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Exploring the nexus between poverty line, minimum wage, and welfare: Evidence from Indonesia's industrial labor

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Abstract: Despite the industrial sector's critical role in Indonesia's economy, many workers remain trapped in low-welfare categories, influenced by factors such as insufficient access to digital resources, urban-rural disparities, and persistent gender and marital status inequalities. Understanding the determinants of labor welfare in this sector is essential to effectively addressing these disparities. This research examines labor welfare in Indonesia's industrial sector and identifies the key determinants by analyzing individual characteristics. The study uses generalized ordered logit, categorizing three welfare groups: those who are poor and earn below the minimum wage, those who are not poor but earn below the minimum wage, and those who are not poor and earn above the minimum wage. Data from the Survei Sosial Ekonomi Nasional (SUSENAS) provides a comprehensive foundation for the analysis. The findings reveal that internet utilization, urban residency, and age significantly increase the likelihood of being in the highest welfare category, with internet users, urban dwellers, and older workers having higher probabilities of better welfare outcomes. Gender also plays a role, as men are more likely than women to be in the higher welfare categories. Married individuals, conversely, have lower odds of being in higher welfare categories, while education shows no significant impact on welfare status. These findings suggest that enhancing internet access and digital inclusion across the workforce could significantly improve labor welfare, particularly for industrial workers. Additionally, targeted policies addressing the unique challenges of married workers and promoting regional economic equity could ensure broader and more inclusive improvements in worker well-being.
Keywords: Industrial Labor; Minimum Wage; Poverty Line; Welfare
JEL Classification: J21; J31; J38

Introduction

The industrial sector plays a pivotal role in Indonesia's economy, contributing the largest share to the country's GDP. According to recent data, manufacturing and industrial activities accounted for 18.67 percent of Indonesia's GDP in 2023, underscoring its importance as a leading sector with a greater impact than others (BPS – Statistics Indonesia, 2023). This sector not only supports a substantial portion of the workforce but also serves as a major driver of economic expansion, as evidenced by a 0.33 percent increase in its performance in 2023 compared to the previous year. As a result, the industrial sector stands as a cornerstone of national

development and a key area for enhancing productivity and global competitiveness. Given its significance, analyzing labor welfare in this sector is essential to ensure that economic gains translate into improved living standards for workers—the backbone of the industry's success.

A comprehensive examination of the relationship between the minimum wage, poverty line, and worker welfare in the industrial sector is crucial for understanding Indonesia's economic dynamics. Minimum wage—the first factor in this study—is a policy that affects millions of industrial workers. It aims to guarantee a basic standard of living by setting a wage floor. However, its effectiveness depends on several factors, including its alignment with the cost of living and regional economic conditions. Moreover, its impact is not uniform; it varies based on individual characteristics such as education, age, and gender. For instance, younger workers or those with lower educational attainment may experience different outcomes in terms of productivity and income than their more educated or experienced counterparts. Understanding the relationship between the minimum wage and other factors such as the poverty line and productivity can yield deeper insights into the policy's influence on worker welfare and income structures.

Although prior studies have addressed the general impact of minimum wage policies on poverty and labor market outcomes (see Aziz & Husenudin, 2024; Gindling, 2018), limited research in the Indonesian context has examined how regional disparities in minimum wages affect the welfare of industrial workers. Indonesia's economic landscape is marked by significant regional variations in cost of living and industrial activity, making it unclear how such disparities influence the effectiveness of minimum wage policies in alleviating poverty and enhancing worker welfare. Furthermore, the interaction between minimum wage policies and socio-economic factors such as digital access and the urban-rural divide deserves further investigation to inform region-specific strategies for improving labor welfare.

Classical economic theory, as developed by Keynes (1936) and expanded by Galbraith (1975), posits that minimum wage policies can enhance worker welfare by increasing purchasing power, stimulating consumption, and boosting aggregate demand and economic growth. In this view, a well-designed minimum wage can lift workers above the poverty line and promote productivity by encouraging greater economic participation and enhancing job security. In contrast, neoclassical economic theory, as articulated by Neumark & Wascher, 2008), offers a more critical perspective, arguing that labor markets naturally reach equilibrium, where wages reflect the marginal productivity of labor. When minimum wages are set above this equilibrium level, employers may reduce their workforce or working hours to offset increased labor costs—particularly in labor-intensive sectors where labor represents a major share of production expenses.

Efficiency wage theory, proposed by Katz (1986), challenges the neoclassical view by suggesting that higher wages can improve productivity by lowering turnover, enhancing morale, and attracting more skilled labor. Schmillen & Packard (2016) support this theory, showing that above-market wages can boost engagement and productivity. Empirical evidence further supports both classical and efficiency wage theories; for example, Storer

& Reich (2021) found that higher minimum wages in low-wage industries led to greater job satisfaction, reduced turnover, and improved productivity. Employers who pay wages above the poverty line may thus enhance both worker output and well-being, aligning with the theory's assertion that better compensation leads to better performance.

The second factor—poverty line—is a key indicator for measuring poverty and economic inequality in Indonesia. It defines the minimum income required to meet basic needs and serves as a benchmark for evaluating economic well-being. Analyzing the relationship between the poverty line and minimum wage helps assess how effectively wage policies reduce poverty and narrow income disparities. This analysis is especially important for understanding how individual worker characteristics—such as education and experience—affect the risk of falling below the poverty line. Workers with less education or fewer skills are more likely to occupy low-paying jobs that fail to provide sufficient income. Therefore, examining the impact of minimum wage policies on these vulnerable groups offers valuable insight into their effectiveness in tackling poverty and inequality.

Minimum wage and poverty line serve as critical indicators of labor welfare. The minimum wage, as the legally mandated wage floor, directly affects workers' ability to afford basic necessities. When set above the poverty line, it can enable workers to meet essential needs such as food, housing, healthcare, and education. The relationship between the minimum wage and poverty line thus provides a benchmark for assessing whether workers can achieve a decent standard of living—especially in sectors like industry, where wages vary by education, skills, and location.

In developing countries, the effects of minimum wage policies on labor welfare and poverty are highly context-dependent. A study by Maurizio & Vázquez (2016) in Latin America found that higher minimum wages helped reduce poverty by raising incomes and enabling greater investment in health, education, and nutrition—factors that improve productivity. However, the study also noted that such benefits were more pronounced in sectors less susceptible to automation or outsourcing. Other studies have emphasized potential downsides; for example, Jiménez Martínez & Jiménez Martínez (2021) conducted a meta-analysis showing that while some workers gained from wage increases, others—particularly low-skilled workers—faced reduced hours or job loss as employers adjusted to higher labor costs, supporting neoclassical concerns. These findings underscore the variability of outcomes based on sectoral and contextual differences. Additionally, individual characteristics such as education, age, and gender significantly influence labor productivity.

Workers with higher educational attainment tend to be more productive and are thus better positioned to benefit from minimum wage increases, as their productivity aligns with higher compensation (Deming, 2022). Conversely, workers with less education may struggle to meet the productivity demands tied to increased wages, potentially facing job insecurity (Shoss et al., 2023). Age and gender also play crucial roles. Younger, less experienced workers are more vulnerable to displacement, while older workers may enjoy improved job security and earnings (Clemens et al., 2021; Yeung & Yang, 2020). Gender disparities remain salient as well—women, who are often overrepresented in low-

wage sectors, may benefit from wage hikes that narrow the gender pay gap (Schrenker, 2023). However, if job losses occur in sectors dominated by female workers, such as retail and hospitality, the net effect may be negative. Thus, both individual and sector-specific variables must be considered when evaluating minimum wage policy outcomes on productivity and welfare.

Several studies have explored the effects of minimum wage policies in developing countries, particularly in Southeast Asia. For example, Higashikata (2021) examined Indonesia's experience and found that while higher wages improved income levels, they also reduced formal sector employment. In Malaysia, Seow (2023) observed that minimum wage policies reduced income inequality but placed pressure on SMEs coping with increased labor costs. In the Philippines, Håkansta et al. (2024) found that although minimum wage adjustments benefited formal workers, they pushed some into informal employment, increasing vulnerability. These studies reveal the complex trade-offs involved in minimum wage implementation in economies with large informal sectors and regional economic disparities.

This study aims to analyze the relationship between the minimum wage, poverty line, and labor welfare in Indonesia's industrial sector, with particular emphasis on how welfare outcomes vary based on workers' individual characteristics. By identifying disparities across demographic groups—such as gender, age, education, and residence—policymakers can develop targeted strategies to improve livelihoods. Enhancing labor welfare not only fosters inclusive economic growth but also ensures the sector's sustainability by maintaining a healthy, motivated, and productive workforce. This analysis is essential in supporting Indonesia's broader development agenda and its commitment to reducing poverty and inequality in the context of rapid industrialization.

Research Method

This study utilizes data from the *Survei Sosial Ekonomi Nasional* (SUSENAS) 2022, a comprehensive individual-level survey conducted by Indonesia's Central Bureau of Statistics (BPS). SUSENAS provides detailed information on various socio-economic characteristics of the Indonesian population, making it an ideal data source for analyzing labor welfare. The dataset used in this study includes observations from 39,733 laborers, allowing for a robust and detailed examination of the determinants of labor productivity and welfare. The response variable in this study is categorized into three distinct welfare groups, providing a nuanced understanding of how poverty status and wage levels interact to influence labor welfare:

Group 1: Individuals who are poor and earn below the minimum wage (MW)
Group 2: Individuals who are not poor but still earn below MW
Group 3: Individuals who are not poor and earn above MW

This study employs a generalized ordered logistic regression model, which is well-suited for estimating the probability of belonging to one of the three welfare categories based

on various explanatory variables. The model produces estimated coefficients and odds ratios for each predictor, quantifying the likelihood of being in a higher or lower welfare group relative to a reference group, namely "not poor and earning above the minimum wage" (Group 3). The general form of the ordered logistic regression model can be expressed as follows:

$$log\left(\frac{P(Y \leq j)}{P(Y > j)}\right) = \alpha_j + \beta_{1j}Education + \beta_{2j}Internet + \beta_{3j}Age + \beta_{4j}Gender + \beta_{5j}Married + \beta_{6j}Urban + \epsilon_j \qquad (1)$$

where Y is the response variable representing the welfare group (1, 2, or 3). $P(Y \leq j)$ denotes the probability of being in category j or lower, while $P(Y > j)$ represents the probability of being in a higher category than j. The α_j terms are the cut-off points or thresholds that determine the transitions between categories, and the β's are the coefficients for each predictor, assumed to have a consistent effect across all cumulative logits.

The independent variables in the model include education, internet utilization, age, gender, marital status, and residential location (urban vs. rural). These variables were carefully selected based on their relevance and potential influence on workforce well-being in the context of Indonesia's industrial sector. Age was included because it reflects work experience, skill accumulation, and economic stability over time—critical factors in determining job opportunities, earnings, and overall welfare (Li, et al., 2023; Liu & Fleisher, 2022). Younger workers, often at the start of their careers, may lack the skills and experience required for higher-paying roles, making age a key factor in analyzing disparities in welfare outcomes.

Marital status was considered due to its impact on household economic dynamics. Being married often entails greater financial responsibilities, such as supporting a spouse and children, which can place additional pressure on household income (Lee & Dustin, 2021). This makes it an important variable for understanding how family structures and obligations influence an individual's economic well-being and ability to meet basic needs.

Internet utilization was included as it plays a vital role in modern economic productivity and access to opportunities. In the industrial sector, internet access enables workers to enhance their skills, find employment opportunities, and stay informed about industry developments, which can significantly affect their earnings and welfare (Hannola et al., 2018; Holtgrewe, 2014). Additionally, digital connectivity is increasingly important for bridging rural-urban disparities by providing access to resources and opportunities that might otherwise be unavailable in less developed areas (Accordino, 2019; Braesemann et al., 2022).

These variables collectively provide a comprehensive understanding of the diverse factors affecting labor welfare, ensuring that the analysis captures both individual characteristics and broader socio-economic influences.

Result and Discussion

Table 1 presents the distribution of individuals across three welfare categories: Group 1 (poor and earn below the minimum wage), Group 2 (not poor but earn below the minimum wage), and Group 3 (not poor and earn above the minimum wage), for various demographic and socioeconomic variables. The percentages within each group reveal significant patterns. Across all categories, 93.51% of individuals in Group 2 have completed senior high school, while only 1.01% of Group 3 comprises individuals with postgraduate education. This highlights the limited representation of highly educated individuals in the highest welfare category within the industrial sector.

Table 1 Descriptive Statistics of the Labor in Industrial Sector

Variables	Group 1: Poor and earn below MW		Group 2: Not poor but earn below MW		Group 3: Not poor and earn above MW	
	Number	%	Number	%	Number	%
Education						
Not graduated from elementary school	264	6.9	3.474	90.9	85	2.2
Elementary school	540	5.8	8.607	92.9	109	1.2
Junior high school	523	5.9	8.194	93.0	91	1.1
Senior high school	823	5.5	14.033	93.5	151	1.0
Diploma	25	4.4	541	94.9	4	0.7
Undergraduate	119	5.4	2.071	93.7	20	0.9
Postgraduate	0	0	48	97.9	1	2.1
Internet Utilization						
Yes	1.527	5.3	26.938	93.8	257	0.9
No	777	7.1	10.030	91.1	204	1.9
Gender						
Male	1.423	5.9	22.623	93.2	219	0.9
Female	881	5.7	14.345	92.7	242	1.6
Marital Status						
Single	679	5.8	10.789	92.4	204	1.8
Married	1.625	5.8	26.179	93.3	257	0.9
Residence						
Rural	1.209	7.3	15.125	91.5	204	1.2
Urban	1.095	4.7	21.843	94.2	257	1.1

Source: SUSENAS (2022), data processed

Regarding internet utilization, 93.8% of internet users belong to Group 2, while a smaller share (0.9%) transitions to Group 3. This underlines the importance of digital access in improving welfare, but also the barriers to achieving the highest welfare status. Gender distribution shows that males dominate Group 1 (5.9%) and Group 2 (93.2%), but females have a slightly higher presence in Group 3 (1.6%) compared to males (0.9%), indicating subtle gender-based disparities in achieving better welfare outcomes. Marital status

reveals that married individuals predominantly belong to Group 2 (93.3%), with only 0.9% reaching Group 3, which might reflect the financial responsibilities and economic pressures associated with marriage. Finally, urban residents are more likely to be in Group 2 (94.2%) and Group 3 (1.1%) compared to rural residents (91.5% and 1.2%, respectively), emphasizing the role of urban living in providing greater access to opportunities and better welfare outcomes. These findings collectively highlight how education, internet access, gender, marital status, and residential location contribute to welfare disparities within Indonesia's industrial sector.

One key assumption of the ordered logit model is the proportional odds assumption, which requires that the effect of the independent variables on the outcome category is consistent across outcome levels. To evaluate whether this assumption holds, the study conducted the Score Test for the ordered logistic regression model. This assumption implies that the relationship between the predictors and the odds of being in higher versus lower categories of the outcome variable is consistent across all thresholds. Conducting this test is crucial because if the assumption is violated, as indicated by significant p-values for certain predictors, the ordered logistic model may produce biased or inaccurate estimates. This would necessitate the use of a more flexible model, such as the generalized ordered logistic regression (gologit), to better fit the data and ensure reliable results.

Table 2 The Score Test Result

Variables	Coef	z	P>|z|
Education	0.00313	0.55	0.548
Internet	0.37941	6.94	0.000***
Age	0.02542	13.15	0.000***
Gender	0.11910	2.88	0.004***
Marital status	-0.30144	-6.34	0.000***
Urban	0.30505	7.27	0.000***
Chi2(6)	149.43		
Prob>chi2	0.0000***		

Source: Data Analysis (2024)
Note: *** p<1%, ** p<5%, * p<10%

The score test results indicate a violation of the proportional odds assumption for several variables in the ordered logistic model, such as internet utilization, marital status, and urban residency (with significant p-values below 0.05). This suggests that the relationship between these predictors and the dependent variable is not consistent across all categories of welfare. Additionally, the likelihood-ratio test for proportionality of odds confirms this violation, as it yields a highly significant result (p < 0.0000). Therefore, the generalized ordered logistic regression (gologit) is more appropriate for this study, as it relaxes the proportional odds assumption, allowing for a more flexible relationship between predictors and different welfare categories. The generalized ordered logistic regression estimation result is presented in Table 3.

Table 3 The Generalized Ordered Logistic Estimation Results

Variables	Coef	Odds Ratio	Std. Err	z	P>|z|
Group 1					
Education	0.00454	1.00548	0.00567	0.80	0.423
Internet	0.51895	1.64697	0.05639	9.20	0.000***
Age	0.02322	1.02221	0.00188	12.32	0.000***
Gender	0.05432	1.05635	0.04479	1.21	0.225
Marital status	-0.13138	0.88645	0.05061	-2.60	0.009***
Urban	0.36642	1.44468	0.04520	8.11	0.000***
Constant	1.36792	4.10282	0.10739	12.74	0.000***
Group 2					
Education	0.00454	1.00087	0.00567	0.80	0.423
Internet	-0.37526	0.75796	0.10708	-3.50	0.000***
Age	0.02322	1.02788	0.00188	12.32	0.000***
Gender	0.34780	1.40469	0.09745	3.57	0.000***
Marital status	-0.78959	0.44844	0.09687	-8.15	0.000***
Urban	0.00486	1.00213	0.09849	0.05	0.961
Constant	-4.86372	0.00629	0.16083	-30.24	0.000***

Source: Data Analysis (2024)
Note: *** p < 1%, ** p < 5%, * p < 10%

The generalized ordered logistic regression results provide insight into how various factors influence welfare status, as measured by three welfare categories. The coefficient for internet utilization is positive and significant, indicating that individuals who use the internet are more likely to be in higher welfare categories than those who do not. This implies that internet access is strongly associated with better welfare outcomes, reflecting the potential role of digital connectivity in improving the economic and social well-being of laborers. The results show that for Group 1, internet utilization increases the likelihood of moving to a higher welfare category by 65% (odds ratio: 1.65), while for Group 2, it decreases the likelihood of remaining in that group by 24.2% (odds ratio: 0.76), thereby encouraging a transition to the highest welfare group (Group 3). In the industrial sector—where automation, technological adoption, and information flow are critical to maintaining competitiveness and efficiency—access to the internet becomes a pivotal factor in enhancing worker productivity and opportunities (Gupta et al., 2023; Sima et al., 2020). Internet access enables industrial workers to stay updated with industry trends, access technical knowledge, and improve their skills through online resources, all of which can contribute to higher earnings (Li, 2022; Saniuk et al., 2023). This finding is supported by empirical evidence showing that digital inclusion in industrial settings reduces information asymmetry and increases access to better-paying jobs, thereby improving overall labor welfare (Cruz et al., 2022). However, as found by Permana et al. (2024) Permana et al. (2023) in their forecasting analysis, economic growth in Indonesia has been largely driven by increased capital accumulation, while the contributions of labor and total factor productivity (TFP) have been declining in recent years. This trend suggests that, despite advancements in technological capabilities, overall productivity remains relatively low. Therefore, efforts should focus not only on the adoption of technology or digitalization but also on ensuring that both contribute to enhancing worker productivity.

Age also shows a positive and significant relationship with welfare status. The results suggest that as age increases, so do the odds of being in a higher welfare category. In Group 1, each additional year of age increases the likelihood of moving to a higher welfare category by 2.22% (odds ratio: 1.02221), while in Group 2, it increases the likelihood of transitioning to the highest welfare group by 2.79% (odds ratio: 1.02788). This may reflect the accumulation of experience and stability that often come with age, thereby improving individuals' welfare status over time. Conversely, the higher likelihood of younger workers being in the lower welfare category reflects the challenges they face in a field that often values experience and technical skills. The industrial sector is characterized by a demand for skilled labor capable of operating machinery, managing production processes, and ensuring quality control. Alazzawi & Hlasny (2022) and Kalleberg (2020) mentioned that younger workers, who often lack experience and sector-specific skills, typically start at lower wages. This aligns with human capital theory, which posits that individuals with more experience and relevant education are more productive and earn higher wages. The findings suggest a need for targeted policies within the industrial sector to support skill development and vocational training for younger workers, enabling them to acquire the necessary expertise to advance in their careers and secure better-paying positions (Lauder & Mayhew, 2020; Sun et al., 2020).

The results in Table 3 also reveal that men are more likely than women to be in higher welfare categories. In Group 1, being male increases the likelihood of moving to a higher welfare category by 5.63% (odds ratio: 1.05635), while in Group 2, being male increases the likelihood of transitioning to Group 3 by 40.47% (odds ratio: 1.40469). This may point to gender-based disparities in economic opportunities and income, where males have better access to higher-paying jobs in the industrial sector. This finding aligns with established economic theories on gender disparities in labor markets, especially in developing economies. According to human capital theory, men often have greater access to education and skills development aligned with higher-paying jobs, particularly in sectors like manufacturing and construction. Labor market segmentation theory further argues that women are often confined to lower-paying sectors or roles due to structural barriers, limiting their access to high-wage opportunities and career advancement.

In contrast, marital status exhibits a negative and significant relationship with welfare status, suggesting that married individuals are less likely to be in higher welfare categories compared to their unmarried counterparts. In Group 1, being married decreases the likelihood of moving to a higher welfare category by 11.35% (odds ratio: 0.88645), while in Group 2, it reduces the likelihood of transitioning to Group 3 by 55.16% (odds ratio: 0.44844). This finding may reflect the increased financial responsibilities or household burdens that often accompany marriage, potentially lowering perceived welfare status. Furthermore, the industrial sector frequently demands long hours and shift work, which can pose challenges for married individuals, particularly those with family responsibilities. The financial pressures of supporting a family—combined with the demanding nature of industrial work—may contribute to lower overall household income despite dual incomes (Perry-Jenkins & Gerstel, 2020). Additionally, gender dynamics within the industrial sector, where women may face occupational segregation or reduce their labor market participation due to caregiving roles, can further exacerbate these challenges (Sahai,

2021; Samtleben & Müller, 2022). This finding suggests that policies aimed at supporting work-life balance, such as flexible working arrangements, affordable childcare, and parental leave, could improve the economic outcomes of married workers in the industrial sector.

Urban residency is also found to have a positive and significant effect, indicating that living in urban areas is associated with higher welfare status. In Group 1, urban residency increases the likelihood of moving to a higher welfare category by 44.47% (odds ratio: 1.44468), while in Group 2, it shows no significant effect on transitioning to Group 3 (odds ratio: 1.00213). This reflects the advantages often associated with urban living, such as better access to infrastructure, services, education, and employment opportunities, which can improve welfare. Urban regions, typically hubs for industrial activity, offer greater access to job opportunities, advanced infrastructure, and proximity to suppliers and services—all of which enhance productivity and earnings (Oqubay & Lin, 2020). The industrial sector in urban areas benefits from economies of scale, proximity to suppliers, and better logistics, which can lead to higher wages for workers. However, the non-significance of urban residency in distinguishing between those earning below versus above the minimum wage (within the non-poor category) suggests that, once poverty is overcome, further income gains may depend more on individual skills and sector-specific opportunities than on geographic location (Adda & Dustmann, 2022; Hervé, 2023).

However, education—as measured by years of schooling—does not show a statistically significant relationship with welfare status. Despite a small positive coefficient, the lack of significance suggests that higher education levels do not meaningfully affect the likelihood of being in a higher welfare category in this model. This may seem counterintuitive, given the common assumption that education improves economic outcomes. Nevertheless, education remains crucial for poverty alleviation, as emphasized in studies by Ayoo (2022) and Hofmarcher (2021). In the industrial sector, where practical experience and technical skills are often prioritized, factors such as industry-specific training, certifications, and hands-on experience may play a more critical role in advancing workers beyond the minimum wage threshold. This finding underscores the importance of continuous professional development and sector-specific training programs that equip workers with the skills necessary to excel in their roles and earn higher wages. Policymakers and industry stakeholders should invest in training and development initiatives that align with the evolving needs of the industrial sector to enhance productivity and improve labor welfare.

Building upon the ordered logistic regression, which provided insights into the relationships between key variables and welfare status, it is also essential to examine the specific probabilities associated with each welfare category. While the regression coefficients indicate the significance of predictor variables, they do not quantify the precise likelihood of belonging to each category. To address this, marginal effects are analyzed to offer a clearer understanding of how each variable influences the probability of being in Group 1 (poor and earning below the minimum wage), Group 2 (not poor but earning below the minimum wage), or Group 3 (not poor and earning above the minimum wage), as presented in Table 4.

Table 4 The Marginal Effects for Specific Category Probabilities

Variables	Group 1		Group 2		Group 3	
	dy/dx	P>|z|	dy/dx	P>|z|	dy/dx	P>|z|
Education	-0.00024	0.423	0.00019	0.423	0.00005	0.424
Internet	-0.02814	0.000***	0.03242	0.000***	-0.00427	0.001***
Age	-0.00125	0.000***	0.00099	0.000***	0.00026	0.000***
Gender	-0.00294	0.225	-0.00102	0.700	0.00396	0.000***
Marital status	0.00712	0.010**	0.00188	0.522	-0.00900	0.000***
Urban	-0.01987	0.000***	0.01981	0.000***	0.00005	0.961

Source: Data Analysis (2024)

Note: *** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$

The estimation results provide insights into the key factors influencing welfare outcomes in Indonesia's industrial sector, supporting the findings from the ordered logistic regression. Education, for example, does not significantly affect the likelihood of belonging to any welfare category, reinforcing earlier results that suggest other factors—such as work experience or technical skills—may play a more critical role than formal education in determining economic well-being. In contrast, internet utilization demonstrates a significant and consistent influence on welfare outcomes. It reduces the probability of being in the poorest category (Group 1) while increasing the likelihood of transitioning to higher welfare categories (Groups 2 and 3). These findings underscore the transformative role of digital inclusion, particularly its capacity to expand access to opportunities and enhance productivity.

Age similarly emerges as a significant determinant, with older individuals less likely to fall into the poorest category and more likely to achieve better welfare outcomes. This pattern aligns with the benefits of accumulated experience and economic stability, as also indicated by the ordered logistic results. Gender disparities persist, with men being less likely to belong to the poorest category and more likely to attain higher welfare, reflecting structural inequalities in economic opportunities between men and women within the industrial sector.

Marital status presents a contrasting dynamic, where married individuals are more likely to be in the poorest category and less likely to experience upward mobility in welfare status. This finding confirms earlier results suggesting that the financial responsibilities associated with marriage and family can diminish economic well-being. Finally, urban residency remains a significant factor, as individuals living in urban areas are less likely to be in the poorest category and more likely to attain higher welfare outcomes. This further underscores the advantages provided by urban environments, including better infrastructure, higher-paying jobs, and a broader range of economic opportunities.
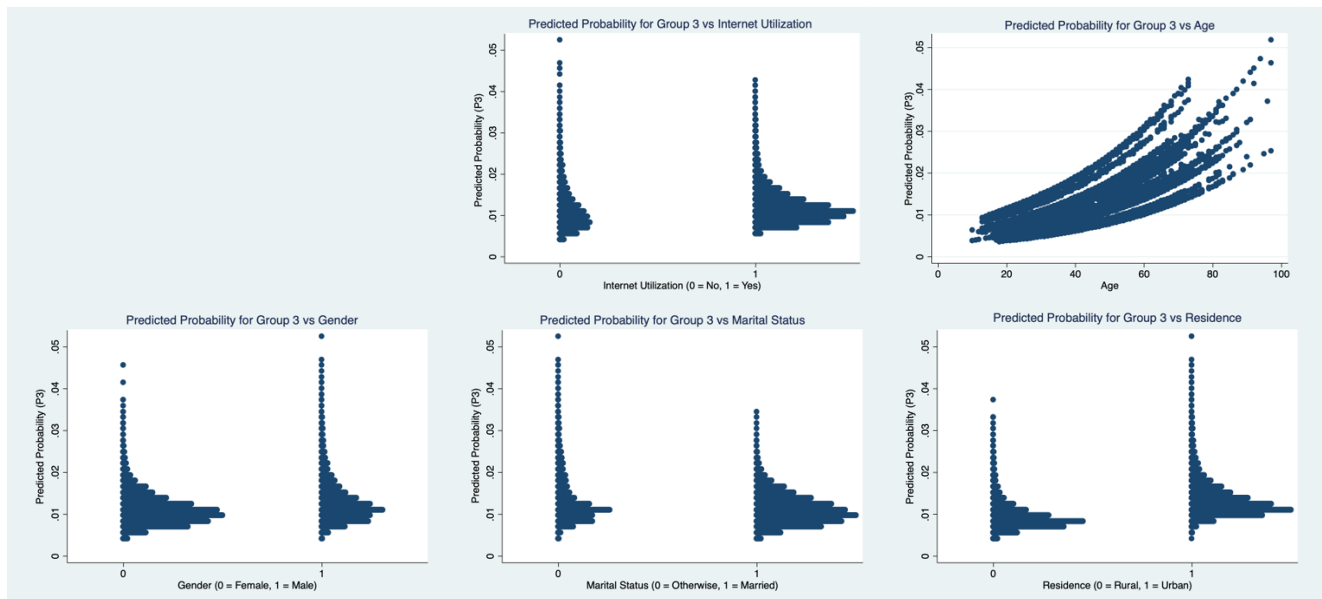
Figure 1 Scatterplots of Predicted Probability for Group 3 and Independent Variables
Source: Data Analysis (2023)

Figure 1 visualizes the relationship between each independent variable and the predicted probability of being in the highest welfare category (Group 3), supporting the statistical analysis in Table 3. Years of schooling shows minimal impact on welfare, consistent with the regression results that found education to be insignificant. In contrast, internet utilization strongly differentiates welfare status, with internet users having higher probabilities of being in Group 3. Gender shows a modest effect, where males have slightly higher predicted probabilities of being in the top welfare category.

For marital status, the scatterplot confirms the negative association, as married individuals have lower probabilities of being in Group 3 compared to unmarried individuals. Urban residency is associated with higher welfare, with urban dwellers showing a clear advantage over rural residents. Lastly, age shows a positive, curvilinear trend, with older individuals having higher probabilities of being in Group 3, although variability in welfare status increases with age. These visuals support and clarify the key findings of the ordered logit model.

Conclusion

This study highlights that internet utilization, age, and urban residency play crucial roles in determining whether individuals are likely to be poor and earn below the minimum wage or achieve better economic outcomes. Specifically, access to the internet is strongly associated with better economic standing, suggesting that digital inclusion is a critical factor in improving labor welfare in the industrial sector. However, the younger workforce remains vulnerable to lower earnings, reflecting the need for targeted support in skill

development and vocational training to help them transition into higher-paying roles. The advantages of urban living further emphasize the importance of regional economic development policies that address disparities between urban and rural areas.

The implications of these findings are significant for policymakers aiming to enhance labor welfare in the industrial sector. Initiatives that promote digital literacy and expand internet access across the workforce can potentially uplift workers, especially in industrial settings where technology plays a vital role. Furthermore, policies focused on supporting younger workers through education, training, and mentorship programs are crucial to building a more skilled and productive labor force. The findings also suggest that addressing the economic pressures faced by married individuals—particularly in balancing work and family responsibilities—could help mitigate the risk of poverty.

To improve welfare in rural areas and foster inclusivity, policies should focus on addressing the structural challenges unique to these regions. Investments in rural infrastructure—such as transportation networks and reliable internet access—can connect rural workers to industrial opportunities and reduce barriers to economic participation. Additionally, establishing rural training centers tailored to local industries can equip workers with relevant skills while supporting small and medium enterprises to stimulate local economic activity. Programs that encourage digital literacy and access to online platforms for job opportunities can further bridge the urban–rural gap, ensuring that rural workers are not left behind in the broader industrial development process.

However, this study acknowledges limitations in establishing causality, as the ordered logistic regression identifies associations rather than cause-and-effect relationships. Potential endogeneity may bias the results, and although an instrumental variable (IV) approach was considered, it was not feasible due to the lack of suitable instruments in the dataset. Future research could address this issue by collecting richer data with valid instruments or applying alternative methods.

Author Contributions

Conceptualization, WS and BF; Methodology, WS; Data Compilation and Analysis, AMS; Original Draft Preparation, BF and AMS; Review and Editing, BF and AMS; Supervision and Finalization, WS.

Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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