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Poverty and Economic Growth: The Socioeconomic Determinants of Stunting Prevalence in Indonesia

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ABSTRACT

Research Originality: This study provides recent provincial evidence from Indonesia (2010–2024) on the nexus between poverty, economic growth, and stunting.

Research Objectives: This study aims to investigate the effects of poverty and economic growth on stunting prevalence in Indonesia, using parental education level and the open unemployment rate as proxies.

Research Methods: This study employs path analysis using a natural-log approach and analyzes data from 2000 to 2023. Key variables include socioeconomic determinants and stunting prevalence.

Empirical Results: The findings of this study include: poverty has a negative and significant effect on parental education and open unemployment, while economic growth has no significant effect on parental education and open unemployment; poverty affects the prevalence of stunting through parental education and open unemployment, while economic growth does not affect the prevalence of stunting through parental education and open unemployment.

Implications: The findings suggest that reducing stunting requires inclusive economic growth and effective poverty alleviation. Therefore, policies should focus on strengthening social protection and improving access to nutrition and health services.

Keywords:
parental education level; open unemployment rate; path analysis; child health; social problem

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INTRODUCTION

Stunting remains one of the most persistent public health and human development challenges in Indonesia (Beal et al., 2018). Most provinces in Indonesia have been in a moderate prevalence of stunting from 2021, 2022, and 2024, namely 20%-29.9%. Data from 2024 shows that several provinces have high stunting prevalence rates, particularly in the eastern region, namely West Sulawesi (35.4%), Central Papua (32.5%), Southwest Papua (30.5%), East Nusa Tenggara (37%), and the province with the very high status is Mountainous Papua (40%). Provinces in the low category are South Sumatra (15.9%), Lampung (15.9%), Riau Islands (15%), North Kalimantan (17.6%), East Java (14.7%), Central Java (17.1%), West Java (15.9%), Jambi (17.1%), DKI Jakarta (17.3%), DI Yogyakarta (17.4%), Bengkulu (18.8%), and Bali (8.7%) (Astuti et al., 2025).

In Indonesia, Beal et.al. (2018) found that community and societal factors, particularly poor access to health services and living in rural areas, have been repeatedly linked to child stunting. Households living below the poverty line generally experience limited access to nutritious food, healthcare services, sanitation facilities, and educational opportunities, thereby increasing children's vulnerability to growth failure (Handoko et al., 2024; Mudd et al., 2021; Widyaningsih et al., 2022). Handoko et al. (2024) and Widyaningsih et al. (2022) found that children from low-income households and rural communities consistently have a higher risk of stunting than those from wealthier households and urban areas. Socioeconomic inequality, therefore, plays a crucial role in shaping nutritional outcomes among children. In Ethiopia, Gebregergis (2024) found that, despite a notable decline in the average rates of stunting and underweight prevalence, the relative and absolute gaps between different demographic and socioeconomic groups have widened. This finding confirmed that higher levels of maternal education and household wealth significantly benefited children from better socioeconomic backgrounds, reducing their risk of malnutrition. Socioeconomic disparities are the primary driver of inequality in child malnutrition. These findings are consistent with studies by (Wand et al., 2024), in South Africa (Saidu & Danielson, 2024), (Ijaiya et al., 2024), and (Kalinda et al., 2023)

According to Ayue et al. (2025) and Mary (2018), economic growth is theoretically expected to improve household welfare and reduce malnutrition by increasing income, expanding employment opportunities, and enhancing government capacity to provide social services. However, according to Soriano and Garrido (2016), the relationship between economic growth and stunting remains inconclusive. In Bangladesh, Yaya et al. (2020) found no significant association between economic growth and child nutritional status in developing countries. The prevalence of stunting decreased with increasing GDP per capita. This was more pronounced among children from the richest quintile. The magnitude of the association was higher among children from low-income countries, suggesting that households in the poorest quintile were typically the least likely to benefit from economic gains.

The findings could serve as a building block needed by Suparman and Muzakir (2023) and Yang et al. (2024) because, consequently, provinces experiencing high economic

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growth may still exhibit high stunting prevalence when growth is not accompanied by inclusive development and improvements in human capital (Alemu et al., 2025; Aswi et al., 2025; Olakunle, 2024; Rogna, 2024). Kustanto (2021) found that empirical evidence from Indonesia indicates a dynamic relationship between economic growth, poverty, and stunting, suggesting that economic performance alone is insufficient to eliminate chronic malnutrition.

Beyond poverty and economic growth, several socioeconomic determinants have been recognized as important factors influencing stunting prevalence by Ariet et al. (2025). Previous studies have highlighted the significance of parental education, employment status, household socioeconomic conditions, access to healthcare, sanitation, and residential location (Arief et al., 2025; Baliwati & Rusyda, 2025; Siramaneerat et al., 2024). Higher parental education is associated with improved nutritional knowledge and childcare practices, whereas unemployment and socioeconomic deprivation limit households' capacity to provide adequate nutrition and health services (Ayue et al., 2025; Siramaneerat et al., 2024). These findings support the view that stunting should be examined through a multidimensional socioeconomic framework rather than a purely health-oriented perspective (Beal et al., 2018).

Higher parental education is associated with improved nutritional knowledge and childcare practices, whereas unemployment and socioeconomic deprivation limit households' capacity to provide adequate nutrition and health services (Ijaiya et al., 2024; Siramaneerat et al., 2024). The prevalence of stunting is commonly used as an indicator of community nutritional status and broader socioeconomic deprivation (Siramaneerat et al., 2024). A high prevalence of stunting often reflects broader structural development problems, such as poverty, inadequate water and sanitation infrastructure, limited access to education, and poor healthcare services (Cameron et al., 2021). The long-term consequences of stunting include lower cognitive performance, diminished human capital, and a higher risk of disease and premature mortality (Suparman & Muzakir, 2023). Galasso and Wagstaff (2019) state that stunting adversely affects individual productivity and human capital formation, which collectively may reduce national economic growth and GDP over time.

Worker productivity plays a fundamental role in generating national income and supporting government fiscal capacity through increased economic output and tax revenues. This is the source of the nation's economic revenue, derived from converting worker productivity into government spending (Hornok & Raeskyesa, 2024). Stunting is the cause of this. contribute to the high costs in the medical field, especially those driven by stunted conditions (Hamzah et al., 2025; Saidu & Danielson, 2024). Those who suffer from this are more likely to experience degenerative illnesses or may pass away too soon. Data on national stunting, its causes, and its effects are intimately related to this study (Kustanto, 2021). This study examines how poverty and economic growth, as mediated by parental education and open unemployment, affect the prevalence of stunting in Indonesia between 2000 and 2023, using the natural logarithm.

Beal et al. (2018) showed that child stunting in Indonesia is closely related to limited access to health services and rural conditions. Meanwhile, Gebregergis (2024) found that

although the prevalence of stunting and underweight in Ethiopia declined, disparities between socioeconomic groups actually increased. Higher maternal education and better household welfare levels have been shown to reduce the risk of child malnutrition, making socioeconomic inequality a major factor causing nutritional disparities. These findings align with research by Wang et al. (2024), Saidu and Danielson (2024), Ijaiya et al. (2024), and Kalinda et al. (2023).

Despite the extensive literature on stunting in Indonesia, research has largely focused on household and child-level determinants, with limited attention to the combined influence of macroeconomic and socioeconomic factors (Anita Kartika Putri & Ida Budiarty, 2026; Kustanto, 2021a; Lumbantoruan & Azansyah, 2024; Yaya et al., 2020). Studies by Kustanto (2021) and Beal et al. (2018) emphasize that, moreover, poverty and economic growth are often examined separately, and few studies have integrated poverty, economic growth, unemployment, and parental education within a single framework to explain provincial variations in stunting prevalence.

Addressing this gap, this study develops an integrative socioeconomic model that simultaneously analyzes the direct and indirect effects of economic growth, poverty, unemployment, and parental education on stunting prevalence in Indonesia. The novelty of this research lies in its examination of parental education and unemployment as mediating pathways linking economic conditions to stunting outcomes. Accordingly, this study aims to investigate the effects of poverty and economic growth on parental education and unemployment, and their direct and indirect impacts on stunting prevalence across Indonesian provinces. The findings are expected to enrich the literature on public health and development economics while providing evidence-based policy recommendations for accelerating stunting reduction through inclusive socioeconomic development.

METHODS

This study covers 34 provinces in Indonesia, and most provinces are in moderate stunting prevalence, with rates of 20% - 29.9% in 2021, 2022, and 2024. Similarly, areas with low poverty rates are mostly located in western Indonesia. Various factors influence the prevalence of stunting, including unemployment, parental education, poverty, and economic growth (Arief et al., 2025). Secondary data were used in this study. The panel data comprises 34 Indonesian provinces over 24 years (2000-2023). The data were obtained from various sources, including the Central Bureau of Statistics (BPS) and the United Nations Children's Fund (UNICEF). Table 1 presents the more detailed information about the operational variables.

Path analysis using natural-log data will reduce bias due to unequal variable measurements (Jinuntuya & Jinuntuya, 2025). Minimal interval measurement scale, additive qualities, causal links, recursiveness, and linear relationships among variables are among the assumptions of path analysis (Sarstedt et al., 2021). Based on previous research, the conceptual framework of this research is as follows, in Figure 1.

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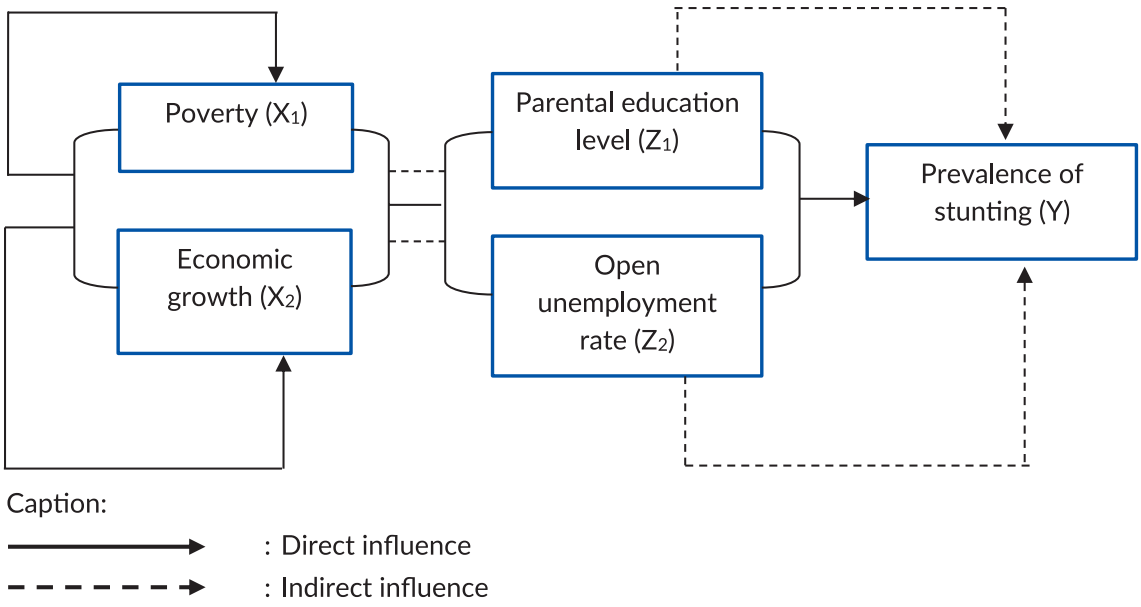
Table 1. Operational Variables

Variables	Definitions	Measurements	Sources	References
Poverty	Proportion of the population living below the poverty line	Poverty rate (%)	BPS	(Wang et al., 2024)
Economic Growth	Indicator of economic performance and its potential to reduce the prevalence of stunting (GRDP)	GRDP per capita (%)	BPS	(Haider et al., 2023; Matovu et al., 2026)
Parental Education Rate	The highest level of education, defined as the level of education completed by the parent during their education	People (soul)	BPS	(Supadmi et al., 2024)
Open Unemployment Rate	The percentage of the number of unemployed to the total workforce	proportion of unemployment rate (%)	BPS	(Apriyanti & Yanuarti, 2024)
Prevalency Stunting	The nutritional status of children less than five years of age was measured anthropometrically	The percentage of the stunting rate	Riskeda, SSGBI	(Siramaneerat et al., 2024; Ssentongo et al., 2021)

Figure 1. Conceptual Framework



The formulation of the path analysis model is as follows:

1. The influence of poverty and economic growth on parental education levels

$$Z1 = \beta 1\ X1 + \beta 2\ X2 + \varepsilon i \quad (1)$$

which: Z1 is parental education level, X1 is poverty, X2 is economic growth, β1 and β2 are the coefficients of the path, and εi is the standard error.

2. The influence of poverty, economic growth, parental education level, and open unemployment rate on the open unemployment rate

$$Z2 = \beta 3\ X1 + \beta 4\ X2 + \epsilon i \quad (2)$$

which: Z2 is the open unemployment rate, X1 is poverty, X2 is economic growth, β3 and β4 are the coefficients of the path, and εi is the standard error.

3. The influence of poverty, economic growth, parental education level, and open unemployment rate on the prevalence of stunting

$$Y = \beta 5\ X1 + \beta 6\ X2 + \beta 7\ Z1 + \beta 8\ Z2 + \epsilon i \quad (3)$$

which: Y is stunting prevalence, X1 is poverty, X2 is economic growth.

4. The influence of poverty and economic growth on the prevalence of stunting through parental education level

$$Y = \alpha 1\ X1 + \alpha 2\ X2 + \alpha 3\ Z1 + \epsilon i \quad (4)$$

Which: Y is stunting prevalence, X1 is poverty, X2 is economic growth, and Z1 is parental education level.

5. The influence of poverty and economic growth on the prevalence of stunting through the unemployment rate.

$$Y = \alpha 4\ X1 + \alpha 5\ X2 + \alpha 6\ Z2 + \epsilon i \quad (5)$$

Which: Y is stunting prevalence, X1 is poverty, X2 is economic growth, and Z2 is open unemployment rate.

RESULTS AND DISCUSSION

Table 2 presents the descriptive statistics for the variables used in the analysis, all of which are natural logarithms. The average stunting prevalence is 3.5096 with a standard deviation of 0.1977, indicating relatively low variation across provinces. Parental education has a mean of 2.0659 and a standard deviation of 0.0988, suggesting a highly homogeneous distribution. The open unemployment rate has an average of 1.9541 and a standard deviation of 0.2343, indicating moderate variation across observations. Poverty has a mean value of 2.5590 and a standard deviation of 0.2532, reflecting noticeable disparities across provinces. Economic growth shows an average of 1.5680 and the highest standard deviation (0.3625), indicating greater heterogeneity in regional economic performance. Overall, stunting prevalence and parental education exhibit relatively low variability, whereas poverty and economic growth show greater variation across provinces.

Table 2. Summary Statistics

Variables	N	Mean	Std. Dev.	Min	Max
Prevalence Stunting	24	3.5096	0.1977	3.0681	3.7471
Parental Education Level	24	2.0659	0.0988	1.9021	2.2192
Open Unemployment Rate	24	1.9541	0.2343	1.6544	2.4195
Poverty	24	2.5590	0.2532	2.2214	2.9518
Economic Growth	24	1.5680	0.3625	0.0000	1.8485
Valid N (listwise)	24				

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Before conducting the path analysis, several assumptions were tested. First, the One-Sample Kolmogorov-Smirnov (K-S) test was used to assess the normality of the data. As shown in Table 3, all variables have p-values greater than 0.05, indicating that the data are normally distributed and satisfy the assumption of normality (Jinuntuya & Jinuntuya, 2025). Second, multicollinearity was examined to identify potential high correlations among the independent variables. The results indicate that economic growth, poverty, open unemployment, and parental education do not exhibit multicollinearity, confirming that the regression model meets the required assumption (Harvey et al., 2022; Selvanus et al., 2024).

Third, Table 4 shows that the results of the path coefficient linearity test are linear, because the p-value is greater than the significance level (α) of 5%. This indicates that all relationships between exogenous and endogenous variables are linear. The additive assumption indicates that the influence of variables poverty, economic growth, parental education level, and open unemployment rate on prevalence is assumed to work independently, and their contributions to prevalence stunting can be assumed linearly (Alemu et al., 2025; Apriyanti & Yanuarti, 2024; Ijaiya et al., 2024).

Table 3. Normality Test, Autocorrelation, and Collinearity Test

Variable	K-S Statistic	Asymp. Sig.	Information	Tol	VIF
Prevalence Stunting	0,271	0,090	Normal		
Parental Education Level	0,077	0,200	Normal	0,038	26,341
Open Unemployment Rate	0,173	0,062	Normal	0,281	3,560
Poverty	0,152	0,161	Normal	0,029	34,062
Economic Growth	0,305	0,070	Normal	0,888	1,126

Durbin-Watson = 1.907
Note: Dependent Variable Prevalence Stunting

Path analysis was employed to examine the direct and indirect effects of poverty and economic growth on stunting prevalence, with parental education and the open unemployment rate serving as mediating variables (Putri & Budiarty, 2026). Previous studies have shown that poverty significantly influences educational attainment, highlighting the importance of integrated policies to improve educational outcomes among disadvantaged populations (Sosu et al., 2026). Evidence also suggests a strong relationship between poverty and parental education, particularly among women (Kalinda et al., 2023; Momo et al., 2021; Wu et al., 2022). Furthermore, education and economic growth are closely interconnected and play important roles in poverty reduction, underscoring the need for policies that strengthen parental education (Li et al., 2024; Wu et al., 2022). The results of the path analysis for the model are presented in Table 5.

Table 5 presents the path analysis results for Models 1-5. Model 1 indicates that poverty has a significant negative effect on parental education, whereas economic growth has a negative but insignificant effect. These findings suggest that poverty is a more important determinant of parental education than economic growth in Indonesia. The F-test further indicates that variations in poverty and economic growth across provinces

should be taken into account when formulating educational policies. The insignificant effect of economic growth may reflect persistent income-distribution inequalities, limited access to education, and the prioritization of basic household needs. Therefore, integrated policies that address poverty and educational access are essential to achieving SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth) (Carneiro et al., 2025; Mauro, 2025; Momo et al., 2021; Otten & Ha, 2024).

Table 4 . Linearity Test of Path Coefficients

Correlation between variables	β	Correlation
Poverty to parental education level	-0.965	Linear
Economic growth and parental education level	-0.060	Linear
Poverty to open unemployment rate	0.830	Linear
Economic growth to open unemployment rate	-0.123	Linear
Parental Education Level to Prevalence of Stunting	0.733	Linear
Open unemployment rate to the prevalence of stunting	0.209	Linear

Table 5. Coefficient Regression and Model Summary

Model	Variable	Beta (Standardize)	P-Value
1	Poverty	-0.965	.000
	Economic Growth	-0.060	.212
	R = 0.977; R Square = 0.955; Adjusted R Square = 0.951; F-test = 224.074; Sig = 0.000 Note: Dependent Variable Parental Education Level		
2	Poverty	0.830	0.000
	Economic Growth	-0.123	0.347
	R = 0.818; R square = 0.669; Adjusted R square= 0.637; F-test=21.205; sig=0.000 Note: Dependent Variable Open Unemployment Rate		
3	Poverty	-1.492	0.007
	Economic Growth	0.074	0.421
	Parental education level	0.022	0.031
	Open Unemployment rate	-2.287	0.000
	R = 0.930; R square = 0.865; Adjusted R square= 0.836 Note: Dependent Variable Prevalence Stunting		
4	Poverty	-1.451	0.001
	Economic Growth	0.072	0.414
	Parental education level	-2.264	0.000
	R = 0.930; R square = 0.864; Adjusted R square= 0.844; F-test = 42.517; sig = 0.000 Note: Dependent Variable Prevalence Stunting		
5	Poverty	-0.987	0.000
	Economic Growth	0.172	0.215
	Open Unemployment	-0.306	0.039
	R = 0.816; R square = 0.666; Adjusted R square= 0.616; F-test = 13.293; sig = 0.000 Note: Dependent Variable Prevalence Stunting		

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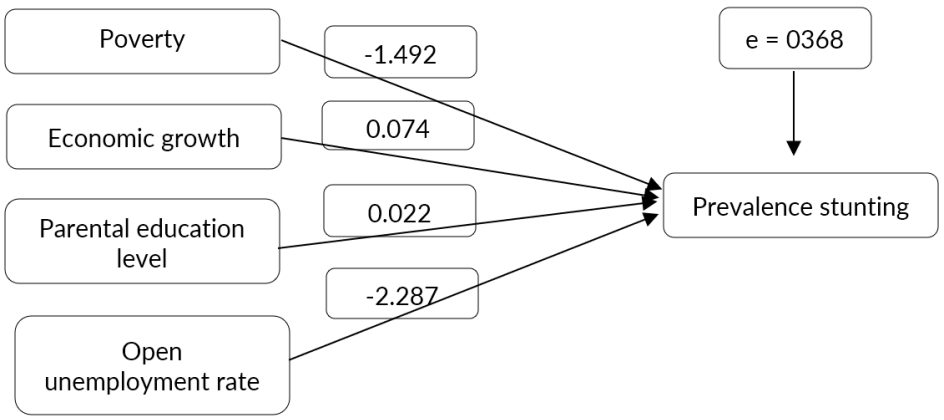
Model 2 shows that poverty has a positive and significant effect on the open unemployment rate, while economic growth has an insignificant effect. This indicates that higher poverty levels tend to increase unemployment, highlighting the need for pro-poor policies to reduce poverty and improve employment opportunities. The insignificant effect of economic growth suggests that economic expansion does not automatically generate jobs. This may occur because growth is concentrated in capital-intensive sectors, labor market skill mismatches, demographic pressures, structural economic changes, productivity-oriented business strategies, and inflationary conditions (Brychka et al., 2023; Dwiningwarni et al., 2019; Kawashita & Marseto, 2024).

Model 3 indicates that poverty has a positive and significant effect on stunting prevalence, while parental education has a significant negative effect, and open unemployment also has a significant effect. In contrast, economic growth has no significant effect. These findings suggest that higher poverty levels increase the risk of stunting, whereas higher parental education reduces it, consistent with previous studies (Jumhur, 2024; Kustanto, 2021a; Mulyaningsih et al., 2021a). The insignificant effect of economic growth implies that economic expansion alone is insufficient to reduce stunting, particularly when its benefits are unevenly distributed and not accompanied by improvements in nutrition, sanitation, healthcare access, and human capital development. Therefore, investments in education and health remain essential for accelerating stunting reduction and achieving the SDGs related to poverty alleviation and public health (Choi & Min, 2024; Mauro, 2025; Yaya et al., 2020). From model 3, the structure of path analysis 3 is shown in Figure 2.

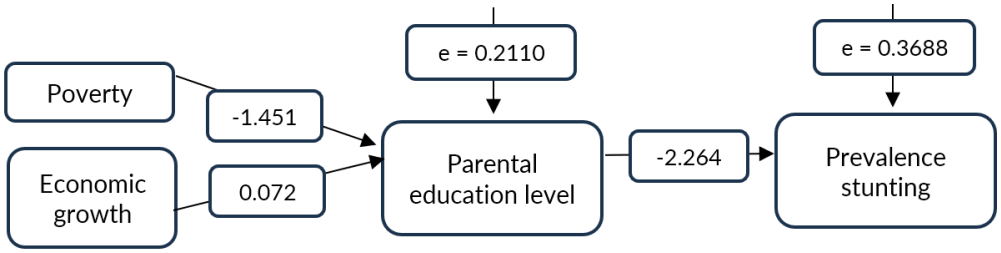
Figure 2. Structure of path analysis-3



Model 4 shows that poverty significantly affects stunting prevalence through parental education, indicating that low-income households tend to have lower educational attainment, limited access to health services, and a higher risk of stunting. This finding supports previous studies emphasizing the role of parental education in linking poverty to child nutritional outcomes (Jamil et al., 2022; Oriaku Emordi, 2024; Wang et al., 2024). In contrast, the indirect effect of economic growth on stunting through

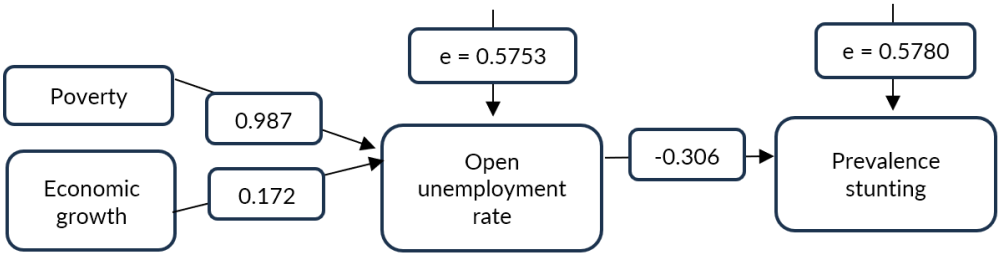
parental education is not significant, suggesting that economic growth has not sufficiently improved educational quality or reduced the prevalence of stunting. This may reflect persistent inequalities in income distribution, nutrition, sanitation, and parenting practices. Therefore, integrated policies that simultaneously promote economic growth, educational improvement, and nutritional well-being are essential for sustainable stunting reduction (Elmira & Qaim, 2026; Jumhur, 2024; Kustanto, 2021). From model 4, the structure of path analysis 4 is presented in Figure 3.

Figure 3. Structure of path analysis-4



Model 5 shows that poverty significantly affects stunting prevalence through the open unemployment rate, indicating that higher poverty increases unemployment, which in turn raises the risk of stunting (Aureli & Juliprijanto, 2022; Laksono et al., 2022; Puja Ilham, 2023; Supadmi et al., 2024b; Suparman & Muzakir, 2023). In contrast, Margettyaningsih et al. (2024) state that the indirect effect of economic growth on stunting through unemployment is not significant, suggesting that economic growth has not generated sufficient employment opportunities to reduce poverty and stunting. These findings imply that the benefits of economic growth have not been fully experienced by low-income households, resulting in persistent poverty and stunting despite economic expansion. However, these results differ from those reported by Purba et al. (2024) and Kirana & Nilasari (2025). From model 4, the structure of path analysis 4 is shown in Figure 4.

Figure 4. Structure of path analysis-5



Kustanto's (2021) research shows that the prevalence of stunting is directly related to poverty and long-term economic growth. Higher levels of formal education of mothers and fathers will reduce the rate of child stunting in rural and urban areas. Research by Mergettyaningsih, Suryanto, and Gravitiani (2024) showed that GDP per capita and

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poverty had a positive and significant effect on the prevalence of stunting, while literacy, sanitation, and HDI had a negative effect. Research by Mulyaningsih et al. (2021) states that several factors influence stunting, namely eating habits, newborn weight, history of infection, gender, family income, parental education level, and environmental factors related to access to water, sanitation, and hygiene.

Table 7. Direct, Indirect, and Total Effect

Correlation	Direct Effect	Indirect Effect	Total Effect
Poverty to Parental Education Level	-0.965		
Economic Growth to Parental Education Level	-0.060		
Poverty to Open Unemployment Rate	0.830		
Economic Growth to Open Unemployment Rate	-0.123		
Poverty and Economic Growth to the Prevalence of Stunting	0.733		
Economic Growth to Prevalence of Stunting	0.133		
Poverty to Prevalence of Stunting through Parental Education Level		-1.6595	-3.1105
Economic Growth to Prevalence of Stunting through Parental Education Level		-0.1630	-0.0910
Poverty to Prevalence of Stunting through Open Unemployment Rate		-0.3020	-0.1300
Economic Growth to Prevalence of Stunting through Open Unemployment Rate		-0.0526	0.9344

The actual impacts of the path analysis used in this study, namely direct, indirect, and total effects, are shown in Table 7. Parental education emerges as the most influential mediator linking poverty to stunting prevalence, indicating that improvements in parental education can substantially reduce the impact of poverty on child nutritional outcomes. While parental education also strengthens the contribution of economic growth to stunting reduction, the mediating role of open unemployment is relatively weaker. Moreover, despite its negative effect on unemployment, economic growth has a positive overall effect on stunting prevalence, suggesting that economic expansion alone is insufficient to reduce stunting rates without parallel improvements in education and broader socioeconomic conditions. The results of the study indicate that poverty is a major determinant influencing stunting prevalence, both directly and indirectly. Among the mediating variables, parental education level showed a stronger mediating effect than open unemployment. These findings indicate that stunting reduction policies need to focus not only on reducing poverty levels but also on improving access to and the quality of parental education as a long-term strategy to improve children's nutritional status and reduce stunting prevalence in Indonesia.

CONCLUSION

Indonesia's stunting situation requires significant attention. Path analysis results show that poverty continues to strongly influence stunting prevalence, whereas economic growth has no significant effect. This situation is driven by persistent poverty during the period 2000-2023. The findings indicate that poverty significantly affects stunting prevalence both directly and indirectly through parental education and open unemployment. In contrast, economic growth does not significantly influence stunting prevalence, parental education, or open unemployment. These results suggest that stunting in Indonesia is primarily a socioeconomic issue linked to household deprivation, limited educational attainment, and labor market vulnerability rather than merely a consequence of low economic growth.

Based on these findings, policy interventions should prioritize targeted poverty reduction among households with pregnant women and children under five through strengthened social protection programs, nutrition-sensitive cash transfers, and improved access to health and nutrition services. In addition, the government should expand parental education and nutrition literacy programs while promoting employment opportunities through labor-intensive industries and vocational training targeted at low-income populations. Since economic growth alone has not translated into lower stunting prevalence, national stunting reduction strategies should focus on inclusive development by integrating indicators of multidimensional poverty, educational attainment, and employment into policy design, implementation, and evaluation, and be supported by regular socioeconomic mapping of vulnerable households to improve targeting effectiveness.

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