



THE IMPACT OF HUMAN CAPITAL AND WOMEN'S PARTICIPATION ON POVERTY IN INDONESIA

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ABSTRACT

Poverty is an important indicator in assessing the level of public welfare and the success of a country's economic development. This study aims to estimate the effect of female workers, females' years of schooling, females' life expectancy, and females' productivity on the poverty rate in 34 provinces in Indonesia from 2018 to 2024 using a panel data regression model with a Fixed Effects Model (FEM) approach. The regression results indicate that females' mean years of schooling negatively impact the poverty rate, while the number of female workers and female workers' productivity positively impact poverty rate. Meanwhile, females' life expectancy is found to have no effect on poverty rate. Therefore, the government is expected to formulate policies that focus on improving the quality and empowerment of the female workforce through the transformation of the informal sector to the formal sector, expanding access to higher education, implementing gender-neutral job evaluations, and providing gender-friendly facilities such as daycare centers so that increased women's workforce participation and productivity can be balanced with a reduction in poverty rates.

Keywords: Poverty, Female Workers, Females' Mean Years of Schooling, Productivity, Fixed Effects Model



INTRODUCTION

Gender equality is one of the priority issues in the vision of sustainable development (*Sustainable Development Goals*), including realizing gender equality and justice, fulfilling women's rights, and eliminating all forms of violence against women. Gender equality is achieved when women, men, girls and boys have equal rights, conditions and opportunities, and the power to shape their own lives and contribute to the development of society (Munasaroh, 2022).

Gender development plays an important role in influencing poverty levels in Indonesia, as women's empowerment directly increases household income and the quality of investment in child welfare. This can be strengthened by empowering women through increasing access to education for girls. The higher the education of women, the more gender equality will be achieved, so that poverty can be reduced (Amalia & Agusalam, 2023).

Table 1
Number of Women Workers (JPBP, Million People), Percentage of Women Workers (%), and Productivity of Women Workers in Indonesia (Million Rupiah Per Person) in 2018-2024

Year	JPBP	(%)	Productivity
2018	54	41,45	237
2019	51	39,54	254
2020	50	39,43	241
2021	51	40,84	243
2022	52	38,98	256
2023	53	39,09	263
2024	56	39,68	268

Source: Central Statistics Agency (BPS) Productivity: GDP on the basis of constant prices / Number of female working force (JPBP)

Table 1 shows that the percentage of female workers is likely to decrease from 41.45% in 2018 to below 40% in 2024. One of the causes of the decline is due to the impact of the pandemic *Covid-19*, before rebounding in 2021. The low ratio of female workers to the total labor force in Indonesia, which continues to be below 45%, illustrates the existence of systemic gender inequality in the labor market. These problems can hinder inclusive economic growth. This inequality is caused by entrenched social norms, especially patriarchal cultures that place domestic and childcare responsibilities exclusively on women, thus limiting their participation (Nuraeni & Suryono, 2021).



The problem of the low ratio of female workers is not only about quantity, but also about quality and protection in the jobs obtained. According to Nuraeni and Suryono (2021), women who make it into the job market are often victims of economic structures that force them into the informal sector, where they face low wages, unclear work rules, lack of health insurance, and the risk of exploitation. Even in the formal manufacturing sector, research shows wage discrimination against women, where the wages given are not in line with their productivity (Laili & Damayanti, 2018). To address this inequality, the government needs to establish a special body to monitor gender equality in the workplace, provide free legal aid to victims of discrimination, and encourage companies to implement gender-neutral performance evaluations so that women workers receive fair wages and full protection (Sarina & Ahmad, 2021). Closing the gender gap in the job market is key to achieving sustainable development and stronger and more equitable economic growth.

Education serves as a major investment that directly determines employment opportunities and an individual's position in the labor market. Higher levels of formal education equip workers with the technical, cognitive, and non-technical skills essential to enter the formal sector, high-skilled positions, and jobs that offer better wages (Putri & Hutasoit, 2024). The increase in average length of school has been shown to have a positive and significant influence on labor productivity (Sirait & Maipita, 2026). This effectively creates wider and more equitable employment opportunities, while also acting as a mechanism to reduce discrimination and gender-based wage gaps (Agusalim et al., 2023).

In addition to education, health also has a cursory impact on worker productivity and is the foundation of productivity at the individual level. Investments in health (such as improved nutrition, sanitation, and access to medical services) are positively and significantly correlated with increased productivity (Hutami & Riani, 2022). Workers who are in top physical and mental condition tend to have high endurance, energy, and focus, which directly increases output and quality of work. Conversely, poor health can lead to decreased productivity and deplete household savings, which can ultimately create poverty (Adriana, 2020). Good health also ensures that the educational capital that has been obtained can be optimized in the workplace. A healthy and educated workforce tends to be more creative and innovative, enabling a country to compete on a global level (Kaloko et al., 2025).



Table 2
Average School Length of Boys and Girls (RLSL and RLSP, Years) and Life Expectancy Rates for Boys and Girls (AHHL and AHHP, Years) in Indonesia in 2018-2024

Year	RLS		AHH	
	Male	Women	Male	Women
2018	8,81	8,01	67,71	71,55
2019	9,00	8,16	68,01	71,84
2020	9,07	8,30	68,17	71,98
2021	9,12	8,40	68,02	72,37
2022	9,18	8,58	68,50	72,39
2023	9,23	8,70	68,78	72,71
2024	9,37	8,87	69,06	73,04

Source: BPS

Table 2 shows the development of the average length of school (RLS) and life expectancy (AHH) in the period 2018 to 2024. In general, both RLS and AHH have increased from year to year, which indicates an improvement in the quality of education and public health. The increase in the average length of school shows that access to education is getting better and public awareness to pursue education is getting higher. However, women's RLS is slightly lower than that of men, reflecting gender inequality in education. Meanwhile, women's life expectancy is actually higher than that of men, which shows that there are differences in health conditions or social factors that affect men's welfare.

The link between education and health is also evident, where an increase in the level of education is generally followed by an improvement in quality of life and awareness of the importance of maintaining health (Kaloko et al., 2025). However, the increase is still relatively slow (based on Table 1), and the differences between men and women still need to be noted. Therefore, continuous efforts are needed to increase the equitable distribution of access to education and health services so that this progress can be felt equally by all levels of society.

Human development is essential for improving well-being and reducing poverty, but gender inequality, particularly affecting women, remains a major obstacle in the labour market, where the percentage of female workers is low and women face a high percentage of wage discrimination and a lack of protection in employment. Therefore, this study aims to analyze the factors of gender inequality in the labor market and its impact on poverty and find policy solutions



that can increase the participation, protection, and productivity of women workers to support inclusive economic growth and sustainable development.

LITERATURE REVIEW

Batalipu and Olilingo (2021) Estimate the influence of education and health levels on poverty in six districts/cities in Gorontalo Province in 2016-2020 using panel data regression with the *Fixed Effects Model* (FEM). It was found that RLS and AHH had a negative effect on poverty, school participation rates and pure participation rates had no effect on poverty. Kevin et al. (2022) found that RLS and AHH had a negative effect on poverty in 35 districts/cities in Central Java Province for the 2013-2021 period, while GDP had no effect.

Pradipta and Dewi (2020) in eight districts/cities in Banten Province in 2011-2015 with the same approach found that RLS had no effect on poverty, while open unemployment had a positive effect on poverty. These findings are supported by Hasanah et al. (2021) which also found that RLS had no effect on poverty, while AHH and per capita expenditure had a negative effect on poverty in 11 districts/cities in Jambi Province for the 2015-2019 period.

Santoso et al. (2022) conducted research in 27 districts/cities of West Java in 2021 using the *autoregressive spatial*, which found that the average length of schooling and per capita expenditure had a negative effect, while the Gini ratio had a positive effect on poverty. Meanwhile, life expectancy and working-age population affected by the pandemic *Covid-19* has no effect on poverty. These results are supported by the findings Baiquni and Feriyanto (2025) which also found that life expectancy had no effect on poverty, while GDP and economic growth rate had a negative effect on the poverty rate in West Java in 2011-2023.

Isfahani et al. (2020) conducted research in West Java in 2015-2019 using the *Fixed Effect Spatial Error Model* and found that population density had a positive effect on poverty rates, while school participation rates, AHH, and per capita expenditure had a negative effect on poverty rates. These results are supported by the findings Oktavia et al. (2025) that AHH, population, and GDP per capita have a negative effect on poverty, while HDI, TPAK, and minimum wage have a positive effect on poverty in East Java in 2021-2023. However, Aulia and the Goddess (2025) found different outcomes, where HDI had a negative effect on poverty. This study also found that the absorption of informal labor and loans from People's Prekreditan Banks (BPR) has a positive effect on poverty in Indonesia in 2019-2023. In research Ramadhani and Utomo (2025) It was found



that HDI and GDP per capita have a negative effect on poverty, while village funds have no effect on poverty on the island of Sulawesi in 2017-2024.

Faritz and Soejoto (2018) in 35 districts/cities in Central Java Province in 2009-2018 using panel data regression with the *Random Effects Model* (REM) found that economic growth and average length of schooling have a negative effect on poverty. Soleman and Soleman (2022) obtained different results, where GDP had a positive effect on poverty, while Life Expectancy (UHH) had a negative effect on poverty. On the other hand, Islamic banking financing, RLS, TPAK, and inflation have no effect on poverty in 13 Eastern Indonesian provinces for the 2011-2021 period. Then Nuraeni and Suryono (2021) found that the level of participation of women in the female labor force had a positive effect on the poverty rate in Indonesia in 2010-2017. It is supported by Sukmana et al. (2024) which also found that the participation of women's labor force had a positive effect on poverty, while the participation of the male labor force, education level and health of both men and women had a negative effect on poverty in Indonesia in 2012-2021.

The difference in this study from previous studies lies in the independent variables used, where this study focuses on women's employment. In this study, the variables used included the number of workers who worked for women, the average length of women's schooling, women's life expectancy, and women's productivity. Thus, this research is expected to provide more specific results on the role of women in reducing poverty in Indonesia.

RESEARCH METHOD

This research is a quantitative research using secondary data obtained through the Central Statistics Agency (BPS) for the 2018-2024 period. The data used in this study is panel data, which is a combination of *cross section* and *time series* data. In this study, *cross section* data covers 34 provinces in Indonesia, while *time series* data covers 2018-2024. The econometric equations to estimate the influence of the number of female workers, the average length of schooling for women, the life expectancy of women, and the percentage of women in poverty are as follows:

$$PPM_{it} = \beta_0 + \beta_1 \text{LogJPBP}_{it} + \beta_2 \text{RLSP}_{it} + \beta_3 \text{AHHP}_{it} + \beta_4 \text{LogPRODP}_{it} + \varepsilon_{it}$$

where:

PPM : Percentage of poor population (%)

β_0 : Constant

$\beta_1 \beta_2 \beta_3 \beta_4$: Independent variable coefficients

$JPBP$: Number of female workers (people)



$RLSP$	: Average length of schooling for girls (years)
$AHHP$	: Life expectancy of women (years)
$PRODP$	: Women's productivity (million rupiah per person)
i	: Cross section (34 provinces in Indonesia)
t	: Time series (year 2018-2024)
ε	: Residual

The regression of the panel data uses three estimates, namely *Common Effects Model* (CEM), *Fixed Effects Model* (FEM), and *Random Effects Model* (REM). The selection of the best model is carried out through the Chow Test and the Hausman Test. The best model will be used in estimating the influence of independent variables on dependents.

A model existence test or *F test* needs to be carried out to find out whether independent variables together have an effect on the dependent variables. H_0 in the *F test* states that $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$, which means that the number of female workers, the average length of female schooling, the life expectancy of women, and women's productivity together have no effect on the percentage of the poor population in Indonesia. H_0 is denied if the *F-statistical* probability $< \alpha$.

Then, the *t-test* also needs to be used to determine the influence of each independent variable individually on the dependent variable. H_0 on the *t-test* states that $\beta_i = 0$ ($i = 1-4$), which means that each variable of the number of female workers, the average length of female schooling, the life expectancy of women, and the productivity of women has an effect on the percentage of the poor population. The H_A states that $\beta_i < 0$ ($i = 1-4$), which means that the number of female working forces, the average length of female schooling, women's life expectancy, and women's productivity have a negative effect on the percentage of the poor population. H_0 is denied if the *probability of t-statistics* is less than α .

RESULTS AND DISCUSSION

Estimation in the panel data regression model is carried out with three approaches, namely *Common Effects Model* (CEM), *Fixed Effects Model* (FEM), and *Random Effects Model* (REM). The results of the panel data estimation are shown in Table 3.

Table 3			
CEM, FEM and REM Regression Results			
Variable	Regression Coefficients		
	EMC	FEM	REM



C	83,213	11,889	17,669
LOG(JPBP)	-0,311	0,643	0,231
RLSP	-1,348	-1,606	-1,589
AHHP	-0,810	0,059	0,044
LOG(PRODP)	-0,734	0,706	0,241
R2	0,362	0,987	0,395
Prob F-stats	0,000	0,000	0,000

1) Chow Test

Cross-section F (33,200) = 283,433; Prob. *F* = 0.000

2) Hausman Test

Cross-section random $\chi^2(4)$ = 14,368; Prob. χ^2 = 0.0062

After the CEM, FEM, and REM regression results are obtained, it is necessary to perform two tests to determine which model is best at estimating the panel data. First, the Chow Test is conducted to determine the best model between CEM and FEM. Second, the Hausman Test was carried out to determine the best model between REM and FEM.

The Chow test is performed to determine the best model to estimate panel data between FEM or CEM. The provision in the Chow Test is that if the *probability value of F-statistical* $< \alpha$, then *H0* is rejected, which means that the model is selected by FEM to estimate the panel data. The results of the Chow Test in Table 3 show that the *probability of Cross-section F* is $0.0000 < \alpha$ (0.01), so *H0* is rejected. Thus, the selected model is FEM.

The Hausman test was carried out to determine the best model between REM and FEM in estimating panel data. The provision in the Hausman Test is that if the probability $\chi^2 < \alpha$, then *H0* is rejected, which means that FEM will be used in estimating the panel data. The results of the Hausman Test in Table 3 show that the probability χ^2 is $0.0062 < \alpha$ (0.01), so *H0* is not rejected, which means that the chosen model is FEM.



Table 4
FEM Regression Results

1. Variable	2. Coefficients
3. C	4. 11,889 5. (0,0257)**
6. <i>Log(JPBP)</i>	7. 0,643 8. (0,081)***
9. <i>RLSP</i>	10. -1,606 11. (0,000)*
12. <i>AHHP</i>	13. 0,059 14. (0,446)
15. <i>Log(PRODP)</i>	16. 0,706 17. (0,098)***
18. <i>R2</i>	20. 0,987
19. Prob. <i>F</i>	21. 0,000

Description: Numbers in parentheses
is the *probability of t-statistics*

* Significant at α 0.01

** Significant at α 0.05

Significant at α 0.1

Table 4 shows that the F-statistical probability value is $0.000 < \alpha$ (0.1) so that H_0 is rejected, and it can be concluded that the number of female workers, the average length of female schooling, the life expectancy of women, and the productivity of women together have a positive effect on the percentage of the poor population in Indonesia in 2018-2024.

The determination coefficient (R^2) of 0.986637 means that 98.66% of the change in the percentage of the poor population is due to changes in the number of female workers, the average length of schooling for women, the life expectancy rate of women, and the productivity of women, while the remaining 1.34% is due to other variables outside the model.

The t-test is performed to find out whether partially or individually independent variables have an effect on the dependent variable. Based on Table 4, it can be concluded that the average length of schooling for women has a



negative effect on the percentage of the poor population. Then, the number of female workers and female productivity have a positive effect on the percentage of the poor population. Meanwhile, women's life expectancy has no effect on poverty in Indonesia in 2018-2024. Summary of *the results of the t-test* is summarized in Table 5.

Table 5
Results of the t-test

Variable	Coefficients	Prob. <i>t</i>	Conclusion
<i>LOG(JPBP)</i>	0,643	0,081	β_1 significant at α 0.1
<i>RLSP</i>	-1,606	0,000	β_2 significant at α 0.01
<i>AHHP</i>	0,059	0,446	β_3 insignificant
<i>LOG(PRODP)</i>	0,706	0,098	β_4 significant at α 0.1

The log coefficient (*JPBP*) of 0.643 with a lin-log relationship pattern means that an increase in the number of female workers by one percent will increase the percentage of the poor population by 0.00643 percent. *The RLSP coefficient* of -1.606 with a lin-lin relationship pattern means that an increase in the average length of girls' schooling by one year will reduce the percentage of the poor population by 1.606 percent. Then, a log coefficient (*PRODP*) of 0.706 with a lin-log relationship pattern of one percent means that an increase in women's productivity by one percent will increase the percentage of the poor population by 0.00706 percent. *The AHHP coefficient* does not need to be interpreted because it is insignificant.

Based on the regression results, it is known that the number of female workers has a positive effect on the number of poor people. These results are in line with the findings Sukmana et al. (2024) which shows that the participation of the female labor force actually increases poverty in Indonesia. This is because most women work in the informal sector, as shown in Table 6.

Table 6
Number and Percentage of Formal and Informal Workers in Indonesia

Year	Formal Workers		Informal Workers	
	Male	Women	Male	Women
2018	24.924.495 (46,10)	20.599.203 (38,10)	40.078.427 (53,90)	46.026.988 (61,90)



2019	26.757.708 (47,19)	22.221.542 (39,19)	39.387.343 (52,81)	45.353.993 (60,81)
2020	21.237.444 (42,71)	17.229.629 (34,65)	45.161.378 (57,29)	51.515.930 (65,35)
2021	21.891.879 (43,39)	18.264.255 (36,20)	43.210.630 (56,61)	48.698.785 (63,80)
2022	23.658.809 (43,97)	19.139.046 (35,57)	45.657.730 (56,03)	52.502.722 (64,43)
2023	24.323.481 (44,19)	19.677.856 (35,75)	46.136.850 (55,81)	53.114.005 (64,25)
2024	25.231.431 (43,46)	22.131.205 (38,12)	47.648.510 (56,54)	52.148.741 (61,88)

Source: BPS

Based on Table 6, the majority of female workers in Indonesia for the 2018–2024 period are concentrated in the informal sector with a consistent percentage above 60%, much higher than female formal workers which only range from 34% to 39%. This phenomenon is in line with regression results that show that the number of female workers has a positive effect on the percentage of the poor population, which means that increasing women's labor participation tends to increase the poverty rate in Indonesia. This condition occurs because the high number of female workers is not accompanied by decent job quality. These results are supported by the findings Nuraeni and Suryono (2021) which states that many women workers are forced into the informal sector with low wages or face wage discrimination in the sector, so that the additional income earned has not been able to alleviate poverty effectively.

The average length of schooling for women has been proven to have a negative influence on the percentage of poor people in Indonesia. These findings show similarities with the findings Batalipu and Olilingo (2021) and Kevin et al. (2022) who also found that a significant increase in average school time can reduce poverty rates. The similarity of these results strengthens the argument that education is the main capital to improve women's skills. As women's levels of formal education get higher, they have a greater chance of getting decent work in the formal sector with better wages. In the end, increasing access to education for women is a very effective step to increase household income while helping to save families from poverty.



Women's life expectancy is an independent variable that has no effect on poverty. This is in line with the findings Baiquni and Feriyanto (2025) who found that life expectancy had no real impact on poverty. These results are also reinforced by Santoso et al. (2022) which shows that life expectancy has no effect on the percentage of the poor population, because the problem of poverty is more dominated by other structural factors that are more crucial. Theoretically, improving the quality of women's health in Indonesia has not been able to significantly reduce the poverty rate. In fact, Table 2 shows that the AHH of women is always higher than that of men. This condition is suspected to occur because the increase in life expectancy is dominated by the elderly female group who are no longer productive. On the other hand, many women of productive age choose or are forced to become housewives (IRT), so they are not absorbed in the labor market. As a result, this excellent health capital fails to generate real income, so it does not make a direct contribution to improving household welfare or reducing macro poverty rates.

Women's productivity was found to have a positive effect on poverty. This is contrary to classical economic theory which states that high productivity should increase welfare and reduce poverty. However, in the context of gender-based employment in Indonesia, these positive results reflect the serious problem of income distribution inequality. According to the data in Table 1, although productivity continues to increase from 237 million rupiah per person in 2018 to 268 million rupiah per person in 2024, the percentage of women's involvement in the job market is stagnant and tends to decline to below 40%. This condition indicates the occurrence of *jobless growth* for women, where productivity increases not because of increasing women's job vacancies, but due to the exploitation of the workload of a handful of women in the formal sector in pursuit of industrial efficiency.

CONCLUSION

Women's productivity and welfare are important indicators in assessing the success of sustainable development and its contribution in reducing poverty in Indonesia. The purpose of this study is to determine the direction and magnitude of the influence of the number of female workers, the average length of female schooling, women's life expectancy, and women's productivity on the percentage of the poor population in Indonesia in 2018-2024. To achieve the objectives of this study, panel data regression was carried out with the *Fixed Effects Model* (FEM) as the selected model.



The regression results showed that women's education level had a negative effect on the percentage of the poor population, which means that increasing formal education was effective in reducing poverty. On the other hand, the number of female workers and women's productivity actually have a positive effect on poverty. This happens because the majority of female workers (above 60%) are still confined to the informal sector with low wages and minimal protection, as well as indications of *jobless growth* in the formal sector. Meanwhile, women's life expectancy was found to have no effect on poverty levels.

Based on the results of the research, the government is expected to prioritize policies to improve the quality of the female workforce through the transformation of the work sector from informal to formal, expanding access to higher education, and special skills training programs. In addition, strengthening women's protection needs to continue to be carried out through policies that encourage gender equality in the labor market, such as the establishment of equality supervisory bodies in the workplace, reducing the wage gap, implementing gender-neutral work evaluations, and providing gender-friendly facilities such as *daycare* so that women of productive age can work optimally.

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