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# DO GENDER DISPARITIES IN WORKING POVERTY PERSIST? EVIDENCE FROM INDONESIA'S LABOR MARKET

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## ABSTRACT

This study examines whether gender disparities persist in working poverty in Indonesia using microdata from the 2024 National Labor Force Survey (SAKERNAS). Employing a binary logistic regression model and heterogeneity analysis by age cohort and education level, this study investigates how gender, human capital, digital access, and structural labor market factors shape the probability of working poverty among employed individuals. The findings show that female workers are significantly more likely to experience working poverty than male workers, indicating persistent gender-based economic vulnerability in Indonesia's labor market. Education, training, and internet use are associated with a lower probability of working poverty, highlighting the protective role of human capital development and digital inclusion. Conversely, informal employment, rural residence, and employment in agriculture are strongly associated with higher poverty risk, suggesting that working poverty is closely linked to job quality and structural labor market segmentation. The heterogeneity results reveal that gender disparities are more pronounced among workers with lower education levels and remain evident across all age groups. Robustness checks using probit and Linear Probability Model specifications confirm the stability of the main findings. These findings contribute to the working poverty literature by demonstrating that gender inequality persists across labor market segments and requires integrated policies addressing gender barriers, job quality, human capital, and inclusive digital access.

**Keywords:** Working Poverty, Gender Inequality, Informal Employment, Digital Access, Labor Market

## *ABSTRAK*

*Penelitian ini menganalisis apakah ketimpangan gender dalam kemiskinan pekerja masih persisten di Indonesia dengan menggunakan data mikro Survei Angkatan Kerja Nasional (SAKERNAS) 2024. Dengan menggunakan model regresi logistik biner dan analisis heterogenitas berdasarkan kelompok umur serta tingkat pendidikan, penelitian ini mengkaji bagaimana gender, modal manusia, akses digital, dan faktor struktural pasar tenaga kerja memengaruhi probabilitas kemiskinan pekerja. Hasil penelitian menunjukkan bahwa pekerja perempuan memiliki kemungkinan lebih tinggi untuk mengalami kemiskinan pekerja dibandingkan laki-laki, yang mengindikasikan persistensi kerentanan ekonomi berbasis gender di pasar tenaga kerja Indonesia. Pendidikan, pelatihan, dan penggunaan internet berasosiasi dengan probabilitas kemiskinan pekerja yang lebih rendah, sehingga menegaskan peran protektif modal manusia dan inklusi digital. Sebaliknya, pekerjaan informal, tempat tinggal perdesaan, dan pekerjaan di sektor*

*pertanian berkaitan erat dengan risiko kemiskinan yang lebih tinggi. Hasil heterogenitas menunjukkan bahwa kesenjangan gender lebih besar pada pekerja berpendidikan rendah dan tetap terlihat di seluruh kelompok umur. Uji robustness menggunakan spesifikasi probit dan Linear Probability Model mengonfirmasi stabilitas temuan utama. Temuan ini berkontribusi pada literatur kemiskinan pekerja dengan menunjukkan bahwa ketimpangan gender bertahan lintas segmen pasar tenaga kerja dan membutuhkan kebijakan terpadu yang menargetkan hambatan gender, kualitas pekerjaan, modal manusia, dan akses digital inklusif.*

***Kata Kunci:*** *Kemiskinan Pekerja, Ketimpangan Gender, Pekerjaan Informal, Akses Digital, Pasar Tenaga Kerja*

## I. INTRODUCTION

Working poverty or in-work poverty has emerged as a critical issue in labor economics, particularly in developing countries, including Indonesia, where employment does not necessarily guarantee an adequate standard of living (Faharuddin and Endrawati, 2022). The concept of working poverty refers to individuals who are employed but still live below the poverty line, reflecting a disconnect between labor participation and economic well-being (D'Aguanno et al., 2026; Polizzi et al., 2022). This phenomenon challenges the conventional assumption that employment is a sufficient pathway out of poverty and highlights the importance of job quality, productivity, and income adequacy. From a theoretical perspective, working poverty is closely linked to labor market segmentation theory, which explains how workers are divided into primary and secondary segments, with the latter characterized by low wages, instability, and limited upward mobility (López-Roldán et al., 2021). In many developing economies, including Indonesia, the dominance of informal and low-productivity sectors reinforces the persistence of working poverty. Therefore, working poverty should be understood not merely as an income problem, but also as an outcome of segmented labor markets in which certain groups of workers remain trapped in low-quality and low-return employment.

Gender inequality represents a key dimension of this issue. A substantial body of literature shows that women are more likely to experience economic vulnerability (Roa et al., 2023; Uwajumogu et al., 2022), even when they are actively engaged in the labor market. This condition is often driven by occupational segregation, unequal pay, and constraints related to unpaid care responsibilities (Busch, 2020; Venkatesan, 2021). The gender stratification theory (Risman, 2018) provides a useful framework to understand these disparities, emphasizing how institutional norms and social structures systematically limit women's access to economic opportunities. In developing contexts, these constraints are further intensified by women's overrepresentation in informal employment, where earnings are low and job security is limited (Chen, 2023). As a result, gender disparities are expected to play a central role in shaping the likelihood of experiencing working poverty. This perspective suggests that women's working poverty may persist not because of labor market participation alone, but because women often enter the labor market under unequal conditions, with weaker access to stable, protected, and adequately paid employment.

In addition to gender, the literature highlights the importance of human capital and technological access in determining labor market outcomes. According to Becker's human capital theory, education and training enhance individuals' productivity and improve their chances of securing better-paying jobs, thereby reducing the risk of poverty (Leoni, 2025). Empirical evidence consistently supports this relationship, although the magnitude of the effect may vary across different groups. At the same time, the expansion of digital technologies has introduced new opportunities for improving labor outcomes. Access to digital resources, particularly internet connectivity, can facilitate access to information, markets, and employment opportunities, thereby reducing poverty risks (García-Mora and Mora-Rivera,

2023; Sharma et al., 2025). However, the benefits of digitalization are not equally distributed, as disparities in access and digital skills, often referred to as the digital divide, continue to shape unequal outcomes (Reddick et al., 2024). Accordingly, human capital and digital access may function as protective factors against working poverty, but their effects are likely to depend on workers' ability to convert education, training, and internet access into productive employment and adequate earnings.

Structural characteristics of the labor market also play a crucial role in explaining working poverty. Informal employment, rural residence, and sectoral differences are consistently identified as key determinants of poverty among workers. Informal workers often face limited access to social protection, low and unstable incomes, and restricted opportunities for skill development (Ugargol and Parvathy, 2023). Similarly, rural areas tend to be characterized by weaker economic infrastructure and limited access to high-productivity employment, which increases vulnerability to poverty (Margarian and Hundt, 2023). Sectoral differences further reinforce these patterns, as workers in agriculture are more likely to experience low productivity and income compared to those in industry and services. These structural factors suggest that working poverty is not only an individual-level issue but also a reflection of broader economic conditions. Thus, the risk of working poverty is shaped by the interaction between individual characteristics and the structure of employment opportunities available to workers.

Based on these theoretical perspectives, this study develops a conceptual framework that links gender inequality, human capital, digital access, and structural labor market conditions to working poverty. Labor market segmentation theory explains how informal and low-productivity employment can expose workers to poverty despite being employed. Gender stratification theory explains why female workers may face higher vulnerability due to unequal access to economic opportunities, occupational segregation, and care-related constraints. Human capital theory emphasizes the role of education and training in improving productivity and earnings capacity, while the digital divide perspective highlights how unequal access to internet and digital resources may reinforce or reduce labor market disadvantage. In this framework, working poverty is viewed as the outcome of multiple and interconnected factors: gender, education, training, internet use, informality, rural residence, and sector of employment. Age and education groups are further used to examine whether these relationships vary across different stages of the life cycle and levels of human capital.

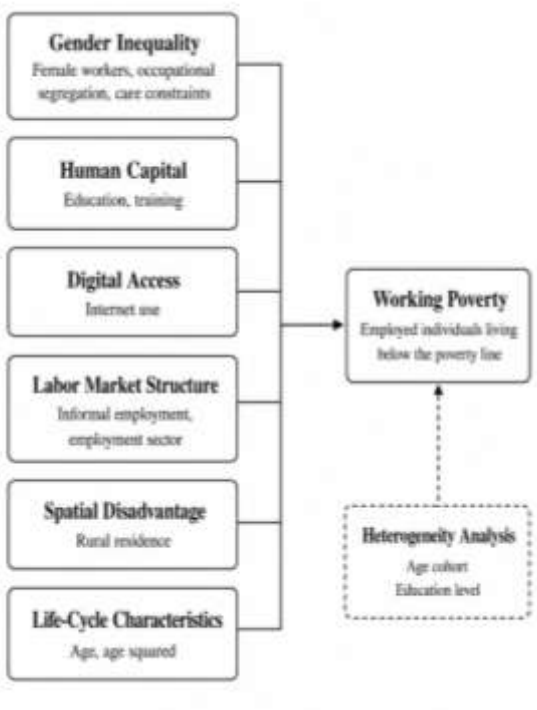


**Figure 1. Conceptual Framework of Gender Disparities in Working Poverty**
Source: Author (2026)

Despite the growing literature, several gaps remain. Existing studies often examine poverty or labor market participation separately, without explicitly focusing on working poverty as a distinct outcome that captures both employment and welfare dimensions. Moreover, while gender inequality is widely recognized, there is limited empirical evidence on how gender interacts with structural labor market conditions, such as informality, sectoral employment, and spatial disparities, in shaping working poverty. The role of digital access as a potential mitigating factor also remains underexplored, particularly in the Indonesian context. More importantly,

previous studies have not sufficiently examined whether gender disparities in working poverty persist across different age cohorts and education groups. This leaves an important gap in understanding whether female workers' vulnerability is concentrated only among certain groups or remains embedded across broader segments of the labor market. These limitations highlight the need for a more integrated analytical approach that considers the joint effects of individual characteristics, digital access, and structural conditions.

Unlike previous Indonesian studies that mainly examine working poverty from income or labor market perspectives separately, this study integrates gender inequality, digital access, labor market segmentation, and human capital into a single empirical framework while simultaneously examining heterogeneity across age and education groups.

This study addresses these gaps by examining whether gender disparities persist in working poverty in Indonesia using microdata from the 2024 Sakernas survey. Specifically, the study investigates how gender, human capital, digital access, and structural labor market factors jointly influence the likelihood of experiencing working poverty. By incorporating heterogeneity analysis across age and education groups, the study provides a more nuanced understanding of vulnerability patterns across different segments of the population. The contribution of this research lies in its integrated framework that links gender inequality, digital inclusion, and labor market structure in explaining working poverty.

This study contributes to the literature in three ways. First, it treats working poverty as a distinct labor market outcome that captures the insufficiency of employment in ensuring economic security. Second, it provides recent micro-level evidence from Indonesia by examining whether female workers remain more vulnerable to working poverty after accounting for human capital, digital access, informality, rural residence, and sectoral employment. Third, it extends the analysis by examining heterogeneity across age cohorts and education levels, thereby showing whether gender disparities are uniform or vary across different labor market segments. The findings are expected to provide important insights for designing policies aimed at reducing working poverty and promoting more inclusive labor market outcomes.

## II. METHOD

### Data and Variables

This study is based on microdata obtained from the 2024 National Labor Force Survey (Sakernas), conducted by Statistics Indonesia (BPS). The dataset provides detailed information on employment conditions, earnings, and individual socioeconomic characteristics, making it highly suitable for examining labor market vulnerabilities such as working poverty. The analysis focuses on individuals who are currently employed, as the concept of working poverty specifically refers to those who participate in the labor market but still fail to achieve adequate living standards. The data processing procedure involved several stages: identifying employed individuals, constructing the working poverty indicator, generating explanatory and control variables, classifying age and education groups for heterogeneity analysis, and excluding observations with incomplete information on the variables used in the model. After applying standard data cleaning procedures and excluding incomplete observations, the final analytical sample consists of 70,007 employed individuals.

The main variable of interest is working poverty, which is constructed as a binary indicator reflecting whether an individual's monthly labor income falls below the national poverty line at the time of the 2024 survey, IDR 595,242 per month. This measure captures the insufficiency of earnings despite active labor market participation and aligns with widely used definitions of working poverty in the empirical literature. The primary explanatory variable is gender, represented by a dummy variable indicating female workers. This variable allows the analysis to directly assess whether gender-

based disparities persist in the likelihood of experiencing working poverty.

To account for differences in individual characteristics, several control variables are included. Age and its squared term are incorporated to capture potential non-linear life-cycle effects, reflecting the possibility that vulnerability to working poverty changes across different stages of working life. Marital status is also considered, as household composition may influence income stability and economic vulnerability. Human capital is proxied by years of schooling and participation in training programs, both of which are expected to enhance productivity and improve earnings capacity.

In addition to individual characteristics, the analysis incorporates factors related to access to economic opportunities. Internet usage is included as a proxy for digital access, recognizing the growing role of digital technologies in shaping income-generating activities. Workers with access to digital resources may have better opportunities to obtain information, access markets, or engage in higher-value economic activities. At the same time, structural aspects of the labor market are explicitly taken into account. Employment informality is included to capture differences in job quality, as informal workers typically face lower and less stable incomes. Spatial disparities are reflected through rural–urban residence, while sectoral differences are captured through employment in agriculture, industry, and services. Finally, age group and education category are constructed to support the heterogeneity analysis. Age groups capture differences in vulnerability across the working life cycle, while education categories reflect different levels of human capital. The definition of each variable is presented in Table 1.

**Table 1. Variable Definition**

| Variable | Definition | Measurement |
|---|---|---|
| Working poverty | Indicates whether an employed individual is classified as poor based on income | Dummy = 1 if an employed individual's monthly labor income is below the 2024 national poverty line of IDR 595,242; 0 otherwise. |
| Female | Gender of the individual | Dummy = 1 if female, 0 if male |
| Informal employment | Employment status based on job formality | Dummy = 1 if self-employed, self-employed assisted by temporary/unpaid workers, casual worker, or unpaid family worker; 0 if formal. |
| Age | Age of individual | Continuous (years) |
| Age squared | Non-linear age effect | $Age^2$ |
| Married | Marital status | Dummy = 1 if married, 0 otherwise |
| Education (years) | Years of schooling completed | Converted from highest education level |
| Training | Participation in job training | Dummy = 1 if attended training, 0 otherwise |
| Internet use | Access to internet | Dummy = 1 if using internet, 0 otherwise |
| Rural | Area of residence | Dummy = 1 if rural, 0 if urban |
| Sector: Industry | Employment in industrial sector | Dummy = 1 if industry, 0 otherwise (ref: agriculture) |
| Sector: Services | Employment in service sector | Dummy = 1 if services, 0 otherwise (ref: agriculture) |
| Age group | Age cohort classification for heterogeneity analysis. | 1 = 15–24; 2 = 25–44; 3 = 45–64; 4 = 65+ |
| Education category | Education level grouping for heterogeneity analysis. | 1 = Basic education; 2 = Secondary education; 3 = Tertiary education. |

Source: SAKERNAS 2024, modified

## Empirical Approach

Given the dichotomous nature of the dependent variable, this study applies a binary logistic regression model to estimate the likelihood of an individual experiencing working poverty. Logit is selected as the baseline model because it provides coefficients that are easier to interpret in terms of marginal effects, while Probit is estimated only as a robustness specification. The logit model is appropriate because the outcome variable takes only two values, namely working poor and non-working poor. Unlike a linear probability model, the logistic specification constrains the predicted probability within the interval between zero and one and allows the estimated coefficients to be interpreted in terms of changes in the log-odds of working poverty. Let $WP_i$ denote the working poverty status of individual $i$, where:

The probability of working poverty is modeled as:

$$WP_i = \begin{cases} 1 \; if \; individual \; i \; is \; classified \; as \; working \; poor \\ 0 \; if \; individual \; i \; do \; not \; classified \; as \; working \; poor \end{cases}$$

(Equation 1)

where $X_i$ represents a vector of explanatory variables and $\beta$denotes the corresponding parameters. The vector $X_i$ includes gender, age, marital status, education, training participation, internet use, employment informality, rural residence, and sector of employment. The empirical specification is formulated as follows:

$$P(WP_i = 1|X_i) = \frac{\exp(X_i\beta)}{1 + \exp(X_i\beta)}$$

(Equation 2)

This specification allows the study to capture the joint effects of individual characteristics, digital access, and structural labor market conditions on working poverty. Because logit coefficients are expressed in log-odds and are not directly interpretable as probability changes, the analysis also reports average marginal effects. These marginal effects indicate the average change in the predicted probability of working poverty associated with a one-unit change in each explanatory variable, holding other variables constant.

$$logit\big(P(WP_i = 1)\big) = \beta_0 + \beta_1 Female_i + \beta_2 Age_i + \beta_3 Age_i^2 + \beta_4 Married_i + \beta_5 Education_i + \beta_6 Training_i + \beta_7 Internet_i + \beta_8 Informal_i + \beta_9 Rural_i + \beta_{10} Industry_i + \beta_{11} Service_i + \varepsilon_i$$

(Equation 3)

Furthermore, to capture potential variations across different segments of the population, the analysis is extended through subgroup estimations. Separate regressions are conducted for different age cohorts, namely 15–24, 25–44, 45–64, and 65 years and above, and for education levels, namely basic, secondary, and tertiary education. The age-based heterogeneity analysis is used to examine whether vulnerability to working poverty varies across the working life cycle, while the education-based heterogeneity analysis is used to assess whether human capital differences shape the magnitude of gender disparities. In each subgroup model, the main focus is placed on the sign, statistical significance, and marginal effect of the female variable. This approach enables the study to identify whether gender disparities in working poverty are concentrated among specific groups or persist across broader labor market segments.

To assess the stability of the baseline findings, this study also performs robustness checks using alternative model specifications. First, the baseline model is re-estimated using a probit model, which provides an alternative binary response specification. Second, a Linear Probability Model (LPM) is estimated as a more transparent linear benchmark. These robustness checks are used to examine whether the direction and statistical significance of the main results, particularly the association between female workers and working poverty, remain consistent across different estimation approaches.

## III. Results and Discussions

### Descriptive Statistics of Working Poverty

Table 2 presents the descriptive profile of the analytical sample. The results show that 23.15 percent of employed individuals are classified as working poor, indicating that a considerable share of workers remain below the poverty line despite being economically active. In terms of gender composition, male workers account for 70.47 percent of the sample, while female workers represent 29.53 percent. The sample is strongly dominated by informal workers, who account for 85.34 percent of employed individuals, compared to only 14.66 percent in formal employment.

**Table 2. Descriptive Statistics**

| Characteristics | Observation (n) | Percentage (%) |
|---|---|---|
| Working poor | | |
| Yes | 16,205 | 23,15 |
| No | 53,802 | 76,85 |
| Gender | | |
| Male | 49,333 | 70,47 |
| Female | 20,674 | 29,53 |
| Job informality | | |
| Formal | 10,261 | 14,66 |

| Characteristics | Observation (n) | Percentage (%) |
|---|---|---|
| Informal | 59,746 | 85,34 |
| Age group | | |
| 15-24 | 2,846 | 4,07 |
| 25-44 | 29,318 | 41,88 |
| 45-64 | 32,996 | 47,13 |
| 65+ | 4,847 | 6,92 |
| Marital status | | |
| Married | 58,489 | 83,55 |
| Otherwise | 11,518 | 16,45 |
| Education | | |
| No schooling / Incomplete primary | 11,618 | 16,60 |
| Primary school | 19,905 | 28,43 |
| Junior secondary | 11,316 | 16,16 |
| Senior secondary | 18,668 | 26,67 |
| Diploma | 1,267 | 1,81 |
| Bachelor's Degree | 6,702 | 9,57 |
| Master's Degree | 489 | 0,70 |
| Doctoral Degree | 42 | 0,06 |
| Training experience | | |
| Yes | 16,508 | 23,58 |
| No | 53,499 | 76,42 |
| Using internet | | |
| Yes | 44,721 | 63,88 |
| No | 25,286 | 36,12 |
| Spatial | | |
| Rural | 46,619 | 66,59 |
| Urban | 23,388 | 33,41 |
| Sector | | |
| Agriculture | 33,243 | 47,49 |
| Industry | 10,756 | 15,36 |
| Service | 26,008 | 37,15 |

Source: Authors' calculation based on SAKERNAS 2024.

The age distribution shows that most workers are concentrated in the 45–64 and 25–44 age groups, representing 47,13 percent and 41,88 percent of the sample, respectively. Most workers are married, accounting for 83,55 percent of the sample. In terms of educational attainment, the largest groups are primary school graduates and senior secondary graduates, while the share of workers with tertiary education remains relatively small. Training participation is also limited, with only 23,58 percent of workers reporting training experience. By contrast, internet use is relatively widespread, with 63,88 percent of workers reporting internet access or use.

Spatially, many workers live in rural areas, representing 66,59 percent of the sample. Sectoral distribution also shows that employment is concentrated in agriculture, which accounts for 47,49 percent of workers, followed by services at 37,15 percent and industry at 15,36 percent. The descriptive statistics indicate that working poverty in Indonesia occurs within a labor market characterized by high informality, rural concentration, and a large share of employment in agriculture.

## Baseline Logit Results: Determinants of Working Poverty

Table 3 presents the baseline logit estimation results on the determinants of working poverty. The results show that gender, human capital, digital access, informality, residence, and employment sector are significantly associated with the probability of being working poor.

Female workers are significantly more likely to experience working poverty than male workers, even after controlling for individual characteristics and structural labor market factors. The marginal effect indicates that being female is associated with a 25,60 percentage-point higher probability of working poverty, making gender one of the most important predictors in the model. The large marginal effect of gender may reflect cumulative disadvantages faced by women in the labor market. Although the model already controls for informality, rural residence, and employment sector, female workers may still experience higher poverty risk due to lower wages, occupational segregation, limited career mobility, irregular working hours, and care-related constraints.

Recent evidence shows that childcare and family responsibilities continue to impose substantial penalties on women's labor market outcomes (Cortés & Pan, 2023), while gender-based occupational sorting remains an important mechanism behind persistent wage gaps (Harris, 2022). Thus, the strong female effect suggests that working poverty is shaped not only by observable job characteristics, but also by deeper gendered labor market inequalities.

**Table 3. Logit Estimation Results**

| Variable | Coef | Prob | Margin (dy/dx) |
|---|---|---|---|
| Female | 1,7803*** (0,0219) | 0,000 | 0,2560 |
| Age | -0,1540*** (0,0046) | 0,000 | -0,0221 |
| $Age^2$ | 0,0015*** (0,00004) | 0,000 | 0,0002 |
| Marital status | 0,0222 | 0,412 | 0,0031 |

| | | | |
|---|---|---|---|
| | (0,0270) | | |
| Education | -0,0230*** (0,0026) | 0,000 | -0,0033 |
| Training | -0,0751*** (0,0291) | 0,010 | -0,0108 |
| Internet | -0,4560*** (0,0253) | 0,000 | -0,0655 |
| Informal | 0,1855*** (0,0313) | 0,000 | 0,0266 |
| Rural | 0,2644*** (0,0237) | 0,000 | 0,0380 |
| Sector (reference: agriculture) | | | |
| Industry | -0,9478*** (0,0320) | 0,000 | -0,1428 |
| Service | -1,1799*** (0,0275) | 0,000 | -0,1696 |
| Constant | 2,3714*** (0,1121) | 0,000 | |
| Number of observation | 70,007 | | |
| LR $chi^2$ | 12941,92 | | |
| Prob > $chi^2$ | 0,0000 | | |

Note: standard error reported in parentheses. Significance levels: *** p < 0,01, ** p < 0,05, * p < 0,10.
Source: SAKERNAS 2024, data analyzed

Age shows a non-linear relationship with working poverty. The coefficient of age is negative and statistically significant, while age squared is positive and statistically significant, indicating that the probability of working poverty decreases at earlier stages of working life but tends to rise again at older ages. Marital status, however, is not statistically significant in the baseline model.

Human capital variables show a protective association. Education and training are both negatively and significantly associated with working poverty, suggesting that higher schooling and participation in job training reduce workers' vulnerability to poverty. Internet use is also negatively associated with working poverty, with a marginal effect of 6,55 percentage points, indicating that digital access is linked to lower poverty risk among employed individuals.

Structural labor market variables remain important. Informal employment and rural residence are positively and significantly associated with working poverty, increasing the probability of being working poor by 2,66 and 3,80 percentage points, respectively. Sectoral differences are also evident. Compared with workers in agriculture, those employed in industry and services are significantly less likely to experience working poverty, with marginal effects of 14,28 and 16,96 percentage points, respectively. The baseline results indicate that working poverty is shaped by both individual characteristics and broader labor market structures.

## Robustness Checks

To assess the stability of the baseline logit results, this study conducts robustness checks using two alternative estimation approaches: a probit model and a Linear Probability Model (LPM). The probit model is used as an alternative binary response specification, while the LPM provides a linear benchmark for comparison. As shown in Table 4, the results remain largely consistent with the baseline logit estimates in terms of direction and statistical significance.

**Table 4. Robustness Checks Using Probit and Linear Probability Models**

| Variable | Probit AME | LPM Coefficient |
|---|---|---|
| Female | 0,2565*** (0,0127) | 0,2985*** (0,0036) |
| Age | -0,0222*** (0,0027) | -0,0245*** (0,0008) |
| $Age^2$ | 0,0002*** (0,00002) | 0,0002*** (0,000009) |
| Marital status | -0,0009 (0,0163) | 0,0052 (0,0047) |
| Education | -0,0034*** (0,0015) | -0,0035*** (0,0004) |
| Training | -0,0112*** (0,0166) | -0,0084** (0,0037) |
| Internet | -0,0670*** (0,0145) | -0,0722*** (0,0039) |
| Informal | 0,0272*** (0,0176) | 0,0267*** (0,0038) |
| Rural | 0,0361*** (0,0135) | 0,0372*** (0,0031) |
| Sector (reference: agriculture) | | |
| Industry | -0,1423*** (0,0175) | -0,1386*** (0,0040) |
| Service | -0,1631*** (0,0159) | -0,1669*** (0,0037) |
| Constant | 1,3439*** (0,0653) | 0,8250*** (0,0190) |
| Number of observations | 70,007 | 70,007 |
| Wald $chi^2$/F-stat | 10194,35 | 1344,51 |
| Prob > $chi^2$/ Prob>F | 0,0000 | 0,0000 |

Note: The table reports average marginal effects for the probit model and coefficients for the Linear Probability Model. Robust standard errors are reported in parentheses. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.10.
Source: SAKERNAS 2024, data analyzed

The association between gender and working poverty remains positive and

statistically significant across both robustness specifications. The probit average marginal effect indicates that female workers have a 25,65 percentage-point higher probability of being working poor, while the LPM coefficient suggests an increase of 29.85 percentage points. These results confirm that the higher vulnerability of female workers is not sensitive to the choice of estimation model.

The robustness results also confirm the protective role of human capital and digital access. Education, training, and internet use remain negatively and significantly associated with working poverty in both the probit and LPM models. Similarly, the signs and significance of the structural labor market variables are stable. Informal employment and rural residence remain positively associated with working poverty, while employment in industry and services remains negatively associated with poverty risk relative to agriculture. The robustness checks support the reliability of the baseline findings and indicate that the main conclusions are stable across alternative model specifications.

## Heterogeneity by Age Group

Table 5 presents the heterogeneity analysis by age group. The results show that the positive association between gender and working poverty remains statistically significant across all age cohorts. Female workers consistently face a higher probability of being working poor than male workers, with marginal effects of 22,63 percentage points for workers aged 15–24, 25,00 percentage points for those aged 25–44, 27,05 percentage points for those aged 45–64, and 27,09 percentage points for workers aged 65 and above. This pattern indicates that gender disparities in working poverty are not limited to a specific stage of working life but persist across the life cycle.

**Table 5. Heterogeneity Analysis by Age Group**

| Variable | 15-24 | | 25-44 | |
|---|---|---|---|---|
| | Coef | Prob | Coef | Prob |
| Female | 1,1830*** | 0,000 | 1,9223*** | 0,000 |
| Marital status | -1,220*** | 0,000 | -0,4644*** | 0,000 |
| Education | -0,0004 | 0,972 | -0,0112** | 0,011 |
| Training | -0,3802*** | 0,000 | -0,1566*** | 0,000 |
| Internet | -0,5495*** | 0,001 | -0,4497*** | 0,000 |
| Informal | 0,2120* | 0,086 | 0,1422*** | 0,002 |
| Rural | 0,7415*** | 0,000 | 0,3447*** | 0,000 |
| Sector (reference: agriculture) | | | | |
| Industry | -1,4772*** | 0,000 | -1,0966 | 0,000 |
| Service | -1,5110*** | 0,000 | -1,2447 | 0,000 |
| Constant | 0,2619 | 0,276 | -,9823 | 0,000 |
| *Margins (dy/dx)* | | | | |
| Female | 0,2263*** | | 0,2500*** | |
| Number of observation | 2,846 | | 29,318 | |
| LR chi$^2$ | 635,03 | | 5155,37 | |
| Prob > chi$^2$ | 0,0000 | | 0,0000 | |

| Variable | 45-64 | | 65+ | |
|---|---|---|---|---|
| | Coef | Prob | Coef | Prob |
| Female | 1,9289*** | 0,000 | 1,2928*** | 0,000 |
| Marital status | 0,4805*** | 0,000 | 0,2994*** | 0,000 |
| Education | -0,0345*** | 0,000 | -0,0256*** | 0,003 |
| Training | 0,0154 | 0,735 | 0,3056** | 0,011 |
| Internet | -0,4473*** | 0,000 | -0,3115*** | 0,001 |
| Informal | 0,1645*** | 0,001 | 0,3397** | 0,013 |
| Rural | 0,1834*** | 0,000 | 0,1880*** | 0,000 |
| Sector (reference: agriculture) | | | | |
| Industry | -0,8566*** | 0,000 | -0,4951*** | 0,000 |
| Service | -1,1631*** | 0,000 | -0,6466*** | 0,000 |
| Constant | -1,7799*** | 0,000 | -1,3499*** | 0,000 |
| *Margins (dy/dx)* | | | | |
| Female | 0,2705*** | | 0,2709*** | |
| Number of observations | 32,996 | | 4,847 | |
| LR chi$^2$ | 6158,52 | | 423,86 | |
| Prob > chi$^2$ | 0,0000 | | 0,0000 | |

Note: Significance levels: *** p < 0,01, ** p < 0,05, * p < 0,10.

Source: SAKERNAS 2024, data analyzed

Several other determinants also show relatively consistent patterns across age groups. Internet use is negatively and significantly associated with working poverty in all cohorts, while rural residence increases the likelihood of being working poor across all age groups. Informality is also generally associated with higher poverty risk, although its magnitude varies by cohort. Sectoral differences remain important, as workers in industry and services are consistently less likely to experience working poverty than those in agriculture. Overall, the age-based heterogeneity results suggest that gender-based vulnerability persists across the working life cycle, while digital access, spatial location, informality, and sectoral employment continue to shape poverty risk among workers of different ages.

## Heterogeneity by Education Level

Table 6 presents the heterogeneity analysis by education level. The results show that the association between gender and working poverty remains positive and statistically significant across all education groups.

However, the magnitude of the gender effect declines as education level increases. The marginal effect of being female is largest among workers with primary education, at 30,71 percentage points, followed by 21,11 percentage points among workers with secondary education and 9,98 percentage points among workers with tertiary education. This pattern indicates that education helps reduce gender-based vulnerability, although it does not fully eliminate the higher risk of working poverty faced by female workers.

**Table 6. Heterogeneity Analysis by Education Group**

| Variable | Primary education | Secondary education | Tertiary education |
|---|---|---|---|
| Female | 1,9165*** [0,000] | 1,742*** [0,000] | 1,0056*** [0,000] |
| Age | -0,1561*** [0,000] | -0,1720*** [0,000] | -0,1990*** [0,000] |
| $Age^2$ | 0,0015*** [0,000] | 0,0018*** [0,000] | 0,0018*** [0,000] |
| Marital status | 0,1747*** [0,000] | -0,2678*** [0,000] | -0,1281 [0,146] |
| Training | 0,0695 [0,135] | -0,0249 [0,582] | -0,2835*** [0,000] |
| Internet | -0,5219*** [0,000] | -0,2627*** [0,000] | -0,8188*** [0,000] |
| Informal | 0,2023*** [0,000] | 0,2074*** [0,000] | 0,0793 [0,294] |
| Rural | 0,2083*** [0,000] | 0,3071*** [0,000] | 0,4713*** [0,000] |
| Sector (reference: agriculture) | | | |
| Industry | -0,8283*** [0,000] | -1,4127*** [0,000] | -1,7421*** [0,000] |
| Service | -1,0675*** [0,000] | -1,3500*** [0,000] | -1,3410*** [0,000] |
| Constant | 2,1321*** [0,000] | 2,4225*** [0,000] | 4,2548*** [0,000] |
| *Margins (dy/dx)* | | | |
| Female | 0,3071*** | 0,2111*** | 0,0998*** |
| Number of observation | 42,839 | 18,668 | 8,500 |
| LR $chi^2$ | 8391,22 | 2832,30 | 767,76 |
| Prob > $chi^2$ | 0,0000 | 0,0000 | 0,0000 |

Note: Probability reported in square brackets. Significance levels: *** p < 0,01, ** p < 0,05, * p < 0,10.
Source: SAKERNAS 2024, data analyzed

Other determinants also vary across education groups. Internet use is negatively and significantly associated with working poverty in all education categories, while rural residence remains positively associated with poverty risk across all groups. Informality is significant among workers with primary and secondary education, but not among tertiary-educated workers. Sectoral differences are also consistent, as workers in industry and services are less likely to experience working poverty than those in agriculture across all education groups. Overall, the education-based heterogeneity results suggest that human capital plays an important role in reducing vulnerability, but structural labor market factors and gender disparities remain relevant across education levels.

## Discussion: Gendered and Structural Dimensions of Working Poverty

The findings show that working poverty in Indonesia is not merely a condition of low income, but a broader indication that employment does not automatically guarantee economic security. The descriptive results show that 23,15 percent of employed individuals are classified as working poor, suggesting that a considerable share of workers remain unable to achieve adequate living standards despite being economically active. In this context, working poverty challenges the conventional assumption that labor force participation is sufficient to lift individuals out of poverty. The persistence of working poverty in Indonesia indicates that job quality, earnings adequacy, access to productive opportunities, and employment protection are as important as employment status itself. Therefore, working poverty should be viewed as a labor market quality problem rather than simply as an employment participation problem.

The baseline results confirm that working poverty has a strong gendered dimension. Female workers are more likely to experience working poverty than male workers, even after controlling for age, marital status, education, training, internet use, informality, residence, and sector of employment. This finding is consistent with the literature on the feminization of poverty, which shows that women often face higher economic vulnerability due to occupational segregation, lower wages, and limited access to productive resources (Li and He, 2024; Perzyńska and Guzowska, 2024). Similar evidence has also been found in developing countries, where female workers are more likely to be concentrated in low-paying and informal jobs, increasing their risk of remaining poor despite being employed (Duman, 2023). The

contribution of this study lies in showing that gender disparities remain significant even after accounting for multiple individual and structural labor market characteristics.

The age-based heterogeneity results provide further evidence that gender disparities in working poverty persist across the life cycle. Female workers face a higher probability of being working poor in all age cohorts, indicating that gender-based vulnerability is not confined to a particular stage of working life. The effect is particularly important among prime-age and older workers, suggesting that gender disadvantages may accumulate over time. Among young workers aged 15–24, the higher risk faced by women may reflect early labor market disadvantages, limited experience, and entry into low-paid or informal jobs. For prime-age workers, especially those aged 25–44, the gender gap may be linked to household formation, childcare responsibilities, and career interruptions that limit women's access to stable and higher-paying employment. This pattern is in line with evidence that gender gaps in labor market outcomes often widen during prime working ages due to career interruptions, caregiving responsibilities, and occupational segregation (Cortés and Pan, 2023). Among workers aged 45–64 and 65 years and above, gender disparities may reflect accumulated disadvantages over the working life, weaker attachment to formal employment, and limited opportunities for skill upgrading.

The non-linear relationship between age and working poverty also supports the view that vulnerability changes across the working life cycle. The probability of working poverty tends to decline at earlier stages of working life but rises again at older ages. This pattern aligns with previous studies suggesting that younger workers often face entry barriers and low initial earnings, while older workers may experience declining productivity or limited access to stable employment (Arellano-Bover, 2024; Wachter, 2020). At earlier stages, workers may gradually move into better jobs as they accumulate experience, skills, and labor market networks. However, at older ages, vulnerability may increase due to declining physical capacity, skill obsolescence, weaker bargaining power, and reduced access to formal employment.

Education plays an important protective role in reducing working poverty, but the heterogeneity results show that it does not fully eliminate gender-based disparities. The marginal effect of being female is largest among workers with primary education, smaller among those with secondary education, and lowest among tertiary-educated workers. This pattern suggests that education helps reduce gender-based vulnerability by improving women's productivity, bargaining power, and access to formal and higher-paying employment. However, the persistence of a positive and significant gender effect even among tertiary-educated workers indicates that education can mitigate, but not fully remove, gender disparities in working poverty. Similar patterns have been documented in the literature, where higher education improves women's labor market outcomes but does not entirely remove structural disadvantages (Elsayed and Shirshikova, 2023).

This finding provides an important nuance to the interpretation of gender disparities in the labor market. Higher educational attainment may improve women's economic position by increasing productivity, strengthening bargaining power, and expanding access to formal and higher-paying employment. Nevertheless, gendered barriers may continue to influence labor market outcomes even among more educated workers. These barriers may include occupational segregation, unequal career mobility, wage gaps, limited access to leadership positions, and care-related constraints that affect women's employment choices and career continuity. Therefore, the results suggest that education is a necessary but insufficient condition for eliminating gender disparities in working poverty. Education policy must be complemented by gender-sensitive labor market policies that promote equal access to formal employment, fair wages, childcare support, career progression, and protection for women in both formal and informal work.

The protective role of human capital and digital access is also evident. Education and training reduce the likelihood of working poverty, supporting human capital theory and empirical evidence that education is one of the most important mechanisms for reducing poverty among workers (Wang, 2023). However, the relatively modest effect of schooling and training also suggests that human capital alone may not be sufficient when structural labor market constraints remain strong. The findings also show that internet use is associated with a lower probability of working poverty. Access to the internet can improve job matching, provide access to market information, and create new income-generating opportunities, particularly in service-oriented and digital-based activities (Denzer et al., 2021). For self-employed and informal workers, digital access may expand market reach, reduce information barriers, facilitate transactions, and connect workers with broader economic opportunities.

However, the benefits of digital access are not automatic. As noted in the digital divide literature, the benefits of digital technologies are often uneven and depend on individuals' ability to use technology effectively (Fang et al., 2019). The education-based heterogeneity results suggest that the economic benefits of internet use may be stronger when workers possess the skills needed to use digital tools productively. This reflects the complementarity between education and digital access, as suggested by the skill-biased technological change literature (Meng et al., 2023). In other words, internet access alone may not be sufficient to reduce working poverty if workers lack the literacy, skills, and resources required to transform digital access into income-generating opportunities. Therefore, digital inclusion and human capital development should be treated as complementary strategies rather than separate policy agendas.

Structural labor market conditions remain central in explaining working poverty. Informal employment is positively associated with poverty risk, reflecting the vulnerability of informal workers who typically face low and unstable income, limited job security, and lack of social protection (Putri et al., 2023; Sultana et al., 2022). This finding is particularly relevant because informal workers dominate the sample. Informality often implies unstable earnings, absence of written contracts, weak bargaining power, limited access to training, and exclusion from minimum wage enforcement. The education-based heterogeneity results also show that informality remains an important source of vulnerability among workers with primary and secondary education, while its effect weakens among tertiary-educated workers. This suggests that education may provide some protection against the risks associated with informal employment, although it does not mean that informality is harmless for educated workers.

Rural residence also increases the likelihood of working poverty, consistent with evidence that rural areas tend to have lower economic diversification, weaker infrastructure, and limited access to high-productivity employment (Castellano-Álvarez et al., 2024). This finding indicates that spatial inequality remains a significant determinant of labor market vulnerability. Rural workers are more likely to experience working poverty due to limited access to diversified employment, weaker connectivity, lower access to training and market information, and stronger dependence on low-productivity activities. The education-based heterogeneity results further suggest that spatial constraints may limit the returns to education in less developed areas. Even when workers have higher educational attainment, living in rural areas may restrict access to suitable employment, productive networks, infrastructure, digital connectivity, and high-value economic activities.

Sectoral differences further reinforce the structural nature of working poverty. Compared to workers in agriculture, those employed in industry and services are significantly less likely to experience poverty. This finding aligns with the structural transformation literature, which emphasizes that shifts from agriculture to higher-productivity sectors are important for reducing poverty and improving income

levels (Bilenko, 2022; Ivanic and Martin, 2018). Agriculture remains more vulnerable because it is often characterized by lower productivity, seasonal income, limited value-added activities, and greater exposure to economic and environmental risks. In contrast, industry and services tend to offer better opportunities for productivity improvement, income stability, and market integration. However, this does not imply that poverty reduction should rely only on moving workers out of agriculture. It also points to the need to improve agricultural productivity, strengthen rural value chains, expand agro-processing, and create non-farm employment opportunities.

Taken together, the findings show that working poverty in Indonesia is a multidimensional labor market problem. It is shaped by the interaction between gender inequality, informality, limited human capital, unequal digital access, rural disadvantage, and sectoral productivity differences. The persistence of gender disparities across age and education groups indicates that women's vulnerability is structural rather than temporary. At the same time, the protective effects of education, training, and internet use suggest that improving human capital and digital inclusion can reduce poverty risk, although these mechanisms are insufficient if not accompanied by broader improvements in job quality and labor market protection. Therefore, reducing working poverty requires an integrated policy framework that combines gender-responsive labor policies, formalization strategies, rural economic development, sectoral productivity improvement, and inclusive digital transformation.

## IV. CONCLUSIONS

This study provides strong empirical evidence that gender disparities in working poverty persist in Indonesia. Female workers are significantly more likely to experience working poverty compared to male workers, and this pattern remains consistent across age and education groups. The results also highlight the important role of human capital and digital access, where higher levels of education, participation in training, and internet use are associated with a lower probability of working poverty. In contrast, structural factors such as informal employment, rural residence, and employment in the agricultural sector are strongly linked to higher poverty risk. The non-linear effect of age further indicates that vulnerability varies across the life cycle, with different risk profiles across younger, prime-age, and older workers. The robustness checks using probit and Linear Probability Model specifications further confirm that the main findings are stable across alternative estimation approaches.

The heterogeneity analysis reinforces these findings by showing that the gender gap is more pronounced among individuals with lower levels of education and remains evident across all age groups. Although higher education and digital access help reduce vulnerability, they do not fully eliminate gender-based disparities. Sectoral differences also persist across all groups, with workers in industry and services consistently less likely to experience working poverty compared to those in agriculture. The results suggest that working poverty in Indonesia is shaped by a combination of gender inequality, differences in human capital, access to digital resources, and structural labor market conditions. The main contribution of this study is to show that working poverty should be understood not only as a problem of low earnings, but also as a gendered and structural labor market issue. By integrating gender, human capital, digital access, informality, spatial location, and sectoral employment, this study provides a more comprehensive understanding of why employment does not always protect workers from poverty.

This study has several limitations. Since the analysis uses cross-sectional Sakernas 2024 data, the findings should be interpreted as associations rather than causal effects. In addition, working poverty is measured using individual labor income relative to the national poverty line, which may not fully capture household-level welfare dynamics or regional differences in living costs. Future

research may extend this analysis by using panel data, region-specific poverty thresholds, or decomposition methods to further examine the mechanisms underlying gender disparities in working poverty.

## V. RECOMMENDATIONS

The findings of this study suggest that reducing working poverty in Indonesia requires a multidimensional policy approach that simultaneously addresses gender inequality, human capital constraints, digital access, and structural labor market conditions. Given the persistent vulnerability of female workers, targeted interventions are needed to improve women's access to quality employment. Policies that promote equal access to formal jobs, strengthen protection for female workers in informal sectors, and support women's economic participation, such as childcare support and flexible work arrangements, can help reduce gender-based disparities in working poverty. These policies are particularly important because the results show that gender disparities remain significant across age and education groups, indicating that women's vulnerability is not confined to a specific segment of the labor market.

Improving human capital remains a critical priority. Expanding access to quality education and strengthening vocational training programs are essential to enhance workers' productivity and income potential. However, the findings also suggest that training programs should be better aligned with labor market demands to ensure their effectiveness. Targeted skill development programs for low-educated workers and vulnerable groups can play an important role in reducing poverty risks. Since the gender gap is largest among workers with lower education levels, human capital policies should prioritize low-educated female workers through accessible training, certification, job placement support, and pathways into formal and better-paid employment.

The results also highlight the importance of digital inclusion as a pathway to improving labor outcomes. Expanding access to affordable and reliable internet, particularly in rural areas, should be complemented by programs that enhance digital literacy and the productive use of technology. Policies that encourage the adoption of digital tools among workers and small-scale enterprises can help improve income opportunities and reduce vulnerability. Digital inclusion programs should therefore go beyond infrastructure provision and include practical support for using digital platforms for job search, marketing, transactions, and access to productive information.

Addressing structural labor market issues is equally important. Efforts to formalize employment, improve job quality, and increase productivity in the informal sector are crucial to reducing working poverty. In addition, sectoral transformation policies that facilitate the transition of workers from low-productivity sectors, such as agriculture, to higher-productivity sectors, such as industry and services, can contribute to more sustainable income growth. Spatial disparities should also be addressed through investments in rural infrastructure and economic development to create more inclusive labor market opportunities. At the same time, policies should not only encourage movement out of agriculture but also improve productivity within agriculture through rural value-chain development, agro-processing, market access, and non-farm employment creation.

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