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Decomposition of Post-Pandemic Gender Wage Gaps in Indonesia: an Analysis Across the Wage Distribution

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Abstract

This study examines post-pandemic gender wage gaps in Indonesia using SAKERNAS data from 2018 to 2023. OLS and RIF-OLS regression results indicate that gender wage gaps widened post-pandemic, with female employees earning 30 percent less than their male counterparts on average, narrowing to 23 percent after controlling for wage-related characteristics. The gap is most pronounced among low-paid workers, where women earned 40 to 50 percent less than men. Decomposition analysis across the wage distribution reveals that the majority of the gap is driven by unexplained factors, reinforcing the persistence of the "sticky floor" and "glass ceiling" effects, indicative of on going gender discrimination in the labor market. While factors such as lower work experience, tenure, and working hours contributed to the gap, women's higher educational attainment, increased formal sector participation, access to training, and representation in white-collar jobs helped mitigate it.

Keywords: post-pandemic, gender, wage gap, decomposition.

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1. Introduction

Progress toward wage equality between men and women has been slow over the past few decades (ILO, 2018). This ongoing gender wage gap could hinder efforts to achieve Target 8 of the Sustainable Development Goals (SDGs) focusing on decent wages and gender equality. This issue is also evident in Indonesia, where the gender wage gap remains around 20 percent based on official data (Figure 1).

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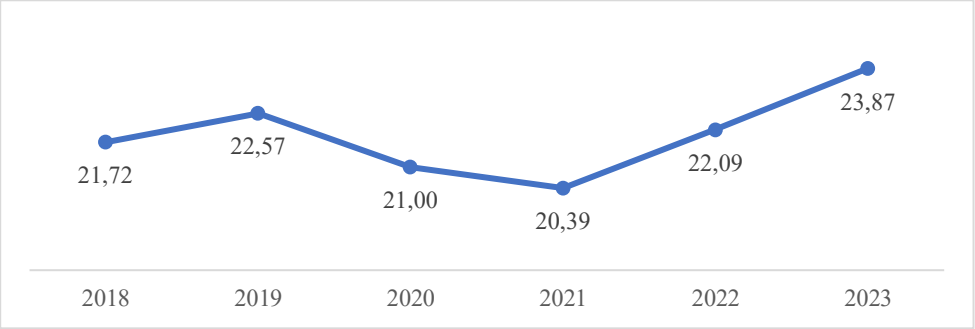


Figure 1. Gender wage gap di Indonesia (%), 2018-2023
Source: (BPS, 2020, 2021, 2022, 2023, 2024)

Between 2019 and 2021, the gender wage gap in Indonesia narrowed (Figure 1). However, this decrease was largely attributed to the economic instability brought about by the COVID-19 pandemic, where the contraction in male earnings primarily contributed to the reduced gap (Panjaitan, 2023). This period also saw an increased labor force participation of women, as many sought to supplement household income (Halim et al., 2023). As the economy gradually recovered, the gender wage gap widened once again, reaching higher levels by 2023. Although the COVID-19 pandemic has officially concluded, its long-term impacts on the labor market continue to be felt, including high rates of underemployment, widespread informal employment, reduced working hours, declining productivity, and persistently inadequate wages (Doleschel & Manu, 2021; ILO, 2023, 2024).

This trend is not exclusive to Indonesia. Among 22 countries, nine experienced an increase in the gender wage gap in 2021/2022 compared to 2019, with the largest increase reaching 6.3 percentage points (ILO, 2022). The widening gender wage gap in several countries has been attributed to labor market disruptions caused by the COVID-19 pandemic (Alon et al., 2020; Botello-Peñaloza, 2022; da Costa Silva & Shinkoda, 2021; Doorley et al., 2021).

The gender wage gap is driven by both explained and unexplained factors. According to the ILO (2020), some of the explained factors include managerial roles being influenced by stigma, differences in working hours, career breaks, education levels, and other personal characteristics. Wage increases tend to be associated with factors such as age, education, job tenure, formal employment, and professional training, while women's wages are often negatively impacted by marital status (da Costa Silva & Shinkoda, 2021; Kafabih & Ridwan, 2022; Panjaitan, 2023).

However, a significant portion of the wage gap remains unexplained. Sukma & Kadir (2019) found that nearly 80 percent of the wage gap in Indonesia in 2016 was attributable to unexplained factors. Even within sectors traditionally considered female-dominated, such as healthcare, more than 22 percent of the wage gap remains unexplained(WHO & ILO, 2022). Wage disparities persist in high-level positions, often influenced by gendered stereotypes, such as assumptions that women lack ambition, are unsuited for certain tasks, face microaggressions, or are perceived as overly demanding (Field et al., 2023). Even highly educated women continue to experience wage

gaps compared to men (Botello-Peñaloza, 2022). The largest unexplained wage gap is typically observed among women of reproductive age, likely due to career interruptions related to traditional gender roles (Alon et al., 2020; da Costa Silva & Shinkoda, 2021).

To effectively reduce the gender wage gap, it is crucial to identify the key contributors to both the explained and unexplained components of the disparity. One widely used method for analyzing these contributors is the Oaxaca-Blinder decomposition, which breaks down the wage gap into its component factors (Blinder, 1973; Oaxaca, 1973). However, this approach only provides decomposition at the mean, offering a limited view of the wage gap.

To obtain a more comprehensive understanding, particularly regarding wage disparities across different points of the wage distribution, alternative decomposition methods, such as the Recentered Influence Function (RIF)-Oaxaca, can be employed (Firpo et al., 2009). This approach enables analysis of the wage gap across the entire distribution, shedding light on phenomena like the "sticky floor" and "glass ceiling." The "sticky floor" refers to the disproportionate concentration of women in low-wage, low-mobility jobs with limited opportunities for advancement (Arulampalam et al., 2007), while the "glass ceiling" describes the barriers preventing women from advancing to higher leadership or management roles, despite their qualifications and capabilities (Cotter et al., 2001).

In the Indonesian context, most gender wage decomposition studies conducted before the pandemic focused either on the mean e.g., Pirmana (2006), Sukma & Kadir (2019), Suharyono & Digdowiseiso (2021) or across the wage distribution e.g., Potrafke & Ursprung (2012), Taniguchi & Tuwo (2014), Sohn (2015). These studies consistently found that the largest portion of the wage gap remained unexplained, often due to gender discrimination that negatively impacts female workers. Observable characteristics contributing to the gap included education, work experience, and occupational segregation.

Research on the decomposition of gender wage gaps during the pandemic in Indonesia is limited. For instance, Panjaitan (2023) only analyzed the gap at the mean. Moreover, to our knowledge, comprehensive studies on the decomposition of post-pandemic gender wage gaps in Indonesia are not yet available.

Our study seeks to fill these gaps by investigating and decomposing gender wage gaps in the post-pandemic period, both at the mean and across the wage distribution. It aims to address the following three research questions: 1) How has the gender wage gap evolved at the mean and across the wage distribution following the pandemic? 2) What are the contributing factors to the development of the gender wage gap at the mean and across the wage distribution post-pandemic? 3) Do the glass ceiling and sticky floor phenomena persist in the Indonesian labor market after the pandemic?

2. Research method

2.1. Data and variable selection

Our study employs microdata from the Indonesian National Labour Force Survey (SAKERNAS), conducted annually in August between 2018 and 2023 by Statistics Indonesia (BPS), encompassing a representative sample of 300,000 households. This research seeks to address three principal questions by analyzing a dataset of 1,186,269 individuals classified as employees, including laborers, formal employees, and casual workers across both agricultural and non-agricultural sectors. Notably, our estimation of the overall gender wage gap diverges from the official figures reported by BPS (Figure 1), which exclude casual workers. The sample comprises 362,169 individuals from the pre-pandemic period (2018-2019), 618,848 from the pandemic period (2020-2022), and 205,252 from the post-pandemic period (2023), with the pandemic period defined in accordance with the official timeline established by the Indonesian government. A comprehensive description of all research variables is provided in Table 1.

Table 1. Summary of research variables

Variable	Definition	Mean	Std. Dev
Lwages	The natural logarithmic of nominal wage per week	14.399	0.92
Female	0 for male (reference category) 1 for female	0.341	0.474
Married	0 unmarried (reference category) 1 married	0.705	0.456
Household members	Number of household members in which an individual belongs to (person)	4.099	1.617
Household members 15+	Number of household members who are 15 years old and above in which an individual belongs to (person)	3.056	1.26
Education completed	The highest education level completed by an individual: 1- no education/elementary school (reference category), 2- junior high school, 3- senior high school, 3- vocational, 4- diploma 1/2/3, 5- university	3.0926	1.8017
Age group	Age of an individual: 1- 15-34 years old (reference category), 2- 35-44 years old, 3- 45-54 years old, 4- 55-64 years old, 65 years old and above	1.0432	1.0702
Experience	Working experience of an individual (year)	20.917	13.749
Tenure	Working tenure of an individual (year)	9.066	9.566
Working Hours	The average working hours of an individual per week (hour)	39.651	15.79
Full Employment	Employment status of an individual based on average working hours per week: 1- severely underemployed (reference category), 2- underemployed,	2.6667	0.6033

Variable	Definition	Mean	Std. Dev
	3- fully employed		
Trained	Participation of an individual in work training: 0- untrained (reference category), 1- trained	0.213	0.41
White collar	0-blue-collar (reference category) 1-white-collar	0.311	0.463
Laborer	Type of individual employment: 0- casual workers (reference category) 1- labourer/employee	2.708	0.626
Formal	Formality status of employment: 0- informal (reference category) 1-formal	0.801	0.399
Urban	The residential area of an individual: 0- rural 1- urban	0.542	0.498
Pandemic	Pandemic periods: 1- pre-pandemic, 2-pandemic, 3- post-pandemic	1.8677	0.6788
Industry	The economic sector in which an individual works, consists of 17 industries (agriculture as the reference category)	-	-
Province	Provincial dummy (Aceh Province as the reference category)	-	-

2.2. Data and variable selection

2.2.1. Gender wage gaps and decomposition at the mean

This study uses SAKERNAS data from 2018 to 2023 to examine gender wage gaps before, during, and after the pandemic. The analysis begins with a basic wage regression, using survey weights to estimate gender differences in nominal wages (log-transformed) but initially only captures the overall gap without controlling for other factors. To address this, we estimate the Equation (1) below:

$$Y_i = \alpha G_i + X'_i\beta + \varepsilon_i \qquad (1)$$

where Y_i is the natural logarithmic of the nominal wages; G_i is gender dummy variable (0= if an individual is male, 1= if an individual is female); X_i is a vector of covariates containing wage determinants as well as a pandemic, industry, and provincial dummies in Table 1; and ε_i is an error term that is assumed to be independently and identically distributed with mean zero and constant variance. The regression coefficient of gender variable measures by how much the wage of female employees on average is lower or higher than their male counterparts, which is calculated using the formula:$(e^{\alpha} - 1) \times 100\%$, and the existence the wage gender gap can be checked by testing the significance of α. The. We also estimate the wage regression equation separately for men and women. This setup isolates the gender effect on wages after accounting for other variables. However, a Blinder-Oaxaca decomposition is used to identify specific factors contributing to wage differences. This method splits the gender wage gap into "explained"

components (differences in observable characteristics) and "unexplained" components (differences in returns to these characteristics).

In our analysis, employees were labelled as groups of *F* for female employees and *M* for male employees. The mean wage of the two groups is denoted as $\bar{Y}_M$ and $\bar{Y}_F$ respectively. Therefore,

$$\Delta\bar{Y} = \bar{Y}_M - \bar{Y}_F \quad (2)$$

In the context of linear regression, Equation (2) can be rewritten as:

$$\Delta\bar{Y} = \bar{X}'_M\hat{\beta}_M - \bar{X}'_F\hat{\beta}_F \quad (3)$$

where $\bar{X}'_F$ and $\bar{X}'_M$ are the vectors of mean estimates for observable characteristics for the two groups, respectively, while $\hat{\beta}_F$ and $\hat{\beta}_M$ are the vectors that contain the least-squares estimates of the regression coefficients for the characteristics of each group, respectively. Equation (3) then can be denoted as the decomposition of the gender wage differentials into two components, which are explained and unexplained components as in Equation (4)(Jann, 2008).

$$\Delta\bar{Y} = (\bar{X}_M - \bar{X}_F)'\hat{\beta}_M + \bar{X}'_F(\hat{\beta}_M - \hat{\beta}_F) \quad (4)$$

where $(\bar{X}_M - \bar{X}_F)'\hat{\beta}_M$ refers to the explained component of the wage differential that is contributed by the gender differences in the levels of observable characteristics (endowment effect), while $\bar{X}'_F(\hat{\beta}_M - \hat{\beta}_F)$ accounted for the unexplained part of the wage gap that is contributed by the gender differences in returns to the same set of observable characteristics (structural effect) (Blinder, 1973; Jann, 2008; Oaxaca, 1973).

2.2.2. Gender wage gaps and decomposition across the wage distribution

The study applies the Recentered Influence Function (RIF) regression (Firpo et al., 2009) to explore the wage gap across the wage distribution. This approach analyzes the effect of variable distribution changes across different wage quantiles. The RIF decomposition extends Blinder-Oaxaca across wage percentiles (Rios-Avila, 2020), allowing for a more nuanced view of how the gender wage gap varies throughout the wage distribution (Rios-Avila & de New, 2022).

The dependent variable was replaced with the RIF of the relevant distributional statistic, which is the unconditional quantile (Firpo et al., 2009). Specifically, if we consider the τ^{th} quantile of the wage distribution, the method defines an Influence Function $IF(y; q_\tau)$ as a dichotomous variable that takes on the value $-(1-\tau)/f_y(q_\tau)$ when the dependent variable is smaller than or equal to the quantile q_τ and $\tau/f_y(q_r)$ otherwise. Thus, the function can be written as

$$RIF(y; q_r) = q_r + IF(y; q_\tau) = q_r + \frac{\tau - 1(y \le q_r)}{f_y(q_r)} \quad (5)$$

where $1(y \le q_\tau)$ is an indicator function; $f_y(q_r)$ is the marginal density distribution of the dependent variable; and $q_\tau = Q_\tau(y)$ is the population τ-quantile of the unconditional distribution of the dependent variable.

3. Results and Discussion

3.1. Development of employees' characteristics

The statistical overview provided in Table 2 reveals several consistent characteristics of the workforce across the pandemic period. A significant portion of employees, regardless of the pandemic's onset, tended to have lower educational qualifications (up to junior high school), were relatively younger (under 45 years of age), lacked formal training, occupied blue-collar positions, worked in full-time and non-casual employment (primarily as laborers), and resided in urban areas. Furthermore, the majority were employed in the formal sector, particularly in the services industry. However, a marked shift occurred during the pandemic, with a notable rise in the proportion of employees working in the informal sector. Similarly, there was a significant increase in the share of underemployed individuals (both moderately and severely underemployed), casual workers in both agricultural and non-agricultural sectors, and agricultural employees.

In contrast, the pandemic period saw a sharp reduction in the average weekly working hours, the proportion of employees with lower educational attainment (junior high school or less), and the share of workers in the manufacturing industry. Post-pandemic, there was a continued decline in the number of employees in agriculture and manufacturing, while the services sector expanded, highlighting a structural shift from traditional sectors such as agriculture and manufacturing to the services sector as a result of the pandemic. These shifts had disproportionate effects on male and female employees, with an increase in the concentration of workers in lower-wage occupations and a corresponding decline in average wages during the pandemic period.

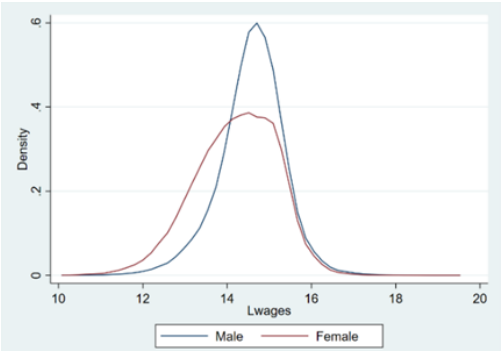
From 2018 to 2023, the gender wage gap fluctuated, narrowing the most during the pandemic years (2020–2022) but widening again in the post-pandemic phase (2023). This persistent wage disparity underscores the enduring gender wage gap in the Indonesian labor market. Wage distribution plots in Figure 2 demonstrate that the gender wage gap extends beyond average wages, manifesting across the entire wage distribution. This is particularly pronounced at the lower end of the wage spectrum, indicating the presence of a "sticky floor" effect, wherein female employees are more concentrated in low-paying jobs. Male employees' wage distribution is more centrally concentrated, while female employees experience a left-skewed distribution across all periods, with minimal variation between the pre-pandemic, pandemic, and post-pandemic phases. This suggests that the gender wage gap remained relatively stable throughout 2018 to 2023.

While the initial summary of mean wage differences (as presented in Table 2) and wage distribution plots (Figures 2) provide valuable insights, these analyses do not account for various factors that could influence wage differentials between male and female employees. Thus, further empirical investigation is necessary to adjust for other relevant determinants, such as employee

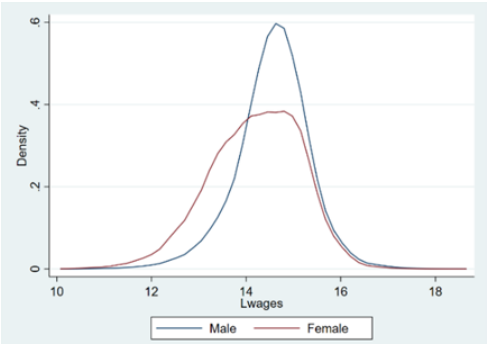
characteristics, in order to obtain a more accurate estimate of gender wage disparities (Blau & Kahn, 2017).

By conducting more detailed multivariate analyses, future research can offer a more nuanced understanding of the underlying factors contributing to the persistent gender wage gap in Indonesia, particularly in light of the structural labor market changes induced by the COVID-19 pandemic.

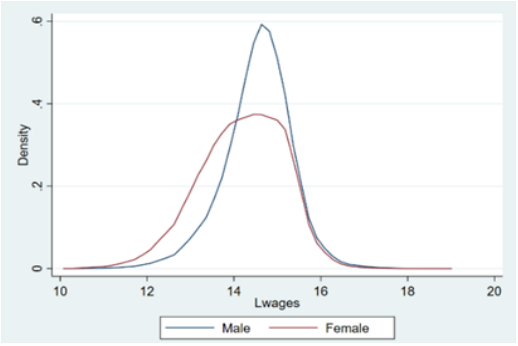
(a) All periods (2018-2023)



(b) Pre-Pandemic (2018-2019)



(c) Pandemic (2020-2023)



(d) Post Pandemic (2023)

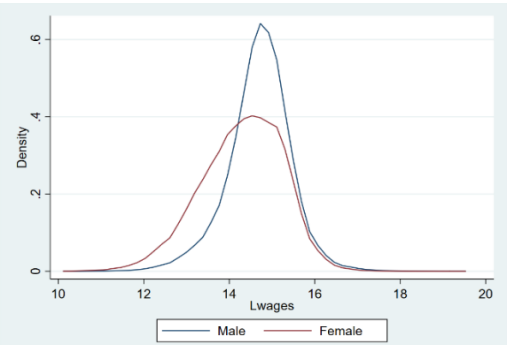


Figure 2. The development of wage distribution by gender, 2018-2023
Source: Author's calculation

Table 2. Summary statistics of the variable by gender and the period of pandemic

Variable	Pre-Pandemic (2018-2019) (n=362,169)				Pandemic (2020-2022) (n=618,848)				Post Pandemic (n=205,252)			
	Total	Male	Female	Difference	Total	Male	Female	Difference	Total	Male	Female	Difference
Ln(wages)	14.441	14.563	14.194	0.369*	14.416	14.534	14.177	0.357*	14.565	14.697	14.296	0.401*
Married (%)												
Not Married/ever married	32.212	28.937	38.895	-9.958*	31.618	27.835	39.31	-11.475*	33.585	30.161	40.599	-10.438*
Married	67.788	71.063	61.105	9.958*	68.382	72.165	60.69	11.475*	66.415	69.839	59.401	10.438*
Household Member (person)	4.154	4.185	4.09	0.095*	3.956	3.987	3.891	0.096*	3.856	3.894	3.778	0.116*
Household Member 15+ (person)	3.15	3.142	3.165	-0.023	3.002	2.99	3.025	-0.035	2.925	2.919	2.937	-0.018
Completed Education (%)												
Elementary School and less	28.4	29.786	25.571	4.215*	26.926	28.428	23.871	4.557*	24.853	26.378	21.729	4.649*
Junior High School	16.593	18.231	13.252	4.979*	15.849	17.714	12.057	5.657*	15.405	17.262	11.603	5.659*
Senior High School	20.193	21.27	17.994	3.276*	20.677	21.845	18.303	3.542*	22.078	23.322	19.528	3.794*
Vocational	14.964	15.999	12.852	3.147*	15.994	17.276	13.389	3.887*	16.614	17.894	13.993	3.901*
Diploma 1/2/3	4.079	2.755	6.779	-4.024*	3.886	2.537	6.628	-4.091*	3.621	2.45	6.02	-3.57*
University	15.772	11.959	23.551	-11.592*	16.668	12.199	25.751	-13.552*	17.429	12.694	27.128	-14.434*
Age Groups (%)												
15-34	47.866	46.459	50.735	-4.276*	45.623	44.151	48.614	-4.463*	46.249	45.004	48.799	-3.795*
35-44	24.686	25.375	23.281	2.094*	25.181	26.025	23.464	2.561*	25.054	25.992	23.133	2.859*
45-54	17.946	18.4	17.019	1.381*	18.524	19.06	17.434	1.626*	18.128	18.545	17.273	1.272*
55-64	7.52	7.78	6.991	0.789*	8.255	8.36	8.041	0.319*	8.321	8.31	8.343	-0.033
65+	1.982	1.986	1.974	0.012	2.417	2.403	2.446	-0.043	2.248	2.149	2.452	-0.303
Experience (year)	19.767	20.626	18.014	2.612*	20.291	21.204	18.435	2.769*	19.959	20.803	18.229	2.574*
Tenure (year)	7.819	8.114	7.218	0.896*	9.137	9.453	8.496	0.957*	9.057	9.473	8.206	1.267*
Working Hours (hours per week)	42.346	43.834	39.311	4.523*	39.889	41.634	36.342	5.292*	41.601	43.279	38.164	5.115*
Full Employment (%)												

Variable	Pre-Pandemic (2018-2019) (n=362,169)				Pandemic (2020-2022) (n=618,848)				Post Pandemic (n=205,252)			
	Total	Male	Female	Difference	Total	Male	Female	Difference	Total	Male	Female	Difference
Severe underemployment	4.675	3.601	6.866	-3.265*	6.976	5.372	10.236	-4.864*	5.086	3.909	7.497	-3.588*
Underemployment	13.81	11.031	19.48	-8.449*	18.943	15.963	25.00	-9.037*	14.738	11.596	21.174	-9.578*
Full employment	81.515	85.368	73.653	11.715*	74.082	78.665	64.764	13.901*	80.175	84.494	71.329	13.165*
Trained (%)												
Not trained	87.09	88.626	83.956	4.67*	80.979	83.303	76.254	7.049*	76.731	79.176	71.724	7.452*
Trained	12.91	11.374	16.044	-4.67*	19.021	16.697	23.746	-7.049*	23.269	20.824	28.276	-7.452*
White Collar (%)												
Blue collar	73.208	79.482	60.409	19.073*	73.513	80.415	59.483	20.932*	73.278	80.476	58.534	21.942*
White collar	26.792	20.518	39.591	-19.073*	26.487	19.585	40.517	-20.932*	26.722	19.524	41.466	-21.942*
Laborer (%)												
Agri casual worker	8.337	8.215	8.584	-0.369*	9.294	9.482	8.911	0.571*	7.981	8.107	7.725	0.382*
Non-agriculture casual worker	10.996	13.968	4.931	9.037*	11.926	15.082	5.511	9.571*	11.287	14.031	5.665	8.366*
Labourer/employee	80.667	77.816	86.485	-8.669*	78.781	75.437	85.578	-10.141*	80.732	77.862	86.611	-8.749*
Informality (%)												
Informal	19.333	22.184	13.515	8.669*	21.219	24.563	14.422	10.141*	19.268	22.138	13.389	8.749*
Formal	80.667	77.816	86.485	-8.669*	78.781	75.437	85.578	-10.141*	80.732	77.862	86.611	-8.749*
Urban (%)												
Rural	35.585	37.253	32.184	5.069*	34.977	36.21	32.47	3.74*	33.263	34.451	30.83	3.621*
Urban	64.415	62.747	67.816	-5.069*	65.023	63.79	67.53	-3.74*	66.737	65.549	69.17	-3.621*
Industry (%)												
Agriculture	13.721	14.683	11.758	2.925*	14.712	16.085	11.923	4.162*	13.222	14.545	10.511	4.034*
Mining	1.702	2.391	0.297	2.094*	1.663	2.361	0.244	2.117*	1.873	2.643	0.298	2.345*
Industry	19.339	18.225	21.613	-3.388*	18.308	17.119	20.725	-3.606*	17.9	16.899	19.949	-3.05*
Services	65.238	64.702	66.333	-1.631*	65.317	64.436	67.109	-2.673*	67.005	65.914	69.241	-3.327*

Table 3. Development of wage gap and determinants, 2018-2023

Dependent variable: log(wage)	Total (2018-2023)		Pre-pandemic (2018-2019)		Pandemic (2020-2022)		Post Pandemic (2023)	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
Female	-0.368***	-0.259***	-0.368***	-0.251***	-0.357***	-0.258***	-0.401***	-0.272***
	(0.00578)	(0.00310)	(0.00523)	(0.00433)	(0.00690)	(0.00370)	(0.00788)	(0.00466)
Married		0.0465***		0.0472***		0.0489***		0.0407***
		(0.00277)		(0.00317)		(0.00483)		(0.00589)
Household Number		-0.00352***		-0.00275		-0.00463**		-0.00133
		(0.00113)		(0.00195)		(0.00190)		(0.00238)
Household Member 15+		-0.00634***		-0.00697***		-0.00609**		-0.00635*
		(0.00183)		(0.00263)		(0.00307)		(0.00353)
Completed Education								
Junior High School		0.0872***		0.0916***		0.0907***		0.0648***
		(0.00401)		(0.00525)		(0.00524)		(0.00949)
Senior High School		0.296***		0.306***		0.303***		0.251***
		(0.00628)		(0.00706)		(0.00700)		(0.0104)
Vocational		0.339***		0.351***		0.348***		0.284***
		(0.00614)		(0.00802)		(0.00757)		(0.00988)
Diploma 1/2/3		0.594***		0.594***		0.599***		0.570***
		(0.0103)		(0.0127)		(0.0124)		(0.0198)
University		0.844***		0.841***		0.859***		0.798***
		(0.00977)		(0.0106)		(0.0118)		(0.0176)
Age Groups								
35-44		-0.00644*		0.00587		-0.0191***		0.00673
		(0.00387)		(0.00559)		(0.00646)		(0.00844)
45-54		0.121***		0.164***		0.0924***		0.114***
		(0.00600)		(0.00870)		(0.00971)		(0.0152)
55-65		0.325***		0.412***		0.276***		0.298***
		(0.0114)		(0.0163)		(0.0159)		(0.0228)
65+		0.596***		0.722***		0.526***		0.546***
		(0.0179)		(0.0290)		(0.0225)		(0.0402)
Experience		0.0282***		0.0296***		0.0283***		0.0255***

Dependent variable: log(wage)	Total (2018-2023)		Pre-pandemic (2018-2019)		Pandemic (2020-2022)		Post Pandemic (2023)	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
		(0.000455)		(0.000695)		(0.000712)		(0.000837)
Experience²/100		-0.0709***		-0.0783***		-0.0685***		-0.0643***
		(0.00113)		(0.00157)		(0.00142)		(0.00164)
Tenure		0.0234***		0.0249***		0.0226***		0.0217***
		(0.000373)		(0.000498)		(0.000491)		(0.000630)
Tenure²/100		-0.0332***		-0.0310***		-0.0324***		-0.0333***
		(0.000810)		(0.00136)		(0.00119)		(0.00168)
Working Hours		0.00685***		0.00667***		0.00719***		0.00616***
		(0.000153)		(0.000186)				
						(0.000218)		(0.000245)
Full Employment								
Underemployment		0.331***		0.226***		0.393***		0.286***
		(0.0109)		(0.0139)		(0.0156)		(0.0194)
Full employment		0.582***		0.511***		0.619***		0.571***
		(0.0123)		(0.0154)		(0.0174)		(0.0200)
Trained		0.138***		0.137***		0.138***		0.138***
		(0.00392)		(0.00677)		(0.00474)		(0.00591)
White collar		0.142***		0.132***		0.153***		0.124***
		(0.00382)		(0.00562)		(0.00533)		(0.00848)
Laborer		0.124***		0.131***		0.132***		0.0895***
		(0.0102)		(0.0131)		(0.0126)		(0.0175)
Formal		0.113***		0.0994***		0.104***		0.160***
		(0.0134)		(0.0166)		(0.0173)		(0.0217)
Urban		0.103***		0.103***		0.108***		0.0876***
		(0.00525)		(0.00505)		(0.00667)		(0.00735)
Pandemic period	Yes	yes	No	No	No	No	No	No
Province and Industry Fixed Effect	Yes	yes	Yes	yes	yes	yes	yes	yes
Constant	14.57***	12.48***	14.56***	12.54***	14.53***	12.38***	14.70***	12.75***
	(0.0109)	(0.0200)	(0.0121)	(0.0263)	(0.0106)	(0.0284)	(0.0110)	(0.0336)
Number of observations	1.186.269	1.186.269	362.169	362.169	618.848	618.848	205.252	205.252
R-squared	0.037	0.437	0.041	0.478	0.031	0.401	0.051	0.488

Note: Survey weights were used in estimation,* Statistically significant at 5 percent. ** Significant at 10 percent, Significant at 1 percent, robust standard error in the parentheses

3.2. Gender wage gap estimation and decomposition results

The estimation results for the wage equation, irrespective of the pandemic period, confirm that education provides positive returns for both male and female employees, with higher educational attainment strongly correlating with higher wages. Furthermore, wages increase significantly with other factors such as age, work experience, tenure, working hours, formal sector employment, urban residency, and white-collar occupations. These findings are consistent with existing literature that highlights the significant role of human capital and employment characteristics in wage determination (Blau & Kahn, 2017; Psacharopoulos & Patrinos, 2018).

The wage equation estimates, both uncontrolled and controlled for other factors, reveal persistent gender wage gaps from 2018 to 2023, regardless of the pandemic period (as detailed in Tables 3). On average, without adjusting for other wage determinants, female employees earned 30.79 percent less than their male counterparts. After controlling for observable characteristics, this gap narrows to 22.82 percent, indicating that differences in characteristics between male and female employees significantly explain a portion of the overall wage disparity. This is in line with prior research, which has found that gender differences in work experience, sectoral employment, and job characteristics contribute to the wage gap (Goldin, 2014; Olivetti & Petrongolo, 2016).

However, differences in the returns to these wage determinants between men and women, as depicted in Figure 3, suggest that a portion of the wage gap remains unexplained by measurable factors. This unexplained component points to potential discrimination or other structural factors contributing to the gender wage disparity. Decomposition results using both the Blinder-Oaxaca and Recentered Influence Function (RIF-Oaxaca) methods—at the mean and across the wage distribution—confirm that the majority of the wage gap is driven by unexplained factors, consistent with findings from studies that highlight the persistence of gender discrimination in the labor market (Fortin et al., 2011; Jann, 2008). These unexplained factors may include biases in hiring, promotion, and wage-setting practices, as well as broader societal norms that restrict women's full economic participation.

3.2.1. Pre-pandemic

Prior to the pandemic (2018-2019), female employees earned on average 30.79 percent less than their male counterparts, without controlling for other employee characteristics (Table 3). After adjusting for various factors, the gender wage gap significantly decreased to 22.20 percent. The Oaxaca-Blinder decomposition in Table 4 reveals that approximately 31.79 percent of the gender wage differential can be attributed to differences in characteristics between male and female employees, commonly referred to as endowment factors. This finding is consistent with the research of Sohn (2015) and Sukma & Kadir (2019), which similarly emphasize the role of such endowment effects in explaining wage differentials. A substantial portion of the explained gap is driven by industrial dummy variables, reflecting differences in the distribution of male and female employees across industries with varying wage structures, suggesting occupational segregation. Women are more concentrated in lower-paying industries, while men are more likely to be

employed in higher-paying sectors. Other significant factors contributing to the explained portion of the gap include differences in work experience, tenure, full employment status, and average working hours, as indicated in Table 2, where female employees generally lag behind their male counterparts, particularly in terms of tenure and work experience.

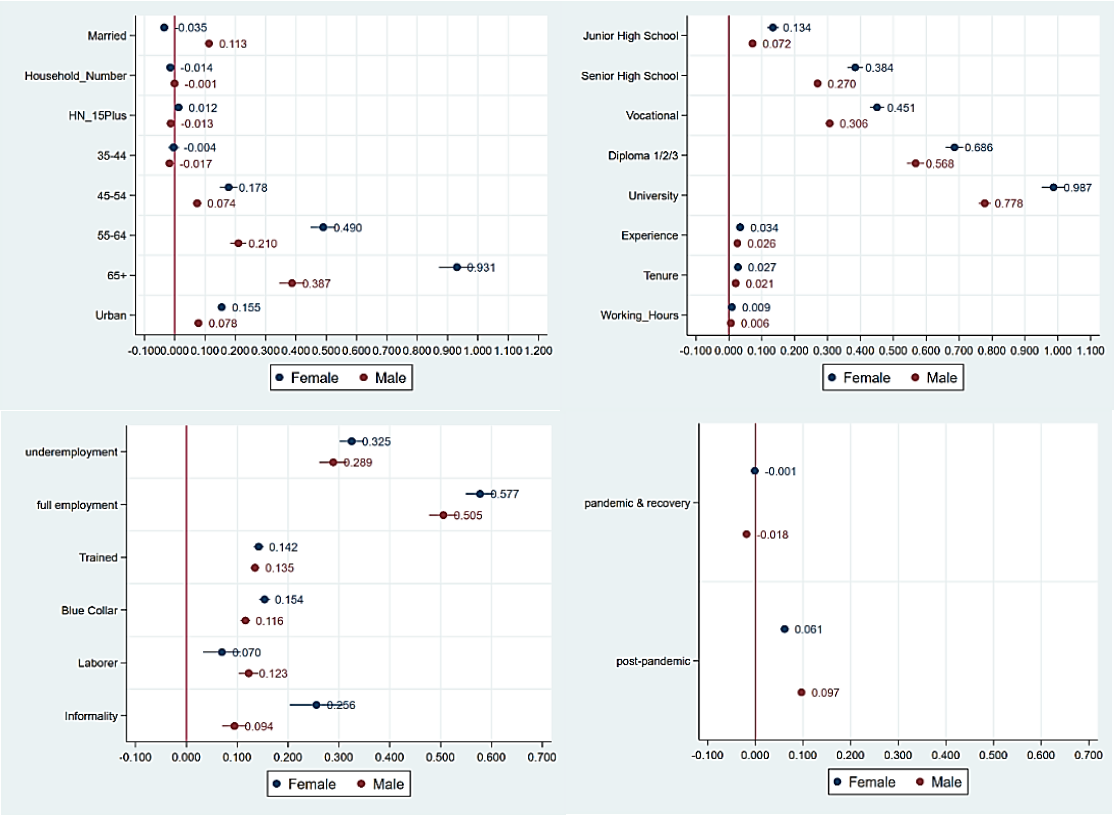


Figure 3. The predictive margin of selective variables of wage equation by gender (pool sample)

Source: Author's calculation

The negative coefficient for education in the explained component of the wage regression indicates that excluding education from the model would increase the gender wage gap by approximately 9.14 percent. This suggests that education has played a critical role in reducing the overall wage gap, as women in Indonesia tend to have higher educational attainment than men, positioning them to access higher-paying jobs. Similar findings are reported by Budig et al. (2021), who also emphasize the role of education in reducing gender disparities in earnings. Additionally, other factors such as participation in job training, as well as women's involvement in formal, white-collar, and stable full-employment roles, have further contributed to narrowing the wage gap during this period. However, despite these contributions, a significant portion of the wage differential remains unexplained.

The decomposition across the wage distribution reveals that the largest wage differentials occur at the lower end of the wage scale, with the gap progressively narrowing at higher wage levels. This pattern suggests that the gender wage gap is predominantly an issue for low-paid workers, driven by factors such as occupational segregation, caregiving responsibilities, and reduced bargaining power among women. Studies such as those by Blau & Kahn (2017) similarly document that women, particularly in developing economies, are overrepresented in low-paying sectors like caregiving, retail, and hospitality, which offer limited opportunities for upward mobility. In contrast, men are more likely to occupy higher-paying jobs in industries such as manufacturing and construction.

At the lower end of the wage distribution, 30-40 percent of the gap is explained by observable characteristics such as work experience, where women generally have less experience than men. However, at the upper end of the distribution, nearly all of the wage gap remains unexplained, with negative signs in the unexplained component indicating that, even with better qualifications, women continue to earn less than men in higher-paying positions. This reflects both the "sticky floor" and "glass ceiling" phenomena, where women are disproportionately confined to the lower end of the wage scale and face significant barriers to breaking into higher-paying roles, despite their qualifications. The persistence of these structural barriers is well-documented in the literature, with authors such as Arulampalam et al. (2007) and Goldin (2014) highlighting the dual constraints of occupational immobility and gender-based discrimination that limit women's access to high-paying roles.

Table 4. Oaxaca-Blinder Decomposition of Wage Gaps, 2018-2023

	Pre-pandemic (2018-2019)		Pandemic (2020-2022)		Post Pandemic (2023)	
1. Gender differential						
Mean male log(wage)	14.56***		14.53***		14.70***	
	(0.0118)		(0.0106)		(0.0110)	
Mean female log(wage)	14.19***		14.18***		14.30***	
	(0.0164)		(0.0157)		(0.0157)	
Log (wage) difference	0.368***		0.357***		0.401***	
	(0.00623)		(0.00671)		(0.00779)	
2. Aggregate decomposition	Endowment	Structural	Endowment	Structural	Endowment	Structural
Total	0.117***	0.251***	0.0993***	0.258***	0.129***	0.272***
	(0.00366)	(0.00473)	(0.00443)	(0.00432)	(0.00578)	(0.00499)
Share of the total gap (%)	31.79	68.21	27.82	72.18	32.17	67.83
3. Detailed decomposition						
Married	0.00470***	0.0822***	0.00561***	0.105***	0.00425***	0.101***
	(0.000348)	(0.00527)	(0.000571)	(0.00602)	(0.000631)	(0.00609)
Household Member	-0.000263	0.0457***	-0.000444**	0.0581***	-0.000154	0.0619***
	(0.000189)	(0.0145)	(0.000186)	(0.0105)	(0.000275)	(0.0169)

	Pre-pandemic (2018-2019)		Pandemic (2020-2022)		Post Pandemic (2023)	
Household	0.000158*	-0.0760***		-		-
			0.000207*	0.0823***	0.000114	0.0647***
Member 15+	(8.91e-05)	(0.0126)	(0.000112)	(0.0114)	(8.99e-05)	(0.0201)
Education	-0.0958***	-0.0877***				-
			-0.112***	-0.110***	-0.111***	0.0952***
	(0.00293)	(0.0106)	(0.00324)	(0.0120)	(0.00365)	(0.0143)
Age Groups	0.00573***	-0.0610***		-		-
			0.00167***	0.0589***	-0.000114	0.0408***
	(0.000874)	(0.00942)	(0.000626)	(0.0118)	(0.00110)	(0.0135)
Experience &	0.0382***	-0.0313*	0.0427***	-0.0350	0.0444***	-0.0523**
Tenure	(0.00142)	(0.0186)	(0.00165)	(0.0223)	(0.00246)	(0.0221)
Working Hours	0.0302***	-0.0871***	0.0380***	-0.140***	0.0315***	-0.154***
	(0.000978)	(0.0125)	(0.00124)	(0.0146)	(0.00147)	(0.0173)
Full Employment	0.0408***	-0.107***	0.0505***	-0.00888	0.0478***	-0.192***
	(0.00120)	(0.0244)	(0.00160)	(0.0158)	(0.00179)	(0.0289)
Trained	-0.00642***	4.42e-05	-0.00975***	-0.00150	-0.0102***	-0.00319
	(0.000405)	(0.00128)	(0.000494)	(0.00161)	(0.000619)	(0.00301)
White collar	-0.0252***	-0.00749*		-		
			-0.0320***	0.00966**	-0.0273***	-0.0165***
	(0.00129)	(0.00410)	(0.00139)	(0.00390)	(0.00198)	(0.00446)
Laborer	-0.0109***	0.133**	-0.0142***	0.119	-0.00817***	0.287***
	(0.00118)	(0.0662)	(0.00140)	(0.0738)	(0.00165)	(0.108)
Formal	-0.00862***	-0.156***	-0.0106***	-0.114***	-0.0140***	-0.185***
	(0.00146)	(0.0299)	(0.00177)	(0.0312)	(0.00196)	(0.0478)
Urban	-0.00523***	-0.0601***		-		-
			-0.00405***	0.0509***	-0.00317***	0.0328***
	(0.000386)	(0.00479)	(0.000376)	(0.00568)	(0.000396)	(0.00694)
Industry	0.143***	0.108***	0.133***	0.0656***	0.167***	0.0963***
	(0.00299)	(0.0171)	(0.00267)	(0.0171)	(0.00362)	(0.0208)
Province	0.00685***	-0.0891***	0.0103***	-0.107***	0.00787***	-0.0550**
	(0.00157)	(0.0189)	(0.00118)	(0.0183)	(0.00184)	(0.0247)

Note: Standard errors in the parentheses; *** statistically significant at 1 percent level of significance. ** statistically significant at 5 percent level of significance. * statistically significant at 10 percent level of significance; the weight of the survey was used for estimation

3.2.2. During the pandemic

The estimation results presented in Table 3 reveal a slight reduction in the wage gap during the pandemic, with the unadjusted gap declining to 30.02 percent. However, after controlling for observable characteristics, the adjusted wage gap increased to 22.74 percent. This observed contraction in the wage gap is consistent with the findings of Panjaitan (2023) and can be attributed to various factors, including employment losses in lower-wage sectors, government wage subsidy programs, the transition to remote work, and reductions in high-income bonuses and overtime pay.

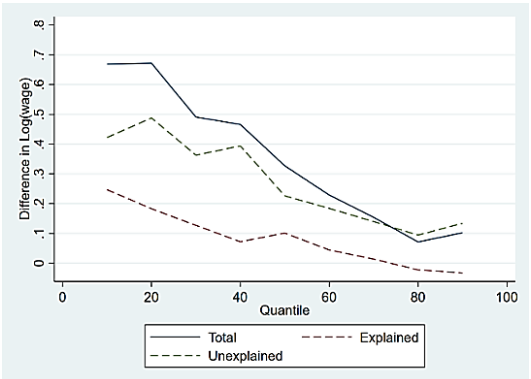
The pandemic disproportionately affected industries with a higher concentration of lower-wage jobs, which are often dominated by female workers. As these sectors experienced significant

job losses, the remaining workforce—comprising both men and women—was concentrated in higher-paying sectors, contributing to the narrowing of the overall wage gap. This outcome is consistent with the broader literature that highlights how structural shifts in employment can temporarily compress wage disparities during economic disruptions (Blundell et al., 2020). Additionally, the wage subsidies provided by the Indonesian government, which supported approximately 12.1 million employees by December 2022 (Liputan6.com, 2022), likely played a role in mitigating income inequality during this period, as suggested in similar analyses of wage subsidy impacts (Köhler et al., 2022).

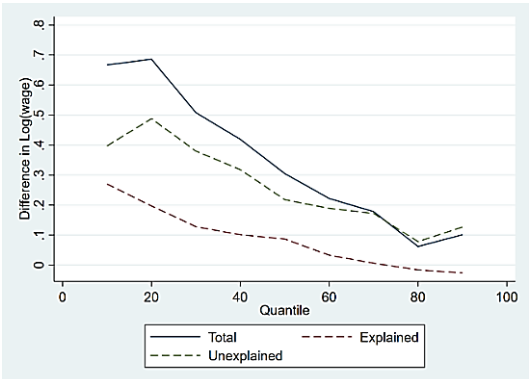
The shift to remote work also introduced greater flexibility in the labor market, particularly benefiting women, who are often burdened with disproportionate caregiving responsibilities. Remote work arrangements allowed women to remain employed or avoid transitioning into lower-paid positions, thereby improving or maintaining their relative earnings compared to men. This phenomenon is supported by findings in the literature, which show that flexibility in work arrangements tends to reduce gender wage disparities (Weeden, 2005), particularly during crises. Additionally, reductions in bonuses, commissions, and overtime pay—more prevalent in high-income, male-dominated roles—likely contributed to the contraction of the wage gap during this period.

However, the pandemic also saw an increase in the unexplained component of the wage gap, as shown in Table 4 and across the wage distribution in Figure 4. The rising dominance of unexplained factors suggests that gender-based discrimination may have intensified during the pandemic. Such forms of discrimination likely manifested through biased hiring, promotion, and compensation decisions, as employers may have relied on stereotypes or perceived risks associated with female employees. Similar findings have been noted in studies examining the exacerbation of gender inequalities during economic downturns, where discriminatory practices become more pronounced (Hupkau & Petrongolo, 2020; Reichelt et al., 2021).

(a) All periods 2018-2023



(b) Pre-pandemic (2018-2019)



(c) Pandemic (2020-2023)

(d) Post-pandemic (2023)

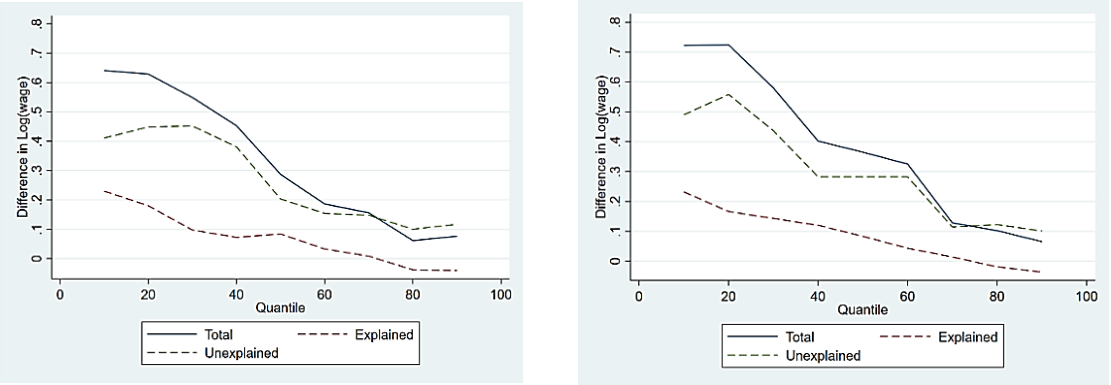


Figure 4. Gender wage gap decomposition across the wage distribution by the period of pandemic

Source: Author's calculation

3.2.3. Post-pandemic

After the pandemic, the gender wage gap not only returned to pre-pandemic levels but also widened further. Our estimations reveal that the overall wage gap increased to 33.03%, and even after controlling for relevant variables, it rose to 23.81%, both figures exceeding those observed prior to the pandemic. This widening was evident both at the mean level and across the entire wage distribution (Figure 4).

This deterioration in the wage gap can be attributed to several factors. One key explanation is the uneven recovery of industries, with sectors in which women are overrepresented—such as healthcare, education, and service industries—experiencing slower recovery or undergoing long-term structural shifts, while male-dominated sectors, including construction and manufacturing, recovered more rapidly. Research has shown that industries traditionally employing a larger share of women have been slower to bounce back from the economic shock of the pandemic, contributing to the persistence of gender wage disparities (Alon et al., 2020; ILO, 2022). Additionally, the long-term career impact on women who took time off or reduced their working hours to assume caregiving responsibilities during the pandemic has been profound, making it more difficult for them to re-enter the workforce or regain pre-pandemic earnings, as also evidenced in previous studies (Neetha, 2021).

The increase in the wage gap may also reflect the reinforcement of traditional gender roles, with women disproportionately taking on household and caregiving responsibilities during the pandemic. Studies indicate that such dynamics tend to depress women's labor market participation and earning potential, as they may face greater barriers to career advancement compared to men who did not take on the same level of caregiving responsibilities (Collins et al., 2021).

Moreover, the contribution of the "explained" portion of the wage gap—differences in observable characteristics between men and women—has grown compared to the pre-pandemic

period (Tables 4). This suggests that while structural discrimination remains a critical factor, disparities in measurable attributes such as education, work experience, and industry representation have become more influential in driving wage inequality post-pandemic. Studies examining post-pandemic labor market outcomes similarly highlight the growing role of observable factors in explaining gender wage gaps (Hupkau & Petrongolo, 2020; Shibata, 2021).

In light of these findings, addressing both structural barriers and the disparities in industry recovery and caregiving responsibilities will be essential in narrowing the persistent gender wage gap.

4. Conclusion and Recommendations

This study analyzes the gender wage gap in Indonesia across three periods—pre-pandemic (2018-2019), pandemic (2020-2022), and post-pandemic (2023)—both at the mean and across the wage distribution. The results show that the gender wage gap decreased slightly during the pandemic but rose post-pandemic, surpassing pre-pandemic levels. Despite fluctuations, the wage gap remained significant, averaging around 30 percent, and narrowing to 23 percent after controlling for wage determinants. Decomposition analysis reveals that most of the gap is driven by unexplained factors, indicating persistent discrimination against women in the labor market. Observable factors such as work experience, tenure, and hours worked contributed to the gap, though women's higher educational attainment and increased participation in the formal and white-collar sectors helped mitigate it. The wage gap is particularly prevalent among low-paying jobs, with "sticky floor" and "glass ceiling" effects persisting post-pandemic.

To address the wage gap, this study recommends enhancing women's skills through education and workforce training, particularly in STEM fields, and encouraging equal access to leadership roles. Strengthening labor regulations, such as paid maternity leave, and providing supportive workplace facilities are essential to retaining women in the workforce. Additionally, promoting gender equality in caregiving responsibilities is critical for creating a more equitable labor market.

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