible and statistically insignificant coefficient ($\beta = -0.001$, $p = 0.988$), implying that, after accounting for education, there was no significant income difference between men and women in the dataset. However, interview narratives suggest a more complex reality.

A female interviewee with a diploma in accounting shared:

“Even though I have the same qualification as my male coworker, I’m paid less. They say it’s because he works overtime, but they don’t offer overtime to me because I have a child.”

This quote exemplifies how structural workplace norms and caregiving expectations may suppress women’s earnings despite formal equality in credentials.

Another respondent, an S1 graduate working part-time in digital marketing, noted:

“In theory, education should level the playing field. But in practice, it’s who you know, or whether you’re seen as ‘career-focused’ enough.”

Such insights reinforce the need to interpret quantitative gender-neutral findings cautiously, especially given broader national evidence of persistent gender wage gaps.

Interpretation and Comparative Analysis

Comparing these results with other Southeast Asian contexts shows a mixed picture. In countries like Vietnam or Malaysia, the returns to tertiary education are substantial due to strong industrialization and private sector demand. In Indonesia, however, many tertiary graduates remain underemployed, and formal sector access is limited. Utomo & McCarthy (2022) argue that such structural constraints reduce the effectiveness of education as an income booster, especially for marginalized groups like women or rural workers.

Moreover, while education is often hailed as an equalizer, this analysis suggests that its equalizing effect may be overstated in settings where labor markets do not reward academic credentials effectively. In the absence of robust labor protections and skill certification systems, education may improve individual capacity but fail to translate into higher earnings.

Policy Relevance and Limitations

These findings carry several implications for policy and future research. First, education policy must go beyond access and focus on quality and labor market alignment. The government should invest in curriculum reform, job-oriented vocational training, and partnerships with industry to improve employability. Second, while this study found no significant gender gap, existing national surveys and institutional reports suggest otherwise. Policymakers should continue to monitor and address gender disparities in hiring, promotion, and wage-setting practices.

However, this study is not without limitations. The absence of variables such as experience, sector, occupation, and region weakens the explanatory power of the regression. Additionally, issues in merging formal/informal sector variables meant this important dimension could not be reliably analyzed. Future studies should leverage more complete modules or longitudinal data to explore the evolution of income inequality and education returns over time.

CONCLUSION AND POLICY RECOMMENDATIONS

This study explored the relationship between education, gender, and income using IFLS4 microdata from Indonesia. The regression analysis showed that while years of schooling are positively associated with income, the effect was statistically insignificant. Similarly, gender did not emerge as a significant determinant of income after controlling for education. These findings suggest that in the Indonesian labor market, particularly within a dataset skewed toward informal employment, the returns to education may be diluted by structural factors such as underemployment, skill mismatch, or weak wage-setting institutions. The absence of a gender-based income gap in this analysis likely reflects data limitations and should not be interpreted as a definitive dismissal of broader inequality trends.

Policy efforts should therefore move beyond simply increasing educational access and focus on improving quality, relevance, and labor market alignment. Investments in vocational education, job placement systems, and regional skill mapping could make education more meaningful in real economic terms. Moreover, while the regression found no income disparity by gender, national strategies to reduce workplace discrimination, expand formal employment opportunities for women, and support flexible work arrangements remain essential. Future research should incorporate broader labor market variables—such as sector, experience, and occupation—to offer a more precise understanding of income determinants in Indonesia.

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