

Analysis of The Impact of Population Growth Rate and School Participation Rate on Open Unemployment in Indonesia

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Abstract

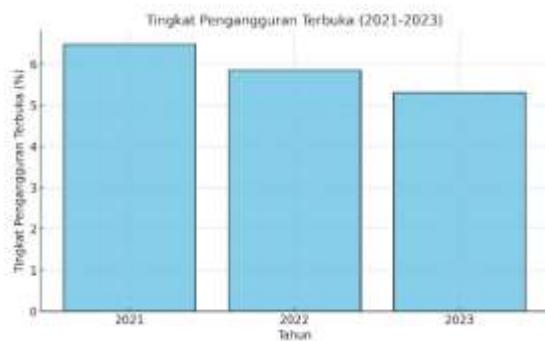
This study aims to analyse the impact of the population growth rate and school participation rate on the open unemployment rate in Indonesia during the 2021–2023 period. The background of this research lies in the high open unemployment rate, influenced by various demographic and educational factors. The novelty of this study is its simultaneous analysis of the relationship between school participation and population growth with the open unemployment rate. The research uses multiple linear regression methods to analyse secondary data from the Central Bureau of Statistics and the Ministry of Education and Culture. The findings indicate that the school participation rate has a significant adverse effect on the open unemployment rate, where an increase in school participation reduces unemployment by improving individuals' skills. Conversely, the population growth rate has a significant positive effect, reflecting pressure on the labour market due to the imbalance between population growth and job availability. In conclusion, education plays a critical role in reducing unemployment, while population growth management needs to be optimised to alleviate pressure on the labour market. Enhancing the quality and accessibility of education, along with market-oriented training programs, are key strategies to address unemployment in Indonesia.

INTRODUCTION

The open unemployment rate (TPT) in Indonesia is one of the key indicators for understanding the dynamics of the labour market. TPT reflects the number of individuals in the labour force who are unemployed despite actively seeking jobs. High unemployment not only indicates pressure on the labour market but also serves as one of the leading causes of social and economic inequality (World Bank, 2020). In the context of Indonesia, changes in TPT trends over the past three years reflect dynamics that merit further investigation.

The following graph illustrates the open unemployment rate in Indonesia during the 2021–2023 period:

Figure 1.1 Open Unemployment Rate 2021-2023



Based on the diagram above, Indonesia's Open Unemployment Rate (TPT) shows a significant decrease from 2021 to 2023. In 2021, the TPT was recorded at 6.49%, then decreased to 5.86% in 2022 and reached 5.32% in 2023 (BPS, 2021). Although there was a decrease, open unemployment remains a challenge, particularly with the rapid population growth rate and suboptimal school participation rate. The high population growth rate puts pressure on the labour market, while insufficient school participation results in low-skilled labour, which affects the match between job supply and demand. Therefore, it is crucial to analyse the impact of these factors on open unemployment to understand the dynamics of the labour market in Indonesia and formulate effective policies to reduce

unemployment in the future (Tempo, 2022). On the other hand, despite the decline in unemployment, a significant challenge remains, with 7.86 million Indonesians recorded as unemployed in 2023 (DDTC, 2023).

The rapid population growth in Indonesia adds pressure to the labour market. According to data from the Central Bureau of Statistics (BPS), Indonesia's population growth rate reached 1.25% per year during the 2020–2023 period. On the other hand, the school participation rate (APS) is also an important factor that affects an individual's ability to secure employment. A low APS can limit the labour force's access to formal jobs that require specific skills (Shari & Abubakar, 2022).

However, the unemployment issue in Indonesia cannot be viewed in isolation from the global and regional context. In the ASEAN-5 region (Indonesia, Malaysia, Thailand, the Philippines, and Vietnam), economic growth shows varied patterns. For example, data from the IMF (2023) indicates that the average economic growth rate of ASEAN-5 during the 2021–2023 period ranged from 4% to 5%, with Indonesia recording relatively stable growth. Nevertheless, unemployment remains a common challenge in the region. The following graph compares the unemployment rates in the ASEAN-5:

Table 1.1 Unemployment Rate in ASEAN-5

Negara	2021	2022	2023
Indonesia	6,5 %	5,9 %	5,3%
Malaysia	4,6 %	4,0 %	3,5 %
Thailand	1,5 %	1,2 %	1,0 %
Filipina	7,4 %	6,0 %	5,2 %
Vietnam	2,4 %	2,2 %	2,0 %

Source: Databoks - IMF Projections, Indonesia's Unemployment Highest in Southeast Asia

The direct relationship between the population growth rate, school

Participation rate and the open unemployment rate in Indonesia. This approach differs from previous studies, which have mainly highlighted the demographic impact on economic growth in general.

LITERATURE REVIEW

Open unemployment is a complex economic issue influenced by various factors. According to economic theory, open unemployment can be explained through different approaches depending on the factors analysed, such as the mismatch between labour skills and market demand, as well as the role of government policies in labour market flexibility.

According to classical theory, open unemployment can be addressed by focusing on supply and price mechanisms in the free market. Sultan, Rahayu, and Purwiyanta (2023) explain that unemployment occurs due to an imbalance in the labour market. When there is an excess supply of labour, wages will decrease, eventually stimulating labour demand. In this context, market mechanisms can solve the unemployment problem, as company production will increase with lower costs, which increases job opportunities.

Keynesian theory differs, focusing on low aggregate demand as the leading cause of unemployment. Ise, Kawung, and Rorong (2022) emphasise that unemployment occurs when consumption and investment are insufficient to support increased production. According to this theory, if aggregate demand is low, companies will not expand production or increase jobs, which causes open unemployment to rise.

Meanwhile, Neo-Classical theory argues that government policies or regulations that limit labour market flexibility can lead to open unemployment. Simanjuntak (2001) noted that implementing excessively high minimum wages or strict labour regulations can hinder companies from hiring more workers. This leads to higher open

unemployment because there are fewer incentives for companies to hire employees.

Additionally, open unemployment is often influenced by a mismatch between labour skills and market needs. Blanchard and Katz (1999) argue that this mismatch, especially during economic crises or recessions, causes labour to be unable to move to sectors that need it, worsening the open unemployment rate. In their research, Acemoglu (2002) explains that the transformation of the economic structure from agriculture to industry and services, combined with technological advancements and globalisation, reduces labour demand in specific sectors. This causes a more significant skill mismatch in the labour market, which, in turn, exacerbates open unemployment.

The theory of frictional unemployment is also relevant in this context, where Mishkin (2007) argued that frictional unemployment occurs because of the time gap needed for individuals to find new jobs. This can be exacerbated by the lack of training and education that aligns with labour market needs, as explained by Heckman and Carneiro (2003). They show that if the labour force lacks relevant skills, they will struggle to adapt to changes in the labour market, which increases open unemployment.

According to OECD (2010), government interventions such as training programs and skill development can help align the skills of the workforce with the ever-changing market needs, thus reducing open unemployment. This research aligns with the views of Blanchard and Katz (1999), who emphasise the importance of policies stabilising the labour market, such as skills enhancement programs, to reduce long-term unemployment.

RESEARCH OBJECTIVES

This research aims to analyse the relationship between the population growth rate and school participation rate with the open unemployment rate in Indonesia and

To evaluate their impacts. Additionally, this study focuses on developing solutions to reduce open unemployment by highlighting the important roles of education and effective population growth management.

RESEARCH HYPOTHESES Alternative Hypotheses:

- The population growth rate significantly affects the open unemployment rate in Indonesia.
- The school participation rate significantly affects the open unemployment rate in Indonesia.

RESEARCH MODEL

This study uses a quantitative method with a panel data analysis approach to analyse the impact of the population growth rate and school participation rate on the open unemployment rate in Indonesia. The panel data approach combines time-series and cross-sectional data, which allows for the analysis of variability over time and across provinces.

Data and Research Variables

1. Dependent Variable: Open Unemployment Rate (TPT)

The Open Unemployment Rate (TPT) is the dependent variable, measured as a percentage, representing the proportion of the labour force that is unemployed but actively seeking work. The operational definition of TPT is as follows:

- **Operational Definition:** The percentage of the labour force that is unemployed but still actively seeking work during a period.
- **Data Unit:** Percentage (%)
- **Data Source:** Central Bureau of Statistics (BPS)

2. Independent Variable: Population Growth Rate

Population Growth Rate

province's population size over a specific period.

- **Operational Definition:** The percentage change in population per year.
- **Data Unit:** Percentage (%)
- **Data Source:** Central Bureau of Statistics (BPS)

3. **Independent Variable: School Participation Rate (APS)**
The School Participation Rate (APS) is a measure that indicates the percentage of school-age children participating in formal education.

- **Operational Definition:** The percentage of school-age children enrolled in primary, secondary, and higher education levels.
- **Data Unit:** Percentage (%)
- **Data Source:** Ministry of Education and Culture

Type of Data

The data used in this study consists of panel data, which includes both cross-sectional data referring to data across provinces and time-series data covering the period from 2021 to 2023. By using panel data, this study can observe the dynamics of the relationship between variables over a more extended period and across provinces with different characteristics.

Analysis Tools and Statistical Tests

To analyse this panel data, multiple linear regression models are used with the following equation:

Explanation:

TPT_i : The open unemployment rate in province i

APS_{1i} : The school participation rate in province i

LPP_{2i} : The population growth rate in province ii
 β_0 : The constant (intercept)
 β_1 dan β_2 : The regression coefficients representing the influence of each variable on open unemployment
 ϵ_i : The error term, which includes other unobserved factors

Statistical Tests Used:

- Chow Test:** To choose between a fixed-effect or random-effect panel data regression model.
- Hausman Test:** To test whether the fixed-effect model is better than the random-effect model.
- Multicollinearity Test:** To ensure there is no high correlation between independent variables.
- Heteroscedasticity Test:** To check if the error variance is not constant across observations.
- Autocorrelation Test:** To ensure there is no correlation between error terms from different periods.
- Normality Test:** To ensure the residuals of the data are typically distributed.

RESULT AND DISCUSSION

Results

Chow Test

Table 1.2

Chow Test

Open unemploym ent	Coef.	Std. Err	T	P > t	95% Conf.	Interv al
Scho ol partici	- 52473 38	0.236 2713	- 2. 22	0.03 0	- 0.996 4648	- 0.053 0028

Population rate						
Population growth rate	1.3405 85	0.364 3588	3. 68	0.00 0	0.613 119	2.068 051
_cons	43.002 48	17.94 05	2. 40	0.19	7.183 121	78.82 183
Sigma_u	3.6206 238					
Sigma_e	0.7717 5279					
Rho	0.9565 3971					
						(Fraction of variance due to u_i)
						F test that all u_i=0: F(33,66) = 15.41
						Prob > F = 0.0000

Source: Stata14 Data Processing Results, 2024

Based on Table 1.2, the following is the interpretation of the statistical results:

• **School Participation Rate (APS)**
 The coefficient of -5247.338 indicates a negative relationship between the school participation rate and the open unemployment rate. A 1-unit increase in APS will reduce the open unemployment rate by 5247 units. This result is statistically significant because the PP-value is 0.030 ($P<0.05$).

• **Population Growth Rate**
 The coefficient of 1.340585 indicates a positive relationship between the population growth rate and the open unemployment rate. A 1% increase in the population growth rate will increase the open unemployment rate by 1.34%. This result is significant because the PP-value is 0.000 ($P<0.05$).

• **F-Statistic Probability (Fixed Effect Model)**

The probability value of the FF statistic is 0.0000, which is less than 0.05. This indicates that the Fixed Effect Model (FEM) is more appropriate for use compared to other models, such as the Random Effect Model.

Hausman Test

Table 1.2

Hausman Test

	(b)	(B)	(b-B)	
	Fe	Re	Difference	S.e
School participation rate	-0,5247338	-0,0252866	-0,4994472	0,2305026
Population growth rate	1,340585	1,260862	0,0797228	0,1596444

Source: Data Processing Results from Stata14, 2024

Output Analysis:

From the Hausman test analysis, the prob > chi2 value of 0.0022 is less than 0.05, indicating that the selected model is the Fixed Effects Model (FEM).

Lagrange Multiplier (LM) Test

Table 1.3
LM Test

	Var	Sd = sqrt (Var)
Open unemployment	3,408497	1,846212
E	0,5956024	0,7717528
U	2,889677	1,699905
Test: Var (u) = 0		
Chibar2 (01) = 80,82		
Prob > chibar2 = 0,0000		

Source: Data Processing Results from Stata14, 2024

The p-value of 0.0000 < 0.05 indicates that the selected model is the Fixed Effects Model (FEM). Based on the results from the Chow test, Hausman test, and LM test, the best model for this study is the Fixed Effects Model (FEM).

Results of Classical Assumption Tests

Since the selected model is FEM, classical assumptions need to be tested. The classical assumption tests used are multicollinearity and heteroskedasticity (Bazuki & Yuliadi, 2014: 183) (Napitupulu et al., 2021, p. 141).

1. Multiple Linear Regression Test

Table 1.4

Multiple Linear Regression Test

source	SS	DF	MS	Number of obs = 102
model	2.02251645	2	1.01125823	F (2,99) = 0.29
residual	342.235872	99	3.45692598	Prob > F = 0.7470
total	344.258189	101	3.40849692	R-squared = 0.0059 Adj R-squared= 0.0142 Root MSE = 1.8593

Open unemployement	coef	Std. Err	T	p> t	[95% conf. interval]
School participation rate	0.0165214	0.0319248	0.52	0.606	-0.0468243 0.079867
Population growth rate	0.1811282	0.4054717	0.45	0.656	-0.6234157 0.9856721
_cons	3.881786	2.362201	1.64	0.103	-0.8053326 8.568905

2. Multicollinearity Test

If the tolerance value (1/VIF) > 0.10 and the VIF value < 10, then there is no indication of multicollinearity (passes the multicollinearity test).

Table
Multicollinearity Test

1.5

Variable	VIF P	1/VIF
School participation rate	1, 04	0,958 948
Population growth rate	1, 04	0,958 948
Mean VIF	1, 04	

Source: Data processing results from Stata14, 2024.

The VIF value is < 10 , so it can be concluded that there is no sign of multicollinearity or that the assumptions of the multicollinearity test have been met.

3. Heteroskedasticity Test

If the $\text{sig.} > \alpha$, is more significant than 0.05, then heteroskedasticity does not occur (passes the heteroskedasticity test).

If the $\text{sig.} < \alpha$, is less than 0.05, then heteroskedasticity occurs (fails the heteroskedasticity test).

Table 1.6
Heteroskedasticity Test

chi2(1)	0,00
Prob > chi2	0.9912

Source: Data processing results from Stata14, 2024.

The probability value of $0.9912 > \alpha$, indicates that there is no heteroskedasticity (passes the heteroskedasticity test).

Discussions

Based on the Chow test:

- **School Participation Rate**
The decline in the unemployment rate due to increased school participation is consistent with the findings of research by Psacharopoulos and Patrinos (2018)](https://doi.org/10.1016/j.worlddev.2018.02.021), which showed that improved access to education positively impacts unemployment reduction by enhancing labour skills. Education provides skills relevant to the labour market, making it easier for individuals to be absorbed into the workforce.
- **Population Growth Rate**
The positive relationship between population growth rate and unemployment aligns with research by Todaro and Smith (2020), which indicates that rapid population growth creates significant pressure on the labour market, especially in developing countries. The imbalance between the growth of the labour force and the capacity to create jobs can lead to unemployment.
- **Selection of the Fixed Effect Model (FEM)**
The selection of this model is consistent with Greene's (2012) research, which emphasises that FEM is more appropriate for panel data when there are unique characteristics among observation units that do not change over time. Based on the Hausman test results, it shows that the Fixed Effect Model (FEM) is the best compared to the Random Effect Model (REM). FEM was chosen because the difference in coefficients between the two models is statistically significant, with a chi-square value of 12.22 and a Prob > Chi2 of 0.0022. The FEM model is more consistent and suitable for explaining the relationship between school participation rates, population growth rates, and the open unemployment rate.

Based on the results of the Lagrange Multiplier test show that the model with random effects is more appropriate than the ordinary least squares (OLS) regression model. The total variance of the open unemployment rate is 3.4085, with the variance of the idiosyncratic error (e) being 0.5956 and the variance of the cross-provincial random effect (u) being 2.8897. The null hypothesis test states that the variance of the random effect is equal to zero, which is rejected based on the chi-squared value of 60.82 with a probability (p-value) of 0.0000. Rejecting the null hypothesis indicates that the random effect is significant, so the model with random effects is more appropriate. This suggests that variations across provinces have a significant impact on the open unemployment rate and, therefore, should be considered in the analysis.

The results of the multiple linear regression test show that the school participation rate and population growth rate do not have a significant effect on the open unemployment rate. According to the model statistics, the F-statistic value of 0.29 with a probability (Prob > F) of 0.7470 indicates that the model as a whole is not significant. The R-squared value of 0.0059 suggests that only 0.59% of the variation in the open unemployment rate can be explained by the model. In contrast, the Adjusted R-squared value of -0.0142 reflects the model's very low predictive ability. Individually, the school participation rate has a coefficient of 0.0165 with a $P>|t|$ value of 0.606, while the population growth rate has a coefficient of 0.1811 with a $P>|t|$ value of 0.656. Both variables are not significant at the 5% confidence level. Additionally, the model constant of 3.8818 with a $P>|t|$ value of 0.103 indicates that the open unemployment rate is predicted to be 3.88 when all independent variables are zero. Overall, these results indicate that the model has very weak explanatory

power for the open unemployment rate, and the independent variables tested do not show significant effects. This suggests that there are other factors outside the model that have a greater influence on the open unemployment rate.

Based on the results of the multicollinearity test using the Variance Inflation Factor (VIF), it shows that the VIF value for the independent variables of school participation rate and population growth rate is 1.04 each, with a mean VIF of 1.04 as well. The low VIF values, below the threshold of 10, indicate that there are no serious multicollinearity issues in this model. Additionally, the values of 1/VIF for both variables are close to 1, which further supports this conclusion. Therefore, the independent variables in this model can be used together in the regression analysis without concern that the linear relationships between these variables will affect the results.

Based on the results of the heteroscedasticity test, the probability value (p-value) of 0.9912 is much greater than the standard significance level ($\alpha = 0.05$ or 5%). Since the p-value is > 0.05 , we fail to reject H_0 . This means that there is no heteroscedasticity issue in this regression model. The residuals have homogenous variance (homoscedastic). The regression model meets the classical assumptions.

Overall, although the school participation rate and population growth rate theoretically relate to the open unemployment rate, the analysis results show that neither of these variables has a statistically significant effect on the regression model used.

CONCLUSION

The results of this study provide a clearer picture of the importance of increasing school participation rates in reducing open unemployment. Improving education not only provides individuals with additional skills but also increases their chances of working in a more stable formal sector. On the other hand, high population growth becomes an inhibiting factor in reducing unemployment, as the limited labour market cannot absorb the continuously increasing workforce.

The Fixed-Effect model was chosen after statistical tests showed its advantages in handling variability between provinces and periods more effectively than other models, such as the Random-Effect Model. However, the low R-squared value indicates the presence of external factors affecting unemployment that are not covered by the variables studied. Therefore, this study suggests that while education and managing population growth rates are important factors, policies related to education quality, skills training, and more holistic economic management are necessary to achieve a more significant reduction in unemployment.

A new finding in this study emphasises the importance of the relationship between the quality of education, which should not only be measured by school participation rates but also by the alignment of education with the evolving labour market needs. Furthermore, more planned and strategic management of population growth becomes a key factor that needs to be addressed to reduce pressure on the labour market.

SUGGESTIONS

Education

1. The government needs to expand access to education and improve its overall quality across Indonesia. These efforts could include building educational facilities in remote

areas, improving the curriculum, and providing job training programs that align with market needs. Quality education will enhance the skills of the workforce, making them more competitive in the formal job market.

2. The government should focus on several important aspects within the education sector. First, vocational education needs to be strengthened, focusing on the technical and practical skills required in the workforce. Collaboration between the education sector and industry should be enhanced to ensure that graduates have skills that are relevant and match the demands of the labour market. Second, character education must become an integral part of the curriculum to foster positive attitudes and behaviours in students, ensuring they are not only equipped with technical skills but also possess strong ethical values for the workplace.
3. The government should also prioritize inclusive education, especially for underprivileged groups such as children from low-income families, people with disabilities, and children in conflict or disaster-stricken areas. Scholarship programs, educational subsidies, and other support facilities can help ensure that no child is left behind in obtaining a quality education.
4. Additionally, it is essential to develop educational technology to expand the reach of education to hard-to-reach areas. E-learning platforms, technology-based learning, and providing digital devices for students in remote areas can be effective solutions to ensure educational equity across Indonesia.

Population Growth Rate

1. Furthermore, managing the population growth rate is crucial. Measures such as implementing family planning programs and educating people about family planning can help reduce the pressure on the labour market caused by uncontrolled population growth.
2. Raising awareness about the importance of family welfare should become a focal point by providing broader information on the social and economic impacts of high birth rates and the benefits of sound family planning. More intensive reproductive health campaigns can help improve public understanding of healthier and more sustainable family choices.
3. Empowering women must be an integral part of the strategy for managing the population growth rate. Providing women with broader access to education, skills, and economic opportunities will encourage more rational family decisions and slow down birth rates. Empowering women also contributes to improving the quality of life for families and can improve their economic standing in society.
4. Building infrastructure that supports small families in both rural and urban areas is critical. Providing healthcare facilities, childcare centres, and easier access to education and employment can help families have a more controlled number of children without sacrificing their quality of life.
5. The government could also introduce economic incentives for families who choose to have fewer children, such as tax breaks or direct assistance for children's education and healthcare. This could encourage people to focus more on the quality of education

and child welfare rather than just quantity.

A more holistic approach to managing population growth can achieve a balance between controlled population size and a more prepared and qualified labour market.

In addition to education and population management, job skills training based on market demand should also be prioritised, particularly in regions with high unemployment rates. This training can focus on rapidly developing strategic sectors such as technology, services, and manufacturing. To support this, the government needs to increase local investment and build economic infrastructure that can drive the growth of new business sectors. This will not only create jobs but also provide a positive boost to the overall economy.

Moreover, further research is needed to understand other factors influencing open unemployment, such as economic policies, infrastructure development, and the impact of technological advancements on the labour market. By integrating new findings, more comprehensive policies can be designed to reduce unemployment rates in Indonesia. This comprehensive approach will encourage the creation of a more inclusive and sustainable labour market (Shari & Abubakar, 2022; Wooldridge, 2013).

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