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## Analyzing the influence of education and work experience on women's wages distribution in Indonesia

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### Abstract

This study aims to analyze the determinants of women's wages, with a focus on the heterogeneity of the effects of education, work experience, employment status, and region of residence across various levels of the wage distribution. The data used are from the Indonesia Family Life Survey (IFLS-5) for the years 2014–2015. The study sample consisted of 5,319 female respondents aged 15 years and older. The quantile regression method was employed, utilizing the Mincer Earnings Model to capture variations in the returns to education and work experience across wage groups from low to high. Descriptive analysis results indicate that the average wage for women remains relatively low, with a fairly high level of inequality. The quantile regression results show that education and work experience have a significant impact on women's wages across all quantiles, with the greatest impact observed in the low-wage group. Employment status as a civil servant consistently increases women's wages, while women living in rural areas earn lower wages compared to those living in urban areas. These findings underscore the role of human capital and structural factors in shaping wage inequality among women in Indonesia.

**Keywords:** Education, Gender inequality, Quantile regression, Women's wages, Work experience.

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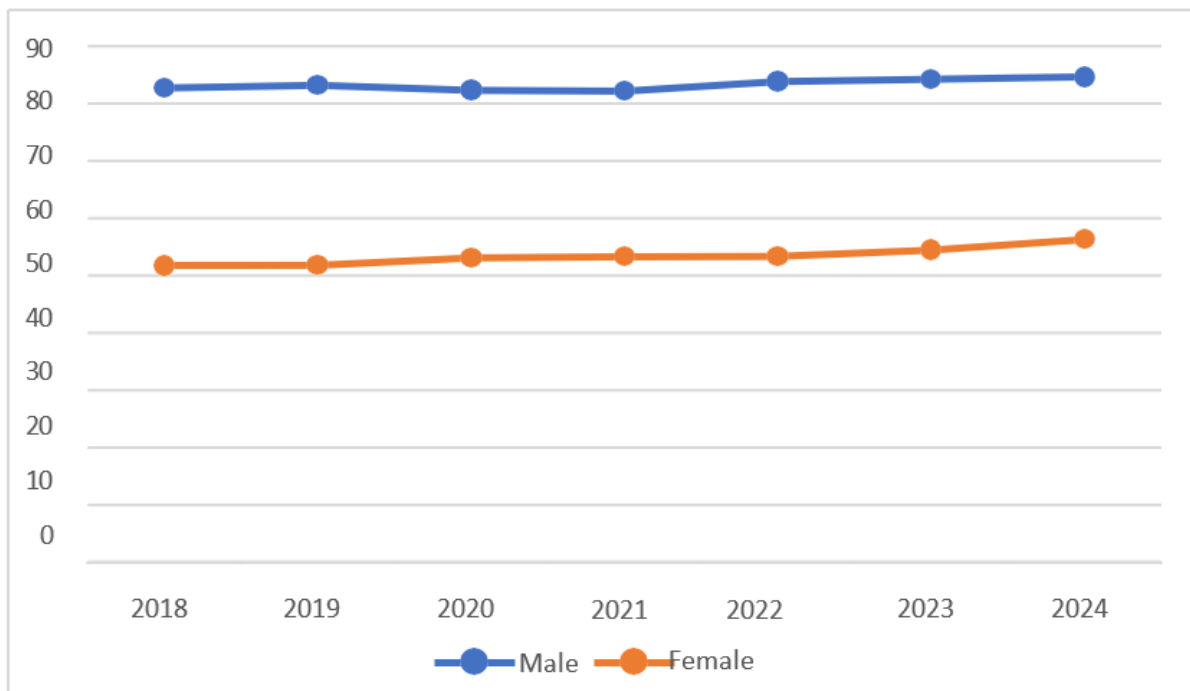
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## 1. Introduction

Women's participation in the labor market is an indicator of economic development, which not only improves well-being but also promotes equal employment opportunities and reduces gender inequality. Indonesia has higher levels of gender inequality compared to other countries [1]. Women's low labor force participation is caused by the formal sector's failure to offer the work flexibility needed to retain female employees. In Indonesia, mothers are viewed as the primary influencers who play a crucial role in child-rearing and as homemakers. The role of women as homemakers plays a significant part in their low economic participation [1-3]. According to research by Putri, et al. [4] education, economics, and culture have a significant influence on female labor force participation rates. Education is one of the main factors contributing to gender inequality, although some studies have found that the educational attainment gap between men and women is narrowing [5, 6]. This means that while both men and women may have the same level of education, their career opportunities differ. Consequently, the labor force participation rate for men tends to be higher than that for women. Data from the 2023 National Labor Force Survey shows the labor force participation rates (LFPR) for women and men in Indonesia. In 2018, the LFPR for men was 83.36 percent, while that for women was 53.49 percent. These figures continued to rise through 2024. In general, there is no significant difference in labor force participation between the two genders. This difference is illustrated by the following data:



**Figure 1.**  
Indonesia's Labor Force Participation Rate (LFPR) 2018–2024.  
**Source:** Statistics Indonesia.

A study by World Bank [7] found that limited access to childcare services and a lack of flexibility are the main factors preventing women from entering the formal labor market. Furthermore, a survey by International Labour Organization (ILO) [8] also noted that women are more likely to work in the informal sector, where wages are low and social protection is minimal, which further compounds the complexity of the gender gap in Indonesia. Research by Balamouné-Lutz and McGillivray [9] shows that gender inequality in school enrollment has a significant negative effect on income levels. Thus, the greater the gender disparity in access to education, the lower the income. Research by Rankin and Aytac [10] explains the role of education in reducing gender inequality. Education is not the primary factor in gender inequality but rather a complementary factor that helps reduce gender inequality in the labor market [10].

This study was inspired by *Mincer Earnings Function*, which found that individual earnings increase with higher levels of education and work experience, but at a decreasing rate over time [11]. This study examines women's wages in the formal sector, specifically among civil servants, a group often perceived as enjoying relatively stable income benefits. These benefits may stem from a more standardized wage system and better social health security. However, no empirical evidence has yet been found to explain the benefits experienced by women in low-income groups. This study uses work experience as a significant indicator of income growth [12, 13]. The role of women as formal workers, particularly in government agencies, is the focus of this study because these positions offer welfare benefits and social protection for workers. This study also identifies regional factors such as rural and urban areas as comparators for income and welfare levels [14, 15].

## 2. Literature Review

A study by De la Rica, et al. [16] reveals that income inequality in Spain differs from that in other countries. Workers with higher levels of education tend to earn higher salaries. However, the gap between men and women in achieving high salaries is widening. Meanwhile, research conducted by Stritch and Villadsen [17] compares female workers in the public and private sectors. Women working in the public sector tend to experience a smaller pay gap due to a transparent pay system and clearer regulations. However, this structured system does not necessarily lead to salary increases or promotions for women. A study reported by Li, et al. [18] found that education can reduce the wage gap in China. Education is one factor that can narrow the income gap. A company can

increase productivity by shifting its workforce from lower to higher levels of education. These results indicate that productivity increases relative to wage costs [19].

The Mincer earnings function explains the relationship between education, work experience, and wage levels based on human capital theory. In this model, education has a positive effect on earnings because it enhances knowledge, skills, and productivity. The longer a person pursues education, the greater their capabilities become, leading the labor market to reward them with higher wages. The education-experience effect explains that work experience is a key factor in determining wages. Work experience enhances an individual's capabilities through learning, skill development, and a better understanding of work productivity. The impact of work experience on wages increases steadily over time. The concept of diminishing returns explains that while additional experience does lead to higher earnings, the duration of employment and accumulated experience also provide new skills.

A study by Blau and Kahn [20] examines the wage gap that occurred from 1980 to 2010. Education and work experience account for only a small portion of the wage gap. Meanwhile, gender differences in employment are influenced by factors, particularly the number of working hours. Based on several studies previously discussed, it can be concluded that the gender wage gap between male and female workers is influenced by their skills and working hours [21].

## 3. Methods

This study employed a quantitative approach to analyze gender inequality in Indonesia. The researcher sought to develop the *Mincerian Earnings Function* model, first proposed by Mincer [22] which posits that individual earnings increase as education and work experience increase. In his estimation, Mincer incorporated an educational estimate using an elaborative method. The first method required education data that was difficult to calculate, so this approach used the natural logarithm of income as a function of the duration of education and potential work experience. Work experience was defined as the length of working life reduced by six years. The Mincer equation is described as follows:

$$\ln Y_i = \alpha + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp_i^2 + \delta X_i + u_i \beta_3 Exp_i^2$$

The squared work experience variable reflects the concept of diminishing returns to experience. This concept explains how the effect of work experience on wages reaches a certain point, after which the increase becomes smaller. Thus, as experience increases, the perceived benefits diminish because skills have already been developed, efforts to improve productivity have already been made early in one's career, and due to other factors.  $\beta_2 > 0$  and  $\beta_3 < 0$

The variable  $Y_i$  represents income, earnings, or wages.  $S$  represents the duration of education.  $Exp$  represents potential work experience, calculated as age minus the duration of schooling and minus six, while the variable  $x$  serves as a control variable. In this study, the control variables include dummy variables for civil servants and non-civil servants, as well as urban and rural areas. The researcher developed the Mincer model equation as follows:

$$\ln(wage_{it}) = \alpha + \beta_1 schooling_i + \beta_2 exper_i + \beta_3 exper_i^2 + \beta_4 PNS_i + \beta_5 urban_i + u_i$$

This study used wage equations that are prone to endogeneity issues, because wages not only represent educational attainment but also reflect individual abilities and motivation that are not fully captured by years of schooling. Individuals with higher educational attainment are likely to have higher IQs, stronger motivation, and come from more educated family backgrounds. In the regression analysis, all explanatory variables that are constant over time will be eliminated, including gender (represented by the "female" dummy variable) [23]. Furthermore, whether it is true that low wages originate from the formal and informal sectors. The researcher uses a dummy variable, namely "civil servant" or "non-civil servant," which indicates that the formal sector consists of civil servants and vice versa. Furthermore, the "urban" variable is used here to examine regional conditions, specifically whether wages tend to be higher in urban or rural areas.

The researchers used secondary data from the Indonesia Family Life Survey (IFLS 5). This survey utilized large-scale household microdata comprising 12,591 individuals. The data were collected from IFLS 5 between 2014 and 2015. The dependent variable in this study was women's income, while the independent variables included length of education, work experience, and control variables. The researchers employed cross-sectional regression analysis using a quantile regression model to account for relationships that are not only conditional on the median or heterogeneity but also account for the data distribution and minimize model outliers. The purpose of this regression model is to observe the returns to education across the entire income distribution to determine which quantile groups benefit most from education. If the lower quantiles, characterized by low wages and skills, receive greater benefits, then education plays a role in reducing inequality. Conversely, if the returns to education are enjoyed by high-income groups, then education will exacerbate inequality. Thus, this quantile regression model is a statistical model for estimating a conditional function that minimizes asymmetric absolute residuals, analogous to classical linear regression, which minimizes the sum of squared residuals. These variables are described in the descriptive table as follows:

**Table 1.**

Variable description.

| Variable           | Description                                                        |
|--------------------|--------------------------------------------------------------------|
| Logsalary          | The logarithm of hourly wages adjusted (indexed) for inflation     |
| Years of schooling | Number of years of formal education                                |
| Exper              | Number of years of work experience (age – length of schooling – 6) |
| Exper <sup>2</sup> | The square of work experience                                      |
| Tenure             | Length of time employed in current job (in years)                  |
| Married            | 1 if married, 0 if not                                             |
| Rural              | 1 if urban, 0 if rural                                             |
| Female             | 1 if female, 0 if male                                             |
| Yosfem             | The rate of return on education for women compared to men          |
| Publik             | 1 = if working for a large company                                 |

#### 4. Results

The results of statistical analysis using Stata in this study include a descriptive analysis of women's income (salary), length of education (educ), work experience (years), and dummy variables for civil servant or non-civil servant status, and region (urban or rural). The number of observations in this study was 5,319 respondents. This study specifically focuses on women's income in Indonesia for those aged 15 and older. The Stata results show that the income variable ranges lowest at Rp 10,000 per year to highest at Rp 420,000,000 per year. The standard deviation of the income variable is relatively moderate. Meanwhile, the education level variable in Indonesia tends to be high, with an average duration of 8 years and a standard deviation of 5, indicating a significant variation in education, ranging from not attending school at all to an average maximum of 24 years of schooling. The work experience variable has an average of 24 years, indicating a high degree of diversity in work experience. Meanwhile, the civil servant (PNS) dummy variable has a mean of 0.11, indicating that approximately 11 percent of respondents are civil servants, and the region variable has a mean of 0.65, indicating that the majority of respondents are located in urban areas.

**Table 2.**

Variable description.

| Variable | Observation | Mean  | Std. dev. | Min.  | Max.     |
|----------|-------------|-------|-----------|-------|----------|
| Lsalary  | 5.319       | 1.77  | 2.55      | 10000 | 4.20e+08 |
| Educ     | 5.319       | 8.514 | 5.05      | 0     | 22       |
| Exper    | 5.319       | 24.13 | 15.91     | 0     | 94       |
| Pns      | 5.319       | 0.11  | 0.313     | 0     | 1        |
| Wilayah  | 5.319       | 1.34  | 0.474     | 1     | 2        |

The results of the descriptive analysis show a significant level of disparity in women's wages and length of education, with a fairly high standard deviation, even though the average wage for women in Indonesia is around Rp 17,700,000, indicating that women's wages in Indonesia remain low and are still below the regional minimum wage.

The researchers used quantile regression to analyze how individual and occupational characteristics affect women's earnings across different levels of the wage distribution. This method provides a more detailed explanation because it reveals the heterogeneity of the effects of education, work experience, employment status, and place of residence on women's wages across quantiles from low to high. The following data from estimated quantile regression results illustrate the conditions of women across various wage distributions:

**Table 3.**

Quantile regression results.

| Variables    | (1) Q_0,10           | (2) Q_0,25           | (3) Q_0,50          | (4) Q_0,75          | (5) Q_0,90          |
|--------------|----------------------|----------------------|---------------------|---------------------|---------------------|
| Educ         | 0.071***<br>(0.011)  | 0.057***<br>(0.007)  | 0.043***<br>(0.005) | 0.041***<br>(0.005) | 0.041***<br>(0.005) |
| Exper        | 0.058*** (0.008)     | 0.040*** (0.006)     | 0.022*** (0.004)    | 0.021*** (0.004)    | 0.027*** (0.003)    |
| Exper2       | -0.001*** (0.000)    | -0.001***<br>(0.000) | -0.000*** (0.000)   | -0.000*** (0.000)   | -0.000*** (0.000)   |
| Pns          | 0.599*** (0.134)     | 0.748*** (0.092)     | 0.963*** (0.060)    | 0.818*** (0.062)    | 0.646*** (0.056)    |
| Wilayah      | -0.588*** (0.086)    | -0.508*** (0.038)    | -0.396*** (0.040)   | -0.319*** (0.036)   | -0.319*** (0.036)   |
| Constant     | 13.980***<br>(0.219) | -0.610***<br>(0.059) | 16.220*** (0.098)   | 16.760*** (0.101)   | 17.051*** (0.091)   |
|              |                      | 15.230***<br>(0.150) |                     |                     |                     |
| Observations | 5,319                | 5,319                | 5,319               | 5,319               | 5,319               |

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.

The results of the quantile regression for all main variables indicate a significant effect on women's income. The education variable (educ) has a positive and significant coefficient at all quantile levels. The coefficient for education

decreases from 0.071 at the 0.10 quantile to

0.041. The work experience variable (*exper*) also has a positive and significant effect on women's income at all quantiles. However, the coefficient value decreases from 0.058 at the

0.10 quantile to 0.027 at the 0.90 quantile. The work experience variable has a negative and significant coefficient, indicating a diminishing returns pattern for the benefits of work experience. The civil servant status variable shows a positive and significant effect on women's income across all wage distribution levels. The highest coefficient is found at the 0.50 quantile, at 0.963. Meanwhile, region has a significant negative effect on women's income across all quantiles, with the largest coefficient value at the 0.25 quantile, at -0.610

## 5. Discussion

The results of the quantile regression analysis reveal the determinants of wages for working women across a diverse wage distribution. Overall, education and work experience yield greater returns for low-wage women, while civil servant (PNS) status consistently increases wages across all quantiles. This finding is consistent with research by Stokke [24] which explains that education is a key indicator of the wage gap. However, there is a significant disparity between bachelor's and master's degree holders. In other words, even at the bachelor's degree level, those with longer work experience receive higher wages than master's degree holders. This gender wage discrimination has a negative impact on growth because it limits women's access to education and work experience and restricts the development of human resource potential [25]. On the other hand, regional disparities are a key factor in determining women's wages, particularly among low-wage groups. These findings highlight the relevance of using quantile regression with heterogeneity in measuring women's wages.

At the 0.10 quantile, education and work experience have the strongest impact on women's wages compared to other quantiles. An additional year of education increases women's wages by about 7.1 percent, while an additional year of work experience raises wages by about 5.8 percent. These findings indicate that increasing human capital plays a very important role for women in the lowest wage groups. The negative and significant coefficient for the square of work experience indicates that although work experience has a positive effect, the additional benefits of work experience diminish after a certain point. Employment status as a civil servant significantly increases women's wages, indicating that the public sector serves as the primary pillar supporting the wages of low-paid women. This finding aligns with research by Mueller [26] which explains that the wages of women working in the public sector are higher than those in the private sector. The existence of this significant wage gap enables government employees to provide quality services and make meaningful contributions to society [27]. Women still face a significant gap, particularly in accessing equal economic opportunities free from exploitation and harmful treatment [28]. Women living in rural areas earn significantly lower wages than women in urban areas, revealing a stark regional disparity among low-income women.

At the 0.25 quantile, education and work experience continue to have a positive and significant effect on women's wages, albeit to a lesser extent than at the 0.10 quantile. An additional year of education increases wages by about 5.7 percent, while work experience increases wages by about 4 percent, indicating that the return on human capital remains relatively high for low-wage women. Civil servant status is associated with a significant increase in wages, even greater than at the 0.10 quantile, confirming that public-sector employment provides fairly strong wage protection for women in the low-wage group. Meanwhile, the wage disparity between urban and rural areas remains very clear at this quantile, although it is slightly smaller than at the lowest quantile.

At the 0.50 quantile, where women's wages fall into the middle range, the effects of education and work experience on wages remain positive and significant, but are weaker than at the lower quantile. An additional year of education increases wages by about 4.3 percent, while work experience increases wages by about 2.2 percent. These findings indicate that the middle wage level has a significant impact on human capital. Civil servant status has the greatest impact, suggesting that the wage structure in the public sector is more favorable to middle-income women. Meanwhile, regional disparities show a smaller trend compared to the lower quantile.

At the 0.75 quantile, education and work experience have a positive and significant effect on women's wages, though the magnitude is relatively smaller. An additional year of education increases wages by about 4.1 percent, while work experience increases wages by 2.1 percent. The results indicate that women in the middle-to-upper income group are no longer responsive to additional human capital. Employment status as a civil servant still has a positive impact, although the magnitude of this effect has decreased compared to the previous quantile, while the wage gap between urban and rural areas is relatively small.

At the 0.90 quantile, education and work experience have a significant impact on women's wages. An additional year of education can increase wages by 4.1 percent, while work experience increases wages by approximately 2.7 percent. These findings indicate that women in this group have high incomes. Structural factors such as job type, position, and industry are likely more dominant than individual characteristics. Civil servant status still results in a significant wage increase, although the effect is smaller than at the median quantile, while regional wage gaps are at their lowest level, though still significant.

Based on the interpretation of data from these quantiles, it was found that the variables significantly affecting women's wages are education and work experience. Furthermore, as the quantile level of the education variable increases, it remains the most influential factor compared to the others. The results indicate that the return on education in terms of a better economic life, as measured by wages, has a significant effect. The results of the Mincer equation test were confirmed. Consistent with previous research by Psacharopoulos and Patrinos [29] the returns to education influence income equality and social welfare [30]. Research by Garcia-Prieto and Gómez-Costilla [31] highlights wage discrimination against women in the

labor market, where women with lower levels of education experience a significant impact on their wages. Research by García and Molina [32] explains that the variables that have a significant effect on wages are length of service and work experience.

## 6. Conclusion and Recommendation

The results of the descriptive analysis and quantile regression indicate that wage inequality among women in Indonesia remains quite high. Women's average income is relatively low, with significant variation among individuals in terms of both income and educational attainment. This situation also illustrates that the labor market is heterogeneous and has not yet been able to ensure equal opportunities, particularly for women with low educational levels and those living in rural areas.

Education and work experience are determinants that influence the distribution of women's wages in Indonesia. The impact of these variables is felt most strongly by low-wage women, while in higher quantiles, the magnitude of this impact tends to decrease. These findings indicate diminishing returns on human capital as wages increase. Employment status as a civil servant consistently leads to higher wages across all quantiles, underscoring the public sector's role as a provider of wage protection and stability for women.

These results generally support the Mincer equation in explaining the effects of education and work experience on women's wages in Indonesia. However, there are still indications of wage discrimination against women in Indonesia. Furthermore, there are still indications of gender discrimination and regional disparities, particularly among low-wage women. Structural factors such as employment status and location play an important role in shaping human capital, but this alone is not enough without the support of inclusive labor market policies and efforts to address gender inequality.

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