

Trapped in the Grip of Income Vulnerability: Who Earns Below or Above the Minimum Among Indonesian Gig Workers?

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Abstract

The development of the gig economy in the digital era has opened up new opportunities in the job market. Jobs in this era offer flexibility in time, location, and work patterns. However, this flexibility also presents challenges in the form of income vulnerability. In general, gig workers are classified as informal workers, a category that is expected to remain dominant in the Indonesian workforce structure until 2024. Their proportion exceeds 50 percent and has even increased recently. Vulnerability will become even more apparent in 2025, when nearly 87 percent of regions in Indonesia will have self-employed workers in the service sector with an average monthly income below the minimum wage. Although several studies have highlighted the gig worker phenomenon in Indonesia, unfortunately, none have examined gig worker income vulnerability simultaneously at the individual, household, and regional levels. This study aims to analyze the determinants of gig worker income vulnerability in Indonesia. The research was conducted in stages, at three levels: individual, household, and regional, using a hierarchical logistic regression approach and drawing on data from the February 2024 Sakernas. The analysis results indicate that male gig workers, those with spouses, and those with work experience have a lower risk of earning below the minimum wage. Conversely, gig workers living in households with four or more members are at greater risk. Furthermore, high open unemployment and regional inflation further increase the risk of gig workers earning below the minimum wage. These findings confirm that gig worker vulnerability is not solely an individual issue, but is also influenced by household conditions and regional macroeconomic dynamics. Therefore, the government needs to design social protection policies, adaptive wage regulations, and skills development programs to protect gig workers better and increase their competitiveness. Furthermore, the government is expected to strengthen labor market stabilization and inflation control at the regional level.

Keywords: Gig economy, gig workers, income vulnerability, minimum wage.

1. Introduction

In today's digital era, technological developments and the emergence of online platform infrastructure have revolutionized the way organizations work by creating a temporary, task-based labor market governed by applications and algorithms (Liu & Yin, 2024). The e-Conomy SEA (2024) report shows that the Gross Merchandise Value (GMV) of Indonesia's digital economy has nearly

tripled, from USD 27 billion in 2018 to USD 90 billion in 2024, reflecting the rapid expansion of digital platform-based economic activities across various sectors. This transformation has given rise to a new form of economic activity known as the gig economy, a work system mediated by digital platforms where the relationship between workers and users is temporary, flexible, and demand-based (Woodcock & Graham, 2020). Stanford (2017) attempts to identify the characteristics of the gig economy, including: (1) Work is performed based on client requests; (2) Wages are paid not based on hours worked, but on the size of the work output; (3) Workers provide their own means of production; (4) Intermediaries connect workers and clients; (5) The mediator connecting workers and clients is a digital platform. Thus, the gig economy represents a shift from traditional employment relationships to a flexible work model mediated by digital technology, with work risks and responsibilities largely shifted to the individual worker.

Workers involved in the gig economy are referred to as gig workers. Gig workers are individuals who earn income through a series of short-term tasks without a formal, ongoing employment contract and rely on platform algorithms to access jobs, determine wages, and receive performance appraisals (Woodcock & Graham, 2020; Wiener et al., 2023). In the Indonesian context, Permana et al. (2022) employed the National Labor Force Survey (Sakernas) data as an empirical approach, selecting occupational indicators based on findings and definitions from various previous international studies. In Sakernas' data, gig workers are identified as self-employed workers in the service sector, including transportation and warehousing, information and communication, financial and insurance services, real estate, corporate services, education, healthcare, and other services. However, the identification does not stop there, as a person can only be categorized as a gig worker if a digital platform mediates their work activities. Therefore, further classification is carried out by adding the criterion that the individual uses the internet in their primary job, specifically to sell goods or services through a marketplace website/app (Permana et al., 2022).

The gig economy ecosystem has opened up new opportunities in the job market by offering flexibility in time, location, and work patterns (Li et al., 2025; Kurian & Bindu Madhavi, 2024). However, this flexibility also presents challenges in the form of income vulnerability. Empirical studies demonstrate that algorithmic management enhances platform control over task allocation, performance assessment, and incentives, thereby intensifying income uncertainty and widening the power asymmetry between workers and platforms (Kadolkar et al., 2025). Gig workers are often categorized in various literature as part of the informal workforce, meaning workers without formal employment relationships and social protections, which makes their incomes more uncertain and vulnerable to economic shocks (Sultana et al., 2022; Zhang et al., 2023). This condition is also reflected in Indonesia's employment structure, where the proportion of informal workers consistently dominates the national labor market. Based on Figure 1a, throughout the 2020–2024 period, the percentage of informal workers remained at around 59–60 percent, significantly higher than the formal workforce, which was only around 40 percent (BPS, 2025a). This dominance of the informal sector demonstrates the still low level of employment formalization and job protection in Indonesia, making worker groups, including gig workers, increasingly vulnerable to income fluctuations and economic uncertainty. This vulnerability becomes even more apparent in 2025, when nearly 87 percent of provinces in Indonesia

will have a proportion of self-employed workers in the service sector with an average monthly income below the provincial minimum wage (UMP), as seen in Figure 1b (BPS, 2025b). This pattern suggests that wage inequality extends not only between individuals but also between regions, with most regions dominated by the service sector experiencing low productivity and minimal levels of formal work. This condition indicates that gig workers in most provinces operate in a work ecosystem that is unable to guarantee a decent income in accordance with applicable minimum standards.

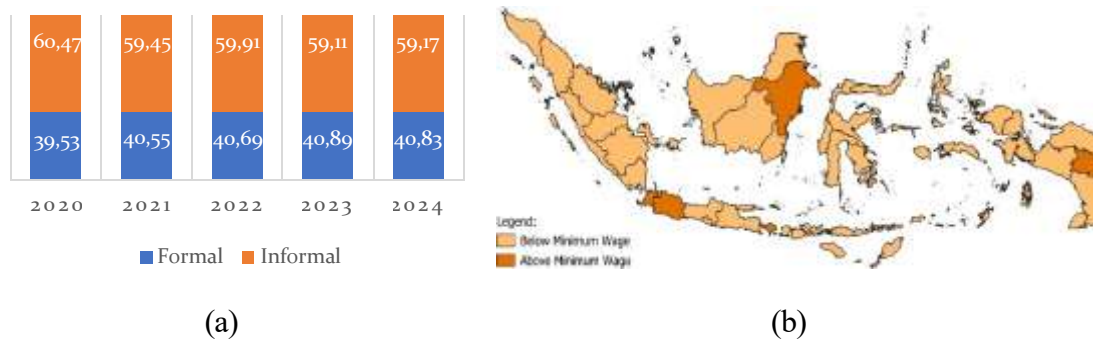


Figure 1. Labor Market Conditions in Indonesia: (a) Proportion of Formal and Informal Workers, 2020–2024; and (b) Distribution of Average Net Salary of Self-Employed Workers in the Service Sector to Minimum Wages, 2025

Source: BPS (2025)

Low wages directly impact the risk of poverty and reduce household welfare, especially among informal workers who lack social protection (Hasanah et al., 2024). Gender is a factor that consistently influences wage levels across countries. Research by Toczec et al. (2021) reveals a significant gender pay gap in Germany, where men consistently earn higher daily earnings than women throughout their working life cycle. Similar results were found by Danquah et al. (2021) in Ghana, confirming that gender wage differences impact women's welfare and empowerment within the household. In Indonesia, Akbar (2022) also found a gender-based wage gap in the informal sector, where women tend to receive lower wages than men. In addition to gender, spouse ownership is also an individual factor suspected of influencing wage vulnerability. Previous studies have found that spouse ownership is often associated with differences in labor income levels through a mechanism known as the marital wage premium. Theoretically, Pilossoph & Wee (2021) explain that selection into marriage and the household search process can generate a wage premium for married individuals due to risk pooling, changes in reservation wages, and increased career stability and acceleration, which encourage higher productivity compared to unmarried individuals. Empirical evidence in Indonesia shows a similar pattern. Akbar (2022) found that having a spouse has a positive influence on wages, with workers who have spouses ending up earning relatively higher incomes than those without spouses. Another individual factor suspected of influencing wage vulnerability is work experience. Work experience is a key component of human capital theory, playing a crucial role in determining labor wage levels. A recent review by Chiswick (2023) confirmed that the Mincerian earnings function model consistently finds a positive relationship between work experience and earnings. In the Indonesian context, similar results were also demonstrated by Putranto et al. (2024), who analyzed the gap between education and the labor market. The study highlighted that work experience, particularly experience relevant to the

occupational field, positively contributes to wage increases and helps reduce skill mismatch in the national labor market.

Beyond the individual level, household and regional characteristics are also suspected to be related to gig workers' wage earnings. The household factor in question is family size. Theoretically, a larger family size implies greater consumption needs and the burden of economic responsibilities that must be met, potentially resulting in lower per capita income and slower human capital accumulation and intergenerational economic mobility (Mu & Chen, 2022). Empirical results indicate a negative relationship between family size and economic well-being. Studies in Indonesia also show a similar pattern. For example, a study in Bandar Sari Village, Way Kanan Regency, found that the larger the household size, the lower the per capita income and the higher the probability of poverty (Marsela & Mulyani, 2024). Meanwhile, regional factors include unemployment and inflation rates. A study by Jokinen (2020) found that local unemployment has a significant impact on worker wages, with a tendency for lower wages in areas with higher unemployment rates. On the other hand, research by Jordà & Nechio (2023) shows that while high inflation can drive nominal wage increases, these increases are generally unable to keep pace with the rate of inflation, leading to a decline in workers' real wages. This finding indicates that macroeconomic dynamics at the provincial level have the potential to exacerbate income inequality and amplify the risk of wage vulnerability.

Various national studies have examined employment dynamics in the gig sector in Indonesia. For example, Prestianawati et al. (2023) analyzed the determinants of the workforce's desire to work in the gig sector; Sitorus & Kornitasari (2024) studied the vulnerability of gig workers; and Natalia & Putranto (2023) examined poverty among gig workers, particularly the likelihood of gig workers experiencing extreme poverty. Although several studies have highlighted the gig worker phenomenon in Indonesia, none have examined the income vulnerability of gig workers, particularly through a simultaneous analysis at the individual, household, and regional levels. Therefore, this study differs from previous studies in that it aims to address this research gap by making several novel contributions. First, this study examines the income vulnerability of gig workers in relation to the provincial minimum wage. Second, this study simultaneously combines individual, household, and regional factors within a hierarchical framework. Therefore, this study aims to analyze the determinants of income vulnerability of gig workers in Indonesia. The results are expected to provide a comprehensive empirical picture of the factors influencing gig workers' chances of earning wages below or above the provincial minimum wage, as well as inform the formulation of more inclusive employment and social protection policies for workers in the gig economy ecosystem.

2. Research method

2.1. Data and Data Sources

This study uses data from the 2024 National Labor Force Survey (Sakernas) sourced from BPS. The unit of analysis in this study is individuals identified as gig workers. Individuals are classified as gig workers when: (1) Aged 15 years and above/workforce; (2) Working; (3) Self-employed; (4) Working in the service sector, namely transportation and warehousing [code 8], information and

communication [code 10], financial and insurance services [code 11], real estate [code 12], corporate services [code 13], education services [code 15], health services [code 16], and [code 17]; (5) Using the internet in their main job; and (6) Using the internet to sell goods/services through marketplace websites/applications. Meanwhile, the research variables can be shown in Table 1.

Table 1. Research Variables

	Variables	Category	Code	Scale
Dependent	Income Status	Below Minimum	1	Nominal
		Above Minimum	0	
Independent	Sex	Male	1	Nominal
		Female ^{r)}	0	
	Spouse Ownership	Have a Spouse	1	Nominal
		Don't Have a Spouse ^{r)}	0	
	Work Experience	Have Work Experience	1	Nominal
		Have No Work Experience ^{r)}	0	
	Family Size	ART < 4	1	Nominal
		ART ≥ 4 ^{r)}	0	
	Unemployment Rate			Numeric
	Inflation			Numeric

Note: ^{r)} Reference Category

Source: BPS (2024)

2.2. Hierarchical Logistic Regression

Hierarchical logistic regression is a development of logistic regression used to examine the relative contribution of a group of independent variables entered in a blockwise entry to a dependent variable (Field, 2018; Pampel, 2000). This approach enables a study to evaluate the extent to which adding new variables at each stage enhances the model's ability to predict the probability of an event occurring (Pituch & Stevens, 2015).

Because the dependent variable in this study is dichotomous (1 = income below the minimum; 0 = income above the minimum), hierarchical binary logistic regression was used. This model is specifically designed to model the relationship between a single binary dependent variable and one or more independent variables, which can be either numeric or categorical (Pampel, 2000). The analysis was conducted by building the model in a step-by-step manner.

1. Model 1: Contains individual-level variables, including gender, spouse ownership, and work experience. Model 1 is shown in equation (1).

$$\ln \ln \left(\frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 \text{Sex}_i + \beta_2 \text{Spouse}_i + \beta_3 \text{Experience}_i \quad (1)$$

2. Model 2: Adds a household-level variable, namely family size. Model 2 is presented in equation (2).

$$\ln \ln \left(\frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 \text{Sex}_i + \beta_2 \text{Spouse}_i + \beta_3 \text{Experience}_i + \beta_4 \text{ART}_i \quad (2)$$

3. Model 3: Adds regional-level variables, namely unemployment and inflation rates. Model 3 is presented in equation (3).

$$\ln \ln \left(\frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 \text{Sex}_i + \beta_2 \text{Spouse}_i + \beta_3 \text{Experience}_i + \beta_4 \text{ART}_i + \beta_5 \text{Unemployment}_i + \beta_6 \text{Inflation}_i \quad (3)$$

The significant value of the coefficient β_j in logistic regression is generally interpreted through the odds ratio (OR) obtained by performing an exponential transformation on the regression coefficient, so that $OR = e^{\beta_j}$. The odds ratio value indicates the magnitude of the change in the relative probability of an event occurring due to a one-unit increase in the predictor variable, assuming the other variables are constant (Field, 2018; Pampel, 2000).

2.3. Simultaneous Testing

Simultaneous testing is used to assess the overall significance of the model, aiming to determine whether the model containing the independent variables provides a significant improvement in fit compared to the baseline model without these variables (Pituch & Stevens, 2015). The hypotheses used are as follows:

$$H_0: \beta_1 = \beta_2 = \dots = \beta_k = 0$$

$$H_1: \text{There is at least one } \beta_j \neq 0; j = 1, 2, \dots, k$$

This test is conducted using the Likelihood Ratio Test (LRT), also known as the G^2 test statistic. The formula for calculating the G^2 test statistic is as follows:

$$G^2 = -2[\ln \ln (L_0) - \ln \ln (L_1)] \quad (4)$$

Where L_0 is the likelihood value of the baseline model (without predictors) and L_1 is the likelihood value of the model with predictors. The G^2 value follows a chi-square distribution (χ^2) with degrees of freedom equal to the number of independent variables tested. A significant G^2 value ($p < 0.05$) indicates that a set of independent variables simultaneously has a significant effect on the dependent variable, and that the model with predictors provides a significant improvement in fit compared to the baseline model.

2.4. Partial Test

A partial test is conducted to assess the significance of each regression coefficient (β_j) in the model (Azen & Walker, 2021). The hypotheses used are as follows:

$H_0: \beta_j = 0$ (the j -th independent variable is not significant)

$H_1: \beta_j \neq 0$ (the j -th independent variable is significant)

This test is conducted using the Wald test statistic, which is obtained by comparing the estimated regression coefficient and its standard error. The formula for calculating the Wald test statistic is as follows:

$$W = \left[\frac{\beta_j}{SE(\beta_j)} \right]^2 \quad (5)$$

The W value follows a chi-square distribution (χ^2) with degrees of freedom equal to one. A p -value < 0.05 indicates that the j -th independent variable has a significant influence on the probability of the modeled event occurring.

2.5. Model Evaluation

Model evaluation aims to assess the model's suitability in fitting the data. Each model is evaluated using several indicators, such as the Nagelkerke R^2 and classification accuracy. Changes in the Nagelkerke R^2 value are used to assess the increase in the proportion of variation explained by the model after the addition of a variable block. Meanwhile, the classification accuracy measure is used to evaluate the model's predictive accuracy (Field, 2018).

3. Results and Discussion

3.1. Characteristics of Gig Workers' Income Vulnerability in Indonesia

Based on the social vulnerability theoretical framework, vulnerability patterns typically emerge from a combination of interrelated individual, household, and structural factors (Adger, 2006). Therefore, descriptive analysis can help identify emerging vulnerability patterns across groups (Field, 2018). This analysis provides a baseline for understanding the economic and social conditions of gig workers, as well as the factors that may influence their ability to earn a minimum wage. It also provides an empirical context for further inferential analysis. A general overview of the income vulnerability characteristics of gig workers in Indonesia is shown in Table 2.

Table 2. Characteristics of Gig Workers' Income Vulnerability in Indonesia

Variables	Category	Income Status	
		Below Minimum	Above Minimum
Sex	Male	59.76%	40.24%
	Female	69.81%	30.19%
Spouse Ownership	Have a Spouse	60.78%	39.22%
	Don't Have a Spouse	61.42%	38.58%

Variables	Category	Income Status	
		Below Minimum	Above Minimum
Work Experience	Have Work Experience	57.38%	42.62%
	Have No Work Experience	65.90%	34.10%
Family Size	ART < 4	55.61%	44.39%
	ART ≥ 4	67.01%	32.99%

Source: Data Processing Results

Table 2 presents the characteristics of income vulnerability among gig workers in Indonesia. In general, the proportion of gig workers earning below the minimum wage remains dominant across all categories. Based on gender, 69.81% of women earn below the minimum wage, higher than 59.76% of men, indicating a gender-based wage gap in the gig sector. In terms of spouse ownership, the proportion of gig workers without a spouse earning below the minimum wage (61.42%) is slightly higher than that of those with a spouse (60.78%). Meanwhile, based on work experience, gig workers without work experience appear more vulnerable to earning below the minimum wage (65.90%) than those with work experience (57.38%), indicating that work experience still plays a role in increasing the opportunity to earn a living wage. Based on family size, gig workers with larger households (more than four members) have a higher proportion of those earning below the minimum wage (67.01%) compared to those with smaller households (55.61%). These conditions reflect greater economic pressure on households with more dependents.

3.2. Determinants of Gig Workers' Income Vulnerability in Indonesia

Factors suspected of influencing gig workers' income vulnerability need to be proven through parameter significance testing using hierarchical binary logistic regression. The estimated parameters of the regression model are shown in Table 3.

Table 3. Hierarchical Binary Logistic Regression Model Parameter Estimation

Variables	Category	Coef.	S.E.	p	OR
<i>Model 1: Individual Factors</i>					
Sex	Male	-0.322	0.013	<0.001*	0.725
	Female ^{r)}			**	
Spouse Ownership	Have a Spouse	-1.412	0.013	<0.001*	0.244
	Don't Have a Spouse ^{r)}			**	
Work Experience	Have Work Experience	-0.665	0.008	<0.001*	0.514
				**	

Variables	Category	Coef.	S.E.	p	OR
	Have No Work Experience ^{r)}				
Likelihood Ratio Test (G^2)				<0.001***	
Nagelkerke R^2				0.097	
Classification Accuracy (%)				63.35	
Model 2: Individual + Household Factors					
Sex	Male	-1.007	0.016	<0.001* **	0.365
	Female ^{r)}				
Spouse Ownership	Have a Spouse	-1.799	0.015	<0.001* **	0.166
	Don't Have a Spouse ^{r)}				
Work Experience	Have Work Experience	-1.002	0.009	<0.001* **	0.367
	Have No Work Experience ^{r)}				
Family Size	ART < 4	-0.546	0.008	<0.001* **	0.579
	ART ≥ 4 ^{r)}				
Likelihood Ratio Test (G^2)				<0.001***	
Nagelkerke R^2				0.231	
Classification Accuracy (%)				66.15	
Model 3: Individual + Household + Regional Factors					
Sex	Male	-1.072	0.016	<0.001* **	0.342
	Female ^{r)}				
Spouse Ownership	Have a Spouse	-1.771	0.015	<0.001* **	0.170
	Don't Have a Spouse ^{r)}				
Work Experience	Have Work Experience	-1.025	0.009	<0.001* **	0.359
	Have No Work Experience ^{r)}				
Family Size	ART < 4	-0.534	0.008	<0.001* **	0.587
	ART ≥ 4 ^{r)}				

Variables	Category	Coef.	S.E.	p	OR
Unemployment Rate		0.054	0.003	<0.001* **	1.055
Inflation		1.428	0.015	<0.001* **	4.169
Likelihood Ratio Test (G^2)			<0.001***		
Nagelkerke R^2			0.266		
Classification Accuracy (%)			70.99		

Notes: ¹⁾ Reference Category; *** Significant at the 1% significance level

Source: Data Processing Results

Table 3 shows that Model 3 was the best model, selected based on statistical test results and overall improved model fit compared to the two previous models. Empirically, Model 3 demonstrated the highest Nagelkerke R^2 value (0.266), indicating that this model explained a greater proportion of the variation in gig workers' income vulnerability than Model 1 (0.097) and Model 2 (0.231). Furthermore, Model 3 achieved an increase in classification accuracy of up to 70.99%, indicating improved predictive ability in distinguishing between gig workers with incomes below and above the minimum wage. Substantively, Model 3 is also more comprehensive because it not only considers individual and household characteristics but also includes regional factors such as unemployment and inflation rates.

Based on partial testing of Model 3, it was demonstrated that gender, spouse ownership, work experience, family size, unemployment rate, and inflation significantly influence the income vulnerability of gig workers in Indonesia. These findings suggest that gig workers' income vulnerability is not only determined by individual characteristics but also influenced by structural conditions at the household level and the regional macroeconomic context in which they work. This condition means that while individual and household factors, such as gender, work experience, spouse ownership, and family size, play a significant role, regional labor market dynamics, such as unemployment rates and inflation, also significantly influence gig workers' chances of earning a living wage.

Gender significantly influences gig workers' income vulnerability, with an OR of 0.342, indicating that male gig workers are less likely to earn below the minimum wage than female workers. This finding is consistent with various studies confirming the persistence of gender-based income disparities in the gig economy. Cook et al. (2021) found that wage disparities between men and women persist even in algorithmic work systems that claim to be gender-neutral. This phenomenon is caused by differences in preferences for working hours, location, and task acceptance strategies on the platforms. Research by Dong et al. (2024) further strengthens this evidence by showing that the flexibility offered by platforms does not automatically reduce the gender gap, as women often choose jobs with shorter hours and lower risks, which are generally lower paid. Furthermore, women's greater burden of domestic responsibilities limits their ability to utilize peak working hours or take on more orders, ultimately impacting their income (Rodríguez-Modroño et al., 2022). Furthermore, Vallas & Schor (2020) suggest that biased trust in women's abilities remains a barrier to assignments and

performance appraisals on many digital job platforms. This condition is due to algorithms and users tending to place more trust in male workers for jobs perceived as requiring technical skills. Overall, these results confirm that income vulnerability in the gig economy is influenced not only by labor market mechanisms but also by social structures, algorithmic bias, and gender norms that remain deeply embedded in digital platform-based flexible work systems.

Spouse ownership also significantly impacts gig workers' income vulnerability, with an OR of 0.170, indicating that spoused gig workers are less likely to earn below the minimum wage than those without a spouse. This finding aligns with the marital wage premium theory, which emphasizes the income benefits earned by married or spoused individuals through mechanisms such as selection, social support, and economic coordination within the household. Pilossoph & Wee (2021) assert that the process of household search and household formation allows spouses to obtain a wage premium due to the stability and economic efficiency of the division of household labor. Similar results were also found by Olivo-Villabrille (2022), who showed that after marriage, working hours increased by approximately 25% and weekly wages increased by approximately 13%, confirming the positive effect of spouse ownership on income through increased work participation and productivity. Consistent with these results, findings in Indonesia by Sihombing (2022) indicate that married individuals and those with spouses have higher average wages and longer working hours than those without a spouse. Overall, these results reinforce the view that spousal ownership plays a significant role in reducing gig workers' income vulnerability through social support, economic stability, and risk sharing at the household level.

Furthermore, work experience significantly impacted gig workers' income vulnerability with an OR of 0.359, indicating that gig workers with work experience are less likely to earn below the minimum wage than those without. These results are consistent with human capital theory, which emphasizes that work experience is a form of productive investment that improves skills, efficiency, and adaptability in the labor market. Chiswick (2023) explains that work experience provides positive returns to wages due to the accumulation of specific knowledge and increased productivity over time. Empirical studies in Indonesia also show similar results Putranto et al. (2024), which found that relevant work experience significantly increases workers' chances of earning above-average wages. In addition to improving technical skills, work experience can also improve job-matching efficiency and increase workers' earnings in flexible jobs (Yang et al., 2023). Thus, work experience is a crucial factor in strengthening the economic resilience of gig workers by increasing productivity and efficiency in digital platform-based work systems.

Family size is a household factor that significantly influences gig workers' income vulnerability, with an OR of 0.587. This finding means that gig workers living in households with fewer than four members are less likely to earn an income below the minimum wage than those living in households with more than four members. Larger family sizes increase consumption needs and dependent burdens, resulting in greater pressure on income and lower per capita welfare. Mu & Chen (2022) demonstrated that large family sizes have a negative impact on intergenerational income mobility, particularly in low-income areas, due to increased economic burdens and a decline in the quality of human capital investments within the household. Similar findings were presented by Bitana et al. (2024), who found

that in lower-middle-income countries, increasing family size leads to a greater proportion of household income being diverted to consumption rather than savings, thereby reducing overall economic welfare. Therefore, larger family sizes increase workers' vulnerability to economic pressures, particularly in the informal and flexible sectors, which lack stable incomes and adequate social protection.

Regional factors, including unemployment rates and inflation, have been found to impact the income vulnerability of gig workers significantly. The unemployment rate, with an OR of 1.055, indicates that the higher the unemployment rate in the area where gig workers live, the more vulnerable they are to earning below the minimum wage. As unemployment rises, more individuals turn to the gig sector as an alternative source of income, increasing the labor supply in the online marketplace and intensifying competition among workers (Huang et al., 2020). Under these conditions, workers' bargaining power for decent wages weakens. This finding aligns with the wage curve, which shows that areas with higher unemployment rates tend to have lower real wages (Blanchflower & Oswald, 2005). Therefore, increased regional unemployment can depress wages, especially for gig workers in structurally weak positions, increasing their likelihood of earning below the minimum wage. Meanwhile, inflation, with an OR of 4.169, indicates that the higher the inflation in the area where gig workers live, the more vulnerable they are to earning below the minimum wage. Consistent with the findings of Pérez Pérez (2020) research, workers at the bottom of the income distribution, particularly in the informal sector, do not receive adequate wage adjustments when prices rise. Therefore, when inflation causes a rise in the cost of living, low-income workers become more vulnerable to real income declines below the minimum wage.

Overall, the results of this study confirm that individual characteristics do not solely determine the income vulnerability of gig workers in Indonesia; instead, they are also influenced by household factors and regional-level structural conditions. Therefore, this study provides a more comprehensive understanding of the determinants of gig workers' income vulnerability by simultaneously integrating individual, household, and regional factors. However, this study still has several limitations, particularly related to the empirical definition of gig workers used. The concept of gig workers in this study is still based on an identification approach derived from questions in the National Labor Force Survey (Sakernas), as Indonesia currently lacks an official survey specifically designed to identify gig workers. Therefore, the estimation results are potentially subject to measurement bias. However, this approach is expected to provide a useful empirical picture of income vulnerability patterns in the digital platform-based work sector.

4. Conclusion and Recommendations

This study provides empirical evidence that gender, spouse ownership, work experience, family size, unemployment rate, and inflation influence the income vulnerability of gig workers in Indonesia. The analysis reveals that male gig workers, those with spouse, and those with work experience are less likely to earn below the minimum wage. Conversely, gig workers living in households with four or more members are more vulnerable to earning below the minimum wage. Furthermore, high regional

unemployment and inflation rates exacerbate the vulnerability of gig workers' incomes. Thus, gig workers' income vulnerability stems not only from individual characteristics but is also influenced by household conditions and regional macroeconomic dynamics. These findings reinforce the view that a comprehensive employment analysis in the gig sector requires consideration of the broader socioeconomic context, including household factors and regional economic conditions. Both factors have been shown to be important determinants of income stability and the level of vulnerability of gig workers in Indonesia.

From a policy perspective, the government needs to strengthen inclusive social protection regulations for digital platform-based workers. These regulations could include information transparency, clarity on workers' rights and obligations, and occupational safety standards for gig workers. Furthermore, expanding social security coverage and providing flexible insurance access for gig workers are potential policy alternatives. Improving digital literacy and providing adequate adaptive skills training are also crucial to strengthening gig workers' competitiveness in the face of changes in the labor market. Furthermore, macroeconomic policies such as inflation control and formal job creation at the regional level are crucial in reducing economic pressures on gig workers. For further research, the use of specialized microdata that can more comprehensively capture the dimensions of platform-based work is recommended, once such data becomes available.

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