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# DYNAMICS OF THE GENDER WAGE GAP IN JAVA ISLAND, 2024: AN OAXACA–BLINDER ANALYSIS WITHIN THE MINCER HUMAN-CAPITAL FRAMEWORK

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## Abstract

Wage disparity between men and women remains a prominent structural issue, even though Java Island serves as the center of national economic growth. This study aims to analyze the determinants of the gender wage gap in Java using the Oaxaca-Blinder decomposition approach through regression methods within the framework of Mincer's human capital theory. The data is sourced from the 2024 National Labor Force Survey (Sakernas). The decomposition results indicate that the disparity is not only driven by differences in individual characteristics (explained component) but also by unobserved discriminatory factors (unexplained component). These findings highlight the urgency of formulating more inclusive and gender-responsive labor policies to reduce structural inequalities in the labor market, particularly in economically active regions such as Java Island.

Keywords: Wage Gap, Gender, Oaxaca-Blinder, Discrimination, Mincer Theory

## INTRODUCTION

Gender equality one of the core pillars of the Sustainable Development Goals (SDGs) is pivotal to social and economic development. Despite various efforts made to improve this condition, gender inequality remains a significant global challenge in many countries, including Indonesia. The wage gap is a crucial issue in the economy, as it indicates inequality in the distribution of wages among individuals. The International Labour Organization defines the gender wage gap as a situation in which the average wage of men is higher than that of women (Laurensia & Yuliana, 2021). A study conducted by Alwago (2024) states that the wage gap is caused by favoritism that leans toward the employment of male labor over female labor. This phenomenon serves as a barrier to gender equality in the labor sector. In Indonesia, although there has been an increase in female labor force participation, the gender wage disparity remains persistent. Data from Statistics Indonesia (BPS) shows that in 2022, the average wage of female workers in Indonesia was only 78.9% of that of male workers (BPS, 2023).

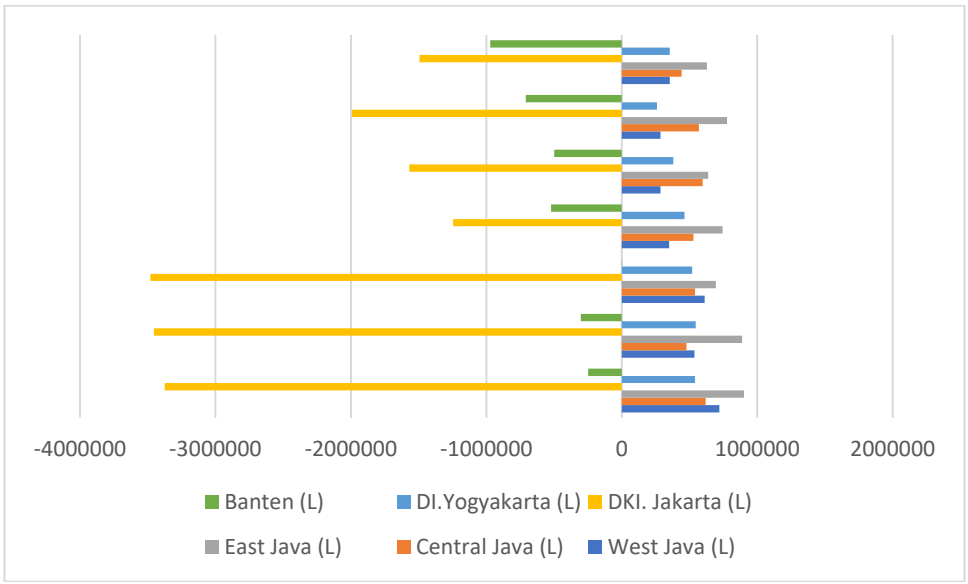


Figure 1. Gender Wage Gap in Java Island, 2020–2023.
Source: Processed from Statistics Indonesia (Badan Pusat Statistik), 2024.
Note: Positive values indicate that women's wages are lower than men's, while negative values indicate that women's wages are higher than men's.

Figure 1 shows the average wage gap between men and women in six provinces on the island of Java. As the main economic center of Indonesia, Java contributes significantly to the national GDP—around 58.49% in 2022 (BPS, 2023). However, this region also faces complex challenges regarding gender wage inequality. Factors influencing this disparity include differences in education levels, work experience, occupational segregation, and potential gender discrimination in the workplace (World Bank, 2021). Provinces such as Central Java, East Java, West Java, and the Special Region of Yogyakarta show that men's wages are higher than women's. One cause of this wage gap is the limited role of women in the public sphere and ongoing discrimination against women in the labor market (Marlina et al., 2024). However, there are exceptions in the provinces of DKI Jakarta and Banten, where women's wages are higher than men's. Higher levels of education and the transition of women into formal employment can help reduce the wage gap. Structural reforms in the workplace and changes in cultural norms are crucial to achieving gender wage equality (Maulida et al., 2024). Research by Bai et al. (2023) found an interesting phenomenon: jobs with a higher proportion of male workers tend to have a smaller gender wage gap, as measured by the ratio of women to men.

## LITERATURE REVIEW AND HYPOTHESIS FORMULATION

The gender wage gap on Java Island during 2020–2023 remains considerable. To examine this disparity, we investigate variables that may influence wage differentials, such as highest educational attainment, gender, training participation, age, and work experience. Several studies have found that these individual characteristics significantly affect the gender wage gap (Akbar, 2022; Etezady et al., 2021; Lee & Kang, 2024; Panjawa et al., 2023). However, some research suggests that not all of these factors are primary drivers: for instance, Bahl & Sharma (2024) report that education level is not the main determinant of wage differentials. Taniguchi & Tuwo (2014) conclude that gender per se has no significant impact on wages once other variables are controlled, whereas Yang et al. (2023) demonstrate that work experience significantly affects earnings in the context of freelance or flexible work. Numerous studies indicate that workers who undergo training tend to earn higher wages than those who do not, highlighting the importance of skill development in enhancing productivity (Bjerge

et al., 2021; Blundell et al., 2021). Additionally, some investigations identify discrimination against women manifested in a preference for male labor as a key factor contributing to the gender wage gap (Morello & Anjolim, 2021).

This disparity results in substantial differences in worker welfare within the labor market. Investigating the gender wage gap remains essential, as it represents a critical development issue and aligns with sustainable development goals. Applying the Oaxaca–Blinder decomposition within a Mincerian human capital framework enables a detailed assessment of how much of the observed gap is explained by differences in characteristics versus unexplained factors, which may reflect discrimination or structural constraints. Although prior studies have explored the gender wage gap in Indonesia Taniguchi & Tuwo (2014), research focusing specifically on dynamics within Java Island is still limited. Therefore, this study aims to fill that gap by employing the Oaxaca–Blinder model to analyze factors contributing to the gender wage gap across highly urbanized and economically active regions, namely Central Java, West Java, East Java, Banten, the Special Region of Yogyakarta, and the Special Capital Region of Jakarta.

*H1:The gender wage differential on Java Island, conditional on education, training, age, work experience, and squared experience, differs from zero.*

## RESEARCH METHODS

This study employs a quantitative approach to analyze the relationships between each variable used by Rustamana et al. (2024), and applies descriptive statistics to evaluate income disparities between genders in the provinces of DKI Jakarta, Banten, D.I. Yogyakarta, Central Java, East Java, and West Java. The data used in this study is secondary data obtained from the 2024 National Labor Force Survey (Sakernas), which focuses on individual-level data and is sourced from the Central Bureau of Statistics (BPS). The Oaxaca-Blinder decomposition method serves as the foundation of the analytical framework applied. To measure the extent of the gender wage gap, several coefficient decomposition and covariate decomposition methods from regression models are estimated, one of which is the Oaxaca-Blinder decomposition method (Oaxaca, 1973).

The Oaxaca-Blinder decomposition method facilitates the identification of contributing factors to wage gaps that can be attributed to observable characteristics such as education and work experience, as well as unobservable factors potentially indicating discrimination or structural barriers. By placing this analysis within Mincer's theoretical framework(Mincer, 1974), this study aims to provide a deeper understanding of how human capital accumulation affects wage outcomes across genders in Java. This approach not only contributes to the existing literature on gender wage disparity in Indonesia but also offers valuable insights for policymakers seeking to address wage inequality in the country's most economically significant region. The equation can be estimated as follows:

1. $\ln[Y(s,x)]=a+p_s s+\beta_0 x+\beta_1 x^2+\varepsilon$,.....(1)

Where Y(s,x) represents income or wages at a given level of schooling and work experience x, $\rho_s$ is the "rate of return to schooling" (assumed to be the same for all levels of schooling), and ε is a zero-mean residual with E(ε|s,x) = 0.9. This regression model is motivated by two conceptually different frameworks used by Mincer (1958). Although the algebra is similar, the economic content differs significantly.

Table 1.Oaxaca-Blinder Decomposition Covariate Matrix (Covariate Product)

| Kovariat | Definisi | Proxy | Referensi | kode |
|---|---|---|---|---|
| lwage | Transformation of individual wage received | Monthly income or wage received | Mincer (1974) | b5r15_1-15 |

| | | | | |
|---|---|---|---|---|
| educ | Education level attained to participate in the labor force | Last completed education level | Mincer (1958) | b5r6a-6a |
| female/ $D^F$ | Biological sex difference between male and female | Gender category (Male or Female) with dummy 1=female | (Blinder, 1973; Oaxaca, 1973b; Oaxaca et al., 1994) | b4k4-k4 |
| trained | Training to improve skills for labor market participation | Training or skill improvement program attended, indicated by dummy 1=trained | Mincer (1962) | b5r6d-6d |
| age | Age range of workers | Worker's age range | Polachek (2007) | b4k10-K10 |
| experience | Work experience gained since completing education | Years of work from graduation to current or last job | Mincer (1962) | b5r44a_thn-44a1 & b5r45b_thn-45b |
| $experience^2$ | Quadratic form of experience used to capture non-linear variables | Squared work experience | Mincer (1962) | (b5r44a_thn-44a1 & b5r45b_thn-45b)$^2$ |

Source: Statistics Indonesia (BPS), based on the 2024 National Labor Force Survey (SAKERNAS), processed by the authors.

Using variables explained within Mincer's theoretical framework, such as workers' last education level (educ), work experience (exp), and quadratic work experience (exp2), this study also considers several covariates—educ, exp, exp2, female dummy (DF)—as explanatory variables of wage gaps (lwage), which are definitively presented in Table 1. Traditionally, the Oaxaca-Blinder decomposition estimation model, with six selected covariates represented as product covariates in the form of a six-column vector covariate matrix, can be estimated as follows:

2. $$\Delta \log \overline{wage}_{i,\frac{M}{F}} = \underbrace{(\beta_M - \beta_F)\ \underbrace{\overline{X}^T_{F,i,6\times1}}_{\text{product covariate}}}_{\text{Unexplained}} + \underbrace{\left(\underbrace{\overline{X}^T_{M,i,6\times1}}_{\text{product covariate}} - \underbrace{\overline{X}^T_{F,i,6\times1}}_{\text{product covariate}}\right)\beta_M}_{\text{Explained}} \text{.....(2)}$$

3. According to Jann (2008)..(2)

According toJann (2008), the traditional Oaxaca-Blinder decomposition analysis divides the wage gap into two main components. The explained component reflects the part of the gap that can be attributed to differences in labor characteristics such as education and experience, assuming that wages are set based on the return rates received by the male group. In other words, differences in endowment factors form the basis of the wage gap. Meanwhile, the unexplained component refers to the portion of the wage gap that cannot be accounted for by these labor characteristics. This component is often associated with potential discrimination or other structural factors, assuming that the characteristics of the female group are used as a reference in evaluating differences in the returns of covariates to the log of wages.

## RESULTS AND DISCUSSION

Table 2 shows the differences in average log wages between men and women in six provinces on the island of Java in 2024. This estimate consists of two main components: explained and unexplained, calculated using two weighting methods: Kitagawa (w = [0.5]) and Jann (w = [-2]). The explained component reflects the portion of the wage gap that can be attributed to measurable characteristic differences, such as age, education level, job training, as well as work experience and its squared term. Meanwhile, the unexplained component reflects differences that cannot be explained by these characteristics and are often associated with discrimination or structural factors in the labor market.

The table shows that most variables in the explained component have a significant impact on the wage gap. The education variable (educ) has a negative impact on the gap, indicating that if only education is considered, women should be receiving higher wages. Conversely, in the unexplained component, the high value of the intercept coefficient indicates a significant mismatch that cannot be explained, reinforcing the suspicion of structural inequality in women's wages in the labor market.

Tabel 2. Hasil Estimasi Oaxaca-Blinder

| | *Explained* | | | |
|---|---|---|---|---|
| | Kitagawa $w$ = [0,5] | | Jann $w$ = [-2] | |
| | Coeff | SE | Coeff | SE |
| intercept | 0,0000(***) | 0,0000 | 0,0000(***) | 0,0000 |
| age | -0,0008(***) | 0,0005 | -0,0007(***) | 0,0004 |
| educ | -0,0334(***) | 0,0042 | -0,0333(***) | 0,0042 |
| trained | -0,0001(***) | 0,0002 | -0,0006(***) | 0,0005 |
| exp | 0,0641(***) | 0,0051 | 0,0661(***) | 0,0049 |
| $exp^2$ | -0,0570(***) | 0,0049 | -0,0585(***) | 0,0047 |
| | Unexplained | | | |
| | Kitagawa w = [0,5] | | Jann w = [-2] | |
| | Coeff | SE | Coeff | SE |
| intercept | 0,4393(***) | 0,0535 | 0,4393(***) | 0,0535 |
| age | 0,0070(***) | 0,0421 | 0,0070(***) | 0,0419 |
| educ | -0,0217(***) | 0,0213 | -0,0218(***) | 0,0214 |
| trained | 0,0118(***) | 0,0034 | 0,0123(***) | 0,0034 |
| exp | 0,0875(***) | 0,0329 | 0,0854(***) | 0,0319 |
| $exp^2$ | -0,0439(***) | 0,0242 | -0,0424(***) | 0,0231 |

Source: Central Statistics Agency (BPS) based on Sakernas 2024 for the Java Island region. The Blinder-Oaxaca decomposition was performed using the oaxaca package version 4.4.1 developed by Marek Hlavac (2022). (***) p-value < 0.01.

The Oaxaca-Blinder decomposition estimation results indicate a wage gap between men and women in Java Island, analyzed through two weighting approaches, namely the traditional decomposition estimation of Kitagawa Kröger & Hartmann (2021) and the Jann weighting which uses the female wage structure as a reference (Jann, 2008). This wage gap analysis is divided into two main components: explained (which can be explained by differences in characteristics such as age, education, training, and work experience) and unexplained (which cannot be explained by these characteristics, often associated with discrimination or different treatment in the labor market).

In the explained component, several variables indicate that women have advantages over men. Years of education (educ) has a negative contribution of -0.0334, indicating that when viewed solely from the level of education, women should receive higher wages. This is marked by the transformation of women in terms of participation and achievement in education. Even in many

developed countries, women's academic performance exceeds that of men, causing shifts in the social and economic structure because their advantage results in higher wage levels for women (Bødker et al., 2024; Böheim & Stöllinger, 2021). Similarly, the age (age) and job training (trained) ohevariables make a small but significant contribution to reducing the gap. Theoretical models in several countries show that the supply of older workers narrows the gender wage gap in aggregate, because it reduces the chances for young men to occupy high-paying positions (Aprilyanti, 2017; Arellano-Bover et al., 2024). A study in New Zealand found that the age variable explains less than half of the gender wage gap, indicating the limited effect of age in closing the gap(Brower & James, 2020). Job training can reduce the wage gap because it has a positive impact, where individuals who undergo training earn 18% higher wages. When women are given equal access to training, they can catch up on the wage gap with men. Training helps women enter quality jobs that offer higher wages (Lee & Kang, 2024).

Work experience (exp) and its square ($exp^2$) exhibit a more complex influence: experience raises wages (positive effect), but its marginal return diminishes over time (negative coefficient on $exp^2$). SAKERNAS data indicate that the gender wage gap in Indonesia is approximately 30%. Blinder–Oaxaca decomposition results show that only about 25–33% of this gap can be explained by differences in characteristics (human capital), with the remainder attributed to discrimination(Sukma & Kar attribut.This finding aligns with(Si et al., 2020), who demonstrate that significant wage gaps decrease as income rises; most of the explained portion stems from lower educational attainment among women and motherhood penalties, while differences in returns to education even favor women. Although work experience is included among human capital characteristics, the total explained component suggests that characteristic differences between genders tend to narrow the wage gap.

In the unexplained component, clear differences in returns to identical characteristics reflect bias or discrimination in the labor market. The intercept coefficient of 0.4393 (43.93%) in Jann's model indicates a substantial portion of the gap that cannot be accounted for by observed characteristics, likely arising from structural inequalities in the wage-setting system. Even when women possess comparable or superior human capital, they still receive lower wages than men, attributable to discriminatory practices. This result is consistent with (Lee & Kang, 2024), who find that in Australia the unexplained component accounts for 84.4% of the gender wage gap among hidden workers, indicating a dominant role of structural discrimination. Similarly, research in Riau Province, Indonesia, shows that 76.76% of the gender wage gap remains unexplained by observed factors, suggesting the presence of structural barriers and discrimination in the labor market (Maulida et al., 2024).

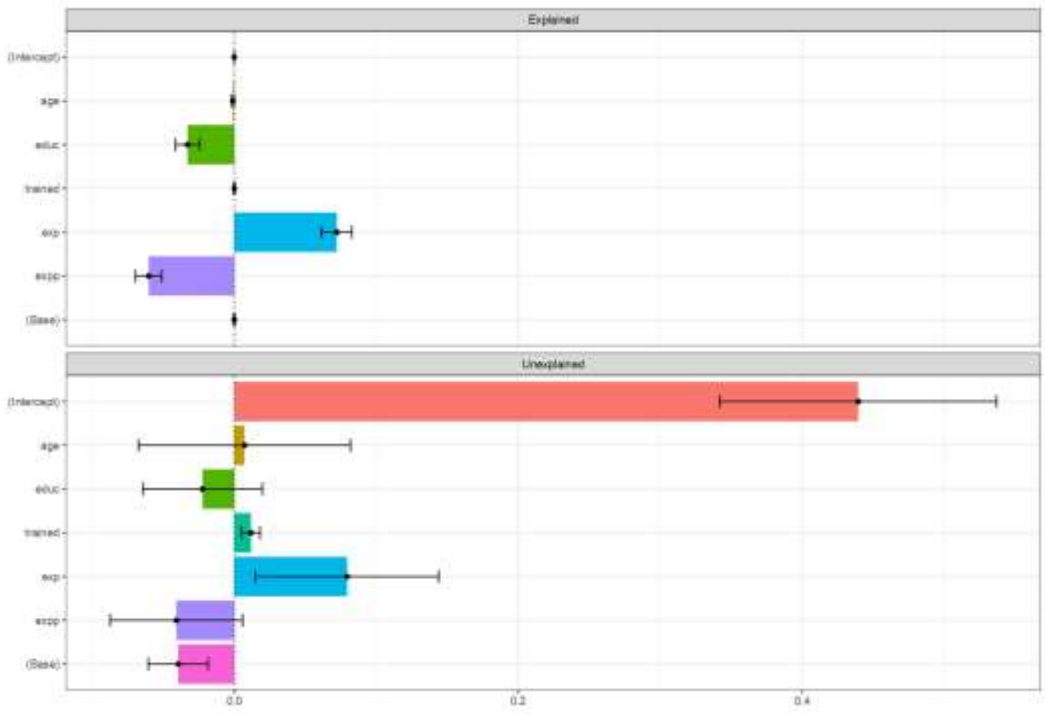


Figure 1. BPS Sakernas 2024 data for the Java Island region (processed in 2025 using R).

The Oaxaca–Blinder plot reveals that only a small fraction of the gender wage gap can be attributed to differences in observable characteristics such as education and work experience with the variables exp and educ contributing most prominently to the explained component. However, the majority of the gap arises from the unexplained component, as indicated by a substantial intercept in the “Unexplained” portion. This suggests that wage differences between men and women are not fully accounted for by measurable factors, implying the presence of discrimination or other latent influences not captured by the model.

## CONCLUSION

This study finds that gender-based wage inequality still occurs significantly on the island of Java, despite it being the center of national economic growth. Using the Oaxaca-Blinder decomposition approach within the framework of Mincer's human capital theory and based on the 2024 Sakernas data, the analysis reveals that the wage gap is not entirely explained by observable characteristics such as education, work experience, and training (explained component), but is largely influenced by unobservable discriminatory factors (unexplained component). Although women demonstrate advantages in educational attainment and participation in training programs, these have not been sufficient to overcome structural disparities in wage returns. The large unexplained component indicates the presence of structural inequality and potential discrimination in the labor market. Therefore, more inclusive and gender-responsive labor policies are urgently needed to reduce the wage gap, especially in economically active regions such as Java.

Future research is encouraged to expand its scope by using long-term panel data and multivariate approaches to capture the dynamics of the gender wage gap more comprehensively. This includes considering contextual variables such as employment sector, family conditions, the motherhood penalty, and social and cultural norms that influence female labor participation and wage returns. Additionally, comparative analysis across regions with different economic characteristics may provide further insights into structural inequality across various geographic contexts. For readers particularly policymakers, academics, and labor market practitioners the

findings of this study are expected to serve as a foundation for designing fairer, data-driven, and gender-sensitive policies to promote a more equitable and just labor market in Indonesia.

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