



The Effects of Higher Education and Health on the Open Unemployment Rate in Indonesia

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ABSTRACT

Open unemployment remains one of Indonesia's major socioeconomic challenges because it reflects the economy's ability to absorb labor and optimize human capital. Although higher education participation and public health indicators have improved over the past three decades, empirical evidence regarding their long-term influence on open unemployment using national time-series data remains limited and inconclusive. This study aims to examine the effects of higher education and health on Indonesia's open unemployment rate during the 1994–2023 period. A quantitative approach with a descriptive-associative design was employed using secondary time-series data obtained from the World Bank Open Data. Open unemployment rate was used as the dependent variable, while higher education was proxied by School Enrollment, Tertiary, and health was measured by Life Expectancy at Birth. Multiple linear regression analysis was conducted after fulfilling the classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation using the Cochrane Orcutt procedure. The findings reveal that higher education has a negative and statistically significant effect on the open unemployment rate, indicating that increased participation in tertiary education enhances human capital quality and improves employment opportunities. Conversely, health does not significantly affect open unemployment. Simultaneously, higher education and health significantly influence open unemployment, with an Adjusted R² value of 0.472, indicating that both variables explain 47.2% of the variation in unemployment, while the remaining variation is explained by other economic factors. These findings highlight that higher education plays a more dominant role than health in reducing open unemployment in Indonesia.

Keywords: *Health, Higher Education, Unemployment Rate*

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INTRODUCTION

The Open Unemployment Rate (TPT) is a macroeconomic indicator that reflects a country's ability to absorb the workforce and is an important measure of the success of economic development and social welfare. According to the International Labor Organization (ILO), high levels of unemployment not only reduce national productivity, but also increase poverty, income inequality and social vulnerability due to suboptimal utilization of human resources (ILO, 2024). In Indonesia, the dynamics of the open unemployment rate show fluctuations influenced by various economic shocks, such as the monetary crisis in 1998, the global financial crisis in 2008, and the COVID-19 pandemic in 2020, which had a significant impact on reducing the national labor absorption capacity (World Bank, 2024). This condition shows that the problem of unemployment is not only influenced by slowing economic growth, but is also closely related to the quality of human capital possessed by the workforce (Becker, 1993). In the perspective of Human Capital Theory, investment in education and health is believed to be able to increase productivity, skills and competitiveness of the workforce so that it can increase opportunities to obtain work and reduce unemployment rates (Mincer, 1974; Becker, 1993). Therefore, studying the influence of higher education and health on the level of open unemployment is important to provide empirical evidence regarding the effectiveness of human capital development in supporting labor absorption in Indonesia during the 1994 - 2023 period.

The long-term trend of Indonesia's open unemployment rate demonstrates that labor market performance remains highly vulnerable to both domestic and global economic disturbances. Based on World Bank data, the unemployment rate increased sharply during the Asian financial crisis, gradually declined during the subsequent economic recovery, and surged again during the COVID-19 pandemic before showing signs of recovery in recent years. This pattern indicates that fluctuations in unemployment are driven not only by economic cycles but also by structural challenges in the labor market, including limited employment opportunities and disparities between labor supply and labor demand (Yunensy & Kistanti, 2025). Furthermore, recent studies argue that labor market resilience depends not only on macroeconomic stability but also on the ability of the workforce to adapt to technological change and evolving industrial needs (Salsabilla et al., 2025). Despite improvements in Indonesia's economic performance after the pandemic, unemployment remains a policy concern because job creation has not kept pace with the growth of the labor force, particularly among educated workers (International Labour Organization, 2025). These conditions suggest that strengthening human capital through education and health policies should be accompanied by labor market reforms capable of improving employment absorption and reducing structural unemployment (OECD, 2024).

Higher education has long been recognized as one of the most important dimensions of human capital development because it enhances individuals' knowledge, technical competencies, and employability in an increasingly competitive labor market. In Indonesia, the gross enrollment rate in higher education has shown a consistent

upward trend over the last three decades, reflecting the government's commitment to expanding access to tertiary education and improving the quality of human resources. Despite this progress, the increase in university participation has not always been accompanied by proportional growth in employment opportunities. Recent studies have reported that many university graduates continue to experience difficulties entering the labor market due to skill mismatches, overeducation, and the limited availability of high-skilled jobs, resulting in educated unemployment (Ardhana et al., 2025). Similarly, Karmeli et al. (2021) argue that discrepancies between graduates' competencies and labor market demands remain one of the primary determinants of unemployment among tertiary education graduates in Indonesia. These findings indicate that although higher education is expected to improve labor market outcomes, its effectiveness in reducing unemployment remains an empirical issue that requires further investigation using long-term macroeconomic data.

Health is another fundamental component of human capital because it directly influences workers' productivity, labor force participation, and long-term economic performance. A healthier population tends to have greater physical and cognitive capacity, lower absenteeism, and higher adaptability to technological and organizational changes in the workplace. In Indonesia, improvements in life expectancy over recent decades reflect substantial progress in public health services and living standards. Nevertheless, better health outcomes do not necessarily translate into lower unemployment rates, particularly when labor demand fails to keep pace with the growing labor supply. Recent empirical studies suggest that the relationship between health and unemployment is complex and may depend on labor market conditions, economic structure, and employment policies rather than health status alone (Wahyudi, 2024). Likewise, Gultom et al. (2025) found that although health contributes positively to labor productivity, its direct impact on employment absorption remains limited without adequate job creation and economic expansion. These findings indicate that improvements in health should be complemented by labor market policies capable of generating productive employment opportunities, making it necessary to re-examine the effect of health on Indonesia's open unemployment rate using long-term time-series data.

Previous studies have extensively examined the determinants of unemployment from various economic perspectives; however, their findings remain inconclusive, particularly regarding the role of higher education and health as dimensions of human capital. Several studies have reported that higher education significantly reduces unemployment by improving workers' productivity and employability, whereas others argue that the expansion of tertiary education may increase educated unemployment due to skill mismatch and labor market imbalance (Ardhana et al., 2025). Likewise, empirical evidence on the relationship between health and unemployment is inconsistent. Some studies conclude that better health enhances labor productivity and employment opportunities, while others find that health improvements alone are insufficient to reduce unemployment without parallel job creation and economic growth

(Gultom et al., 2025; Wahyudi, 2024). Furthermore, most previous studies in Indonesia have relied on cross-sectional or panel data, whereas studies employing long-term national time-series data to simultaneously examine higher education and health remain limited. These inconsistencies highlight the need for further investigation using a comprehensive time-series approach to obtain more robust empirical evidence on the determinants of open unemployment in Indonesia.

Based on the identified research gaps, this study contributes to the existing literature in several ways. First, it simultaneously examines higher education and health as key components of human capital in explaining Indonesia's open unemployment rate. Second, unlike most previous studies that employed cross-sectional or panel datasets, this study utilizes national time-series data covering a thirty-year period (1994 - 2023), enabling a more comprehensive analysis of the long-term relationship between human capital development and unemployment. Third, the study provides updated empirical evidence that may assist policymakers in formulating integrated education, health, and labor market policies to improve employment absorption. Therefore, this study aims to analyze the effect of higher education and health on Indonesia's open unemployment rate during the 1994 - 2023 period using a multiple linear regression model.

RESEARCH METHODOLOGY

This study employed a quantitative research approach using a descriptive-associative design to examine the effects of higher education and health on Indonesia's open unemployment rate. The study population comprised annual macroeconomic data for Indonesia, while the sample consisted of 30 annual observations covering the period 1994 - 2023, selected using a census (total sampling) approach because all available observations within the study period were included. Secondary data were obtained from the World Bank Open Data database. Open unemployment rate was used as the dependent variable, whereas higher education was measured by School Enrollment, Tertiary (% gross), and health was proxied by Life Expectancy at Birth (years). Data collection was conducted through documentation and literature review to ensure that the selected indicators were conceptually and empirically consistent with the Human Capital Theory and previous empirical studies.

The data were analyzed using multiple linear regression to estimate the effects of higher education and health on open unemployment. Before estimating the regression model, classical assumption tests were performed, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests. Because the initial model exhibited autocorrelation, the Cochrane Orcutt procedure was applied to obtain unbiased and efficient parameter estimates. The hypotheses were evaluated using partial (t-test) and simultaneous (F-test) significance tests, while the coefficient of determination (Adjusted R^2) was employed to assess the explanatory power of the model. Statistical analyses were conducted using SPSS version 26. Since the study relied exclusively on secondary time-series data from a single country, the findings

should be interpreted within the Indonesian context and may not be directly generalizable to other countries or different institutional settings.

RESULT AND DISCUSSION

The findings of this study

Asumsi Classic Test

Normality Test

The normality test was conducted using the One-Sample Kolmogorov–Smirnov test to determine whether the regression residuals followed a normal distribution. The test results showed an Asymp. Sig. (2-tailed) value of 0.682, which exceeded the significance level of 0.05, indicating that the residuals were normally distributed. Therefore, the normality assumption required for multiple linear regression analysis was satisfied, and the regression model was considered appropriate for subsequent statistical analysis.

Multicollinearity Test

The multicollinearity test was performed to determine whether a high correlation existed among the independent variables in the regression model. As presented in Table 2, the tolerance values for higher education and health were 0.255, exceeding the minimum threshold of 0.10, while the Variance Inflation Factor (VIF) values for both variables were 3.916, which were below the critical value of 10. These results indicate that no multicollinearity was detected among the independent variables. Therefore, each predictor provides unique information to the regression model, and the estimated coefficients can be interpreted reliably.

Heteroscedasticity Test

The heteroscedasticity test was conducted using the Glejser test to examine whether the variance of the regression residuals remained constant across all observations. The significance values for the higher education and health variables were 0.627 and 0.087, respectively, both of which exceeded the significance level of 0.05. These findings indicate that the regression model does not suffer from heteroscedasticity. Therefore, the residual variance can be considered homoscedastic, suggesting that the regression model satisfies one of the key assumptions of the classical linear regression model and is appropriate for further hypothesis testing.

Autocorrelation test

The autocorrelation test was performed using the Durbin - Watson (DW) statistic to determine whether serial correlation existed in the regression residuals. The initial estimation produced a Durbin - Watson value of 0.566, indicating the presence of positive autocorrelation in the regression model. To address this issue, the Cochrane–Orcutt transformation was applied, which is commonly used to correct first-order autocorrelation in time-series regression models. Following the transformation, the Durbin - Watson statistic increased to 1.631, falling within the acceptable range for the

absence of autocorrelation. These results indicate that the autocorrelation problem was successfully resolved, and the revised regression model satisfies the classical assumption of independent residuals. Therefore, the model was considered appropriate for subsequent hypothesis testing

Hypothesis Testing

Partial Test (t test)

A partial test (t test) was carried out to determine the effect of each independent variable on the open unemployment rate individually. The results of the Higher Education Variable Test on the unemployment rate are in the following table.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2.610	2.379		1.097	.283
LAG_Pendidikan	-.119	.028	-.694	-4.305	.000
LAG_Kesehatan	.011	.107	.016	.102	.919

a. Dependent Variable: LAG_Pengangguran

Based on the analysis results in Table 1, the higher education variable has a regression coefficient of -0.119 with a significance value of 0.000 ($p < 0.05$). These results show that higher education has a negative and significant effect on the level of open unemployment in Indonesia. Thus, increasing public participation in higher education tends to reduce the level of open unemployment. Meanwhile, the health variable which is proxied by life expectancy at birth (Life Expectancy at Birth) has a regression coefficient of 0.011 with a significance value of 0.919 ($p > 0.05$). These results indicate that health has no significant effect on the open unemployment rate during the study period. Therefore, only the higher education variable is proven to have a significant influence on the level of open unemployment in Indonesia.

Simultaneous test

A simultaneous test (F test) was carried out to determine the influence of higher education and health variables together on the level of open unemployment in Indonesia. Simultaneous test results can be seen in table 2 below.

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	6.051	2	3.025	11.612	.000 ^a
Residual	6.774	26	.261		
Total	12.824	28			

a. Predictors: (Constant), LAG_Kesehatan, LAG_Pendidikan

b. Dependent Variable: LAG_Pengangguran

Based on the analysis results in Table 2, the Fcount value is 11.612, while the Ftable value is 3.35 at a significance level of 5% with degrees of freedom $df1 = 2$ and $df2 = 27$. Because $F_{count} > F_{table}$ ($11.612 > 3.35$) and a significance value of 0.000 ($p < 0.05$), it can be concluded that the variables of higher education and health simultaneously have a significant effect on the level of open unemployment in Indonesia. These results indicate that the regression model used meets the goodness of fit of the model so it is suitable to be used to test the relationship between the independent variables and the dependent variable.

Determination Coefficient

The Determination Coefficient Value can be seen in table 3 below

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.687 ^a	.472	.431	.51041

a. Predictors: (Constant), LAG_Kesehatan, LAG_Pendidikan

The Adjusted R^2 value obtained was 0.472, which shows that 47.2% of the variation in the open unemployment rate in Indonesia during the 1994–2023 period can be explained by higher education and health variables. Meanwhile, the remaining 52.8% is influenced by other factors not included in the research model, such as economic growth, investment, inflation, wage levels, technological developments and employment policies. These results show that the model has quite good explanatory power, although there are still other factors that contribute to changes in the open unemployment rate.

Discussion

The Effect of Higher Education on the Open Unemployment Rate in Indonesia

The findings of this study indicate that higher education has a negative and significant effect on the open unemployment rate in Indonesia during the 1994–2023 period. This result suggests that increasing participation in higher education contributes to reducing unemployment by improving the quality of human capital. Individuals with higher educational attainment generally possess better knowledge, analytical skills, problem-solving abilities, and professional competencies, enabling them to adapt more effectively to changes in labor market demands. Consequently, higher education enhances employability and increases the likelihood of obtaining formal employment, thereby contributing to lower unemployment rates. These findings confirm that investment in higher education plays an important role in improving labor productivity and supporting sustainable economic development.

These findings are consistent with Human Capital Theory, which argues that education is a form of long-term investment capable of increasing workers' productivity, knowledge, and skills, thereby improving their employment opportunities and lifetime

earnings (Becker, 1993). Human capital accumulated through higher education enables individuals to respond more effectively to technological progress, structural economic transformation, and increasing labor market competition. Similarly, the OECD (2024) emphasizes that tertiary education remains one of the most important determinants of labor market performance because graduates generally experience lower unemployment rates and higher labor force participation than individuals with lower educational attainment.

The results of this study also support recent empirical findings. Ardhana et al. (2025) reported that higher education improves graduates' competitiveness by enhancing competencies required in the labor market, although skill mismatch remains a significant challenge in Indonesia. Likewise, Sipayung et al. (2025) found that investment in education contributes positively to labor productivity and employment absorption through improvements in human capital quality. At the international level, the World Bank (2024) also highlights that countries with greater investment in education tend to achieve better employment outcomes because education facilitates workforce adaptability to technological change and economic restructuring. These studies strengthen the argument that higher education remains one of the key drivers of labor market performance despite the continuing challenges posed by educational mismatch.

From a policy perspective, these findings imply that expanding access to higher education alone is insufficient to reduce unemployment unless it is accompanied by improvements in educational quality and stronger alignment between university curricula and labor market needs. Strengthening collaboration between universities, industries, and government institutions through internship programs, competency-based curricula, digital skill development, and industry-oriented learning is therefore essential to enhance graduate employability. Such policies are expected to maximize the contribution of higher education to employment creation while supporting Indonesia's long-term human capital development strategy.

The Effect of Health on the Open Unemployment Rate in Indonesia

The findings of this study indicate that health, as measured by life expectancy at birth, does not have a statistically significant effect on the open unemployment rate in Indonesia during the 1994 - 2023 period. This result suggests that improvements in population health alone are insufficient to directly reduce unemployment. Although better health enhances individuals' physical capacity, productivity, and ability to participate in economic activities, employment opportunities are primarily determined by labor market conditions, economic growth, investment, and the availability of productive jobs. Consequently, improvements in health outcomes may increase the quality of the labor force, but they do not automatically guarantee higher employment absorption in the absence of sufficient labor demand.

From the perspective of Human Capital Theory, health is recognized as an important investment that enhances workers' productivity and economic performance

(Becker, 1993). However, the theory also implies that the returns to human capital depend on the availability of economic opportunities capable of utilizing workers' skills and productivity. Therefore, although Indonesia has experienced continuous improvements in life expectancy over the past decades, these improvements have not necessarily translated into lower unemployment because labor market absorption remains constrained by structural factors. This finding suggests that health contributes indirectly to employment through increased productivity rather than exerting an immediate influence on unemployment.

The results of this study are consistent with the findings of Gultom et al. (2025), who reported that health positively affects labor productivity but does not necessarily increase employment opportunities without adequate economic expansion and job creation. Likewise, Wahyudi (2024) argued that improvements in public health primarily enhance workforce productivity, while employment outcomes are more strongly influenced by economic structure and labor market dynamics. Furthermore, the World Health Organization (2024) emphasizes that healthier populations contribute to economic development through higher productivity; however, the impact on employment depends largely on supportive labor market and macroeconomic policies. These findings indicate that health should be viewed as an enabling factor for labor productivity rather than as a direct determinant of unemployment.

From a policy perspective, these findings imply that improvements in public health should be integrated with broader employment and economic development strategies. Investments in health services need to be complemented by policies that encourage investment, industrial expansion, entrepreneurship, and job creation to ensure that a healthier workforce can be effectively absorbed into productive employment. Therefore, strengthening coordination between health, education, and labor market policies is essential to maximize the contribution of human capital development to sustainable employment growth in Indonesia.

The Simultaneous Effect of Higher Education and Health on the Open Unemployment Rate in Indonesia

The results of this study demonstrate that higher education and health jointly have a significant effect on the open unemployment rate in Indonesia. These findings indicate that human capital development should not be viewed as the outcome of a single factor but rather as the result of complementary investments in education and health. While higher education enhances knowledge, technical skills, and employability, health improves workers' physical and cognitive capacity to participate effectively in productive economic activities. The significant simultaneous effect observed in this study suggests that both dimensions of human capital collectively contribute to explaining variations in Indonesia's open unemployment rate, although their individual contributions differ.

The findings are consistent with Human Capital Theory, which argues that investment in education and health increases the quality of human resources, enhances

productivity, and supports long-term economic growth (Becker, 1993). According to this theory, education and health are complementary forms of human capital because improvements in one dimension can strengthen the effectiveness of the other. However, the results of this study also indicate that the contribution of education is more dominant than health in reducing unemployment, suggesting that labor market outcomes are more directly influenced by educational attainment and workforce competencies than by improvements in health status alone.

These findings are supported by previous empirical studies. Sipayung et al. (2025) reported that strengthening human capital through education and health contributes to improving labor productivity and employment outcomes, although education tends to have a stronger direct influence on employment opportunities. Similarly, Gultom et al. (2025) concluded that health improves labor productivity, but its impact on employment depends on the availability of productive jobs and favorable economic conditions. Furthermore, the World Bank (2024) emphasizes that countries investing simultaneously in education and health generally achieve stronger human capital accumulation, which supports sustainable employment and inclusive economic development.

From a policy perspective, these findings suggest that reducing open unemployment requires integrated human capital policies rather than sector-specific interventions. Expanding access to higher education should be accompanied by efforts to improve educational quality, strengthen university–industry collaboration, and enhance graduates' competencies in line with labor market needs. At the same time, continued investment in public health remains essential to maintain workforce productivity and resilience. Therefore, education, health, labor, and industrial policies should be implemented in a coordinated manner to maximize employment creation and strengthen Indonesia's long-term economic competitiveness.

Theoretical and Policy Implications

The findings of this study provide important theoretical implications for the development of Human Capital Theory in explaining the relationship between human capital investment and labor market outcomes in Indonesia. The significant negative effect of higher education on the open unemployment rate confirms that investment in tertiary education enhances human capital quality by improving knowledge, skills, and workforce competitiveness, thereby increasing employment opportunities. Conversely, the insignificant effect of health suggests that improvements in health status alone are insufficient to reduce unemployment without adequate labor market demand and productive employment opportunities. These findings indicate that the effectiveness of human capital investment depends not only on improvements in education and health but also on broader economic conditions capable of absorbing a more productive workforce. Therefore, this study enriches the empirical evidence on Human Capital Theory by demonstrating that education plays a more direct role than health in reducing open unemployment in Indonesia.

From a policy perspective, the findings suggest that efforts to reduce open unemployment should emphasize integrated human capital development through improvements in higher education quality, stronger alignment between university curricula and labor market needs, and the expansion of competency-based and digital skills training. At the same time, investments in public health should be complemented by policies that stimulate job creation through industrial development, investment promotion, and entrepreneurship support to ensure that a healthier workforce can be effectively absorbed into productive sectors. Furthermore, this study contributes to the existing literature by utilizing a 30-year national time-series dataset (1994–2023), providing a more comprehensive understanding of the long-term relationship between higher education, health, and open unemployment in Indonesia. Nevertheless, the model explains 47.2% of the variation in the open unemployment rate, indicating that other macroeconomic factors, such as economic growth, investment, inflation, wages, and labor market policies, should be incorporated into future studies to obtain a more comprehensive explanation of unemployment dynamics.

CONCLUSION

This study concludes that higher education and health have different roles in influencing the open unemployment rate in Indonesia during the 1994 - 2023 period. Higher education was found to have a negative and statistically significant effect on the open unemployment rate, indicating that increased participation in tertiary education contributes to improving human capital quality, enhancing workforce competitiveness, and expanding employment opportunities. In contrast, health, as measured by life expectancy at birth, did not have a significant direct effect on the open unemployment rate, suggesting that improvements in health alone are insufficient to reduce unemployment without adequate labor market demand and productive job creation. Nevertheless, higher education and health jointly exerted a significant influence on the open unemployment rate, confirming that human capital development remains an important determinant of labor market performance in Indonesia. These findings support Human Capital Theory, while also indicating that the effectiveness of human capital investment depends on broader economic conditions and labor market absorption. Therefore, policies aimed at reducing unemployment should not only expand access to higher education and improve public health but also strengthen the alignment between education and labor market needs, promote productive investment, and create sustainable employment opportunities. Future studies are encouraged to incorporate additional macroeconomic variables and apply more advanced econometric techniques to provide a more comprehensive understanding of the determinants of unemployment in Indonesia.

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