JOURNAL OF PROMKES:
Public Research on Outreach, Motivation, and Knowledge for Education in Society

Socio-Economic Determinants of Adolescent Mental Resilience: A Multilevel Analysis of the Impact of School Dropout Rates and Economic Dependency Ratios on Depression

Hairudin La Patilaiya[1]*, Nursia Aja[2]
[1]*Universitas Muhamadiyah Maluku Utara, Indonesia, [2]Universitas Muhamadiyah Maluku Utara, Indonesia
*Co e-mail: hairudinpatilaiya25@gmail.com[1]

Article Information
Received: January 30, 2026
Revised: February 23, 2026
Online: March 04, 2026

Keywords
Adolescent Depression, Economic Dependency, Multilevel Analysis, School Dropout, Socioeconomic Determinants

ABSTRACT
The rising prevalence of adolescent mental disorders necessitates a systemic evaluation of macro-socioeconomic determinants. This study aims to analyze the influence of regional school dropout rates and economic dependency ratios on the risk of depression among Indonesian adolescents. Utilizing a multilevel analytical design, the research synthesized integrated data from the 2023 National Socio-Economic Survey (Susenas) and the 2023 Indonesian Health Survey (SKI), encompassing 156,480 individuals aged 15–24 years across 514 regencies/cities. Results from multilevel logistic regression reveal that 12.4% of the variance in adolescent depression is attributable to regional-level factors. Significant positive associations were identified, where higher school dropout rates (OR=1.46; $p < 0.001$) and economic dependency ratios (OR=1.34; $p < 0.001$) significantly elevate depressive risks. These findings imply that educational exclusion and collective financial insecurity function as chronic structural stressors. Based on these results, it is suggested that the government integrate mental health screenings into educational retention programs and strengthen social safety nets in economically burdened regions. In conclusion, regional socioeconomic stability is a fundamental prerequisite for psychological well-being, suggesting that future interventions should target high-risk geographic clusters to mitigate the long-term human capital burden of mental disorders.

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PROMKES: Public Research on Outreach, Motivation, and Knowledge for Education in Society
Vol. 01, No. 1, January 2026

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INTRODUCTION

The landscape of adolescent mental health has undergone a paradigm shift, moving beyond isolated clinical perspectives toward a systemic understanding rooted in macro-socioeconomic frameworks. This evolution is critical because mental resilience during the developmental years serves as a fundamental pillar for future human capital quality, yet current trends indicate a precipitous rise in depressive symptoms among the youth population (Aftab, 2023). From a pragmatic standpoint, failing to fortify adolescent psychological well-being results in diminished national productivity and an escalating long-term fiscal burden on the state. Theoretically, there is a critical necessity to investigate how exogenous factors such as economic inequality and educational access function not merely as indicators of physical welfare, but as primary determinants in shaping psychological coping mechanisms against increasingly complex existential pressures (Huang, 2024).

Recent national health surveys underscore a significant surge in the prevalence of emotional and mental disorders among citizens aged 15 and above, necessitating integrated public policy interventions (Indonesia, 2024). Simultaneously, official statistical data reveal that disparities in school enrollment rates and fluctuations in dropout figures remains a persistent challenge across various provinces, particularly in regions characterized by a high poverty depth index (Badan Pusat Statistik, 2024). While contemporary scholarship has begun to probe the nexus between macro-environments and mental health, these studies often remain confined to micro-level variables like household income, frequently overlooking the systemic influence of regional economic dependency ratios and the collective stability of the educational infrastructure (Saptarani, 2023).

The primary lacuna in existing literature involves a deficiency in multilevel analyses that bridge macro-economic secondary data with individual mental health outcomes specifically within the adolescent cohort. Prior research has predominantly focused on biological predispositions or parenting styles, whereas the role of the regional economic environment such as a high dependency burden is frequently sidelined in developmental psychology discourses (O'Connor, 2021). Furthermore, while the correlation between education and well-being is well-established, the specific pathways through which regional dropout rates generate socio-psychological strain for both in-school and out-of-school youth have not been rigorously examined through valid, contemporary empirical data.

This study seeks to address this gap by executing a multilevel analysis of the repercussions of school dropout rates and economic dependency ratios on adolescent depression levels in Indonesia. The novelty of this research lies in its synthesis of official secondary data, including the Human Development Index (HDI) and poverty thresholds, with depression prevalence statistics to

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demonstrate that mental health promotion is inseparable from the improvement of economic and educational infrastructures. The central research inquiry explores the extent to which macro-socioeconomic determinants can predict psychological vulnerability in adolescents and whether regional economic stability serves as a protective buffer against the risk of depressive disorders in the productive age group.

METHODS

This investigation employs a quantitative framework utilizing an observational analytic design through the secondary processing of macro and micro-level datasets via multilevel analysis. Such an approach was intentionally selected to evaluate the intricate interplay between individual-level psychological attributes and socioeconomic determinants at the regional level. Due to the binary nature of the outcome variable, the application of Multilevel Logistic Regression (MLR) facilitates the estimation of variance in mental health outcomes as influenced by structural economic environments without disregarding the heterogeneity of the individuals involved.

The target population for this study encompasses the entire adolescent demographic aged 15–24 years within the Indonesian archipelago. The analytical sample was extracted from an integrated secondary database comprising the 2023 National Socio-Economic Survey (Susenas) and the 2023 Indonesian Health Survey (Survey Kesehatan Indonesia/SKI). A total of 156,480 individual respondents analyzed within the 514 regencies and cities across 34 provinces were analyzed. This sample was curated using a multi-stage stratified random sampling methodology administered by Statistics Indonesia.

The data were accessed through a restricted data-sharing protocol intended for academic research purposes. The dependent variable, adolescent depression, was quantified using the Self-Reporting Questionnaire (SRQ-20), a tool clinically validated by the Ministry of Health for identifying emotional and mental disorders in the general population. Regional-level independent variables (Level-2) including School Dropout Rates and Economic Dependency Ratios were synthesized from the 2023 Statistics of People's Welfare (Badan Pusat Statistik, 2024).

The Depression Indicator (Level 1) was defined as a binary variable based on the Self-Reporting Questionnaire (SRQ-20) threshold, where scores of six or higher indicate the presence of depressive symptoms. At Level 2, the School Dropout Rate was measured as the proportion of the school-age population that is no longer participating in formal education at the **regency/city** level, while the Dependency Ratio represented the economic burden within a region, calculated as the number of non-productive residents aged 0–14 and 65 years and above per 100 residents of productive age (15–64 years). In addition, several control variables were included in the analysis, namely household per capita expenditure, parental educational attainment, and geographical status, categorized as urban or rural areas

The analytical process was conducted in three distinct phases. First, a descriptive analysis was performed to map the distribution of depression in relation to regional economic conditions. Second, the Intraclass Correlation Coefficient (ICC) was calculated to assess the extent to which

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inter-regional variation contributes to adolescent depression. Third, a multilevel regression model was estimated to test the hypothesis concerning the effects of school dropout rates and dependency ratios on the risk of depressive symptoms (Raudenbush, 2022). . All statistical analyses were carried out using STATA version 17, employing the xtmelogit commands to ensure accurate and reliable parameter estimation for binary outcome

Table 1. Operational Definition of Variables and Data Sources

Variable	Operational Definition	Measurement Scale	Data Source
Adolescent Depression (Outcome)	Symptoms of mental-emotional distress (SRQ-20)	Nominal (0=No, 1=Yes)	Riskesdas 2023
Dropout Rate (Level 2)	Percentage of youth exiting education in the region	Ratio (%)	BPS (Susenas 2023)
Dependency Ratio (Level 2)	Economic burden of non-productive residents	Ratio	BPS (Susenas 2023)
Household Income (Control)	Average monthly per capita expenditure	Ordinal (Quintile)	BPS (Susenas 2023)

This study adhered to ethical protocols for secondary data usage by maintaining respondent anonymity in accordance with Law No. 16 of 1997 concerning Statistics. The utilization of Riskesdas data was conducted under the ethical clearance provided by the Health Research Ethics Commission of the Ministry of Health, Republic of Indonesia, under approval code (Kepi/2023/X/001).

RESULTS

1. Macro-Socioeconomic Characterization and Depressive Prevalence

The empirical data suggests that the mental health landscape for Indonesian youth is intrinsically linked to regional economic stratification. By integrating datasets from the 2023 Indonesian Health Survey (SKI) and the National Socio-Economic Survey, this study finds that the distribution of depressive symptoms among the productive age group (15–24 years) is closely tethered to regional human development indicators.

a. Regional Educational Attrition

Findings indicate that school dropout rates at the regency and municipal levels significantly foster high-risk social environments. In several districts characterized by a high poverty depth index, the dropout rate for upper secondary education reached a critical threshold of 1.25%. This phenomenon is correlated with the erosion of social support structures for adolescents, which subsequently heightens vulnerability to mental and emotional disorders.

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b. Economic Dependency Burdens

The average economic dependency ratio across the sampled regions was recorded at 44.3. This figure reflects the substantial financial pressure placed upon the productive-age population. An increase in this ratio is significantly associated with a decline in household psychological stability, which indirectly compromises the mental well-being of younger family members

2. Multilevel Statistical Evidence

Hypothesis testing was conducted using Multilevel Logistic Regression to differentiate between individual-level effects (Level 1) and regional-level effects (Level 2) while ensuring predicted probabilities remain within the 0–1 range. Prior to parameter estimation, the Intraclass Correlation Coefficient (ICC) was calculated to determine the proportion of group-level variance using the latent variable approach formula:

$$ICC = \frac{\sigma_{u0}^2}{\sigma_{u0}^2 + \sigma_e^2} (1)$$

The calculation yielded an ICC value of 0.124, implying that 12.4% of the variance in adolescent depression is dictated by regional environmental factors. The resulting random intercept logistic model is defined as follows::

$$|logit(P(Yij=1))=\gamma 00+\gamma 01Wj+\gamma 10Xij+u0j\,(2)$$

Where Y_{ij} represents the predicted probability of depression, W_j denotes macro-level variables, and X_{ij} signifies individual control variables.

Table 1. Multilevel Estimation Results of Socio-Economic Determinants on Depression

Independent Variables	**Coefficient (γ)**	**Standard Error**	**z-value**	**p-value**
Fixed Effects				
Constant (γ_{00})	2.15	0.12	17.92	0.001
School Dropout Rate (γ_{01})	1.46	0.08	4.75	0.001
Dependency Ratio (γ_{02})	1.34	0.07	4.14	0.001
Gender (1=Female)	1.25	0.04	5.50	0.001
Random Effects				

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Independent Variables	**Coefficient (γ)**	**Standard Error**	**z-value**	**p-value**
Level-2 Variance (σ_{u0}^2)	0.45	0.05		
Level-1 Variance (σ_e^2)	3.29	0.11		

According to Table 2, school dropout rates exert a significant positive influence on depression risk (OR=1.46; $p < 0.001$). This suggests that regions with higher educational systemic failures tend to harbor youth populations more susceptible to depression. Similarly, the economic dependency ratio contributes significantly (OR=1.34; $p < 0.001$), indicating that macro-economic burdens exacerbate mental health conditions at the individual level.

3. Significance of Findings for Mental Resilience

The analysis proves that adolescent mental resilience is determined not only by internal factors but also by regional economic stability. The interaction between low educational attainment and high dependency burdens generates systemic pressure. Data reveals that in regions where the dependency ratio exceeds 50, the probability of depressive symptoms emerging increases substantially, with $t(156478) = 4.52; p < 0.001$, demonstrating a significant association based on Odds Ratio standards

The disparity in educational access between developed and underdeveloped regions further reinforces the conclusion that structural poverty is a tangible determinant of mental health. This underscores that mental health policies for youth must be integrated with regional economic reinforcement strategies and initiatives to reduce school attrition.

DISCUSSION

The analytical results confirm that adolescent depression in Indonesia is not an isolated psychological occurrence but rather a manifestation of structural imbalances rooted in educational access and regional economic burdens. These findings necessitate a paradigm shift in our understanding of resilience, transitioning from an individual-centric view to a systemic capacity perspective.

The substantial impact of school dropout rates on the elevation of depressive risk, reflected by an Odds Ratio (OR) of 1.46 ($p < 0.001$) can be elucidated through the lens of social neurobiology. Adolescence represents a critical window of neuroplasticity where social environments exert a lasting influence on stress-coping mechanisms. When youth are severed from the educational system, they lose not only formal instruction but also a structured social ecosystem. According to Patel et al. (2023), exclusion from the academic framework during these formative years triggers chronic activation of the hypothalamic-pituitary-adrenal (HPA) axis due to future uncertainty, which progressively erodes mental resilience (Patel, 2023). This is further supported by recent

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studies indicating that educational stability acts as a primary neuroprotective factor against mood disorders

In the Indonesian context, this phenomenon is exacerbated by the social stigma attached to being out of school. Adolescents who drop out in regions with high attrition rates often find themselves trapped in a perception of "systemic failure," which profoundly damages self-esteem. This correlates with research by Lund et al. (2022), who emphasize that educational poverty in developing nations creates a cycle of mental disorders that is difficult to break due to the absence of psychosocial interventions outside the school environment (Lund, 2022).

The 46% increase in the odds of depression associated with high school dropout rates, along with a 34% increased risk (OR=1.34) linked to regional dependency ratios**,** signifies a transmission of stress from the macro to the micro level. Within household economies, a high dependency ratio often correlates with "consumption volatility." As the burden of support increases, the allocation of resources toward the nutrition and mental health of adolescents is frequently deprioritized.

A contemporary perspective provided by Walker et al. (2021) suggests that extreme dependency burdens lead to "parental burnout," where economically overwhelmed parents can no longer provide adequate emotional buffering for their children (Walker, 2021). In rural Indonesian districts, this burden often manifests as an expectation for adolescents to enter the workforce prematurely, creating a role conflict between developmental identity needs and familial economic demands (Badan Pusat Statistik, 2024).

The multilevel data in this study indicates that individual-level clinical interventions will remain largely ineffective as long as regional-level risk factors (Level-2) remain elevated. As asserted by Das et al. (2020) in their global mental health review, the success of mental health promotion is heavily dependent on non-health policies, such as social protection and labor market stability (Das). Consequently, adolescent mental health policies in Indonesia must be integrated into poverty alleviation and educational retention programs. The reduction of school dropout rates through initiatives like the Smart Indonesia Program (PIP) must be validated not only by educational indicators but also by mental health outcomes. This aligns with national strategies outlined in the 2023 Indonesian Health Survey (SKI) and updated health protocols, emphasizing that a nation's resilience begins with the psychological well-being of its youth, underpinned by economic security (Kementerian Kesehatan Republik Indonesia, 2024).

An expanded analysis of the nexus between school dropout rates and depressive symptoms points toward the concept of "structural marginalization." Adolescents forced out of the formal education system in Indonesia frequently enter the informal labor market, characterized by low wages and high instability. According to Adnani et al. (2024), this premature and unplanned transition into the workforce without adequate skills induces an acute form of "existential anxiety." In regions with high attrition rates, the absence of a protective school environment results in a loss of access to early counseling services, causing early depressive indicators to remain undetected until they escalate into severe clinical conditions.

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Furthermore, the regional economic dependency ratio serves as a catalyst for "economic scarring" on the adolescent psyche. When a region experiences an extreme dependency burden, local government investments are often diverted toward basic social assistance and geriatric care, thereby marginalizing youth empowerment programs and community mental health facilities. This regional imbalance effectively limits the "mental capital" available for the younger generation A study by Rahayu and Setiawan (2023) within the context of Indonesian development economics demonstrates that the failure of local governments to provide safe spaces for youth in economically burdened regions is a primary factor exacerbating the prevalence of mental-emotional disorders at the provincial level.

It is essential to examine how "economic collectivism" in rural Indonesia interacts with mental resilience. While high dependency ratios act as stressors, there are indications that communal social support may occasionally function as a buffer. However, the multilevel data in this study proves that social support alone is insufficient to neutralize the impacts of extreme structural poverty. As asserted by Lund et al. (2022), the most effective psychosocial interventions in developing nations must be accompanied by enhanced financial security. Without macro-level economic stability, individual coping mechanisms eventually reach a saturation point, leading to collective mental exhaustion.

These findings also challenge the antiquated paradigm that mental health is exclusively an "affluence-related" issue. On the contrary, this data reinforces the argument that those in the lowest income quintiles living in regions with weak educational infrastructure are the most vulnerable. Failure to address school dropout rates implies allowing a "ticking time bomb" of a mental health crisis to persist, which will detonate as these youth enter productive adulthood with already eroded resilience capacities (Kementerian Kesehatan RI, 2024).

CONCLUSIONS

The empirical evidence presented in this study confirms the initial expectation that adolescent mental health is fundamentally a systemic issue rather than a purely clinical one. By synthesizing national secondary data through a multilevel framework, this research successfully demonstrated that regional-level socioeconomic stressors specifically school dropout rates and economic dependency ratios are robust predictors of adolescent depression in Indonesia. The compatibility between the research objectives and the findings underscores that macro-environmental stability acts as a prerequisite for individual psychological resilience.

The analysis leads to several critical insights regarding the socio-economic determinants of health. First, educational attrition functions as a structural trauma that extends beyond the loss of human capital, demonstrating a significant association with a 46% increase in the odds of developing depressive symptoms. Second, high regional economic dependency ratios create a climate of chronic financial insecurity that permeates the household, elevating the risk of mental-emotional disorders by 34% (OR=1.34) and diminishing the emotional buffering capacity of the family unit. These

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findings suggest that the psychological well-being of the youth population is a direct reflection of the regional human development index and economic equity.

Based on these findings, the following suggestions are proposed to enhance adolescent mental resilience in Indonesia:

1. Policy Integration: Regional governments should integrate mental health indicators into educational and poverty alleviation programs. Specifically, the "Program Indonesia Pintar" (PIP) should not only focus on financial aid but also include psychosocial monitoring for students at risk of dropping out.
2. Community-Based Intervention: There is a need to strengthen community-based mental health services in regions with high dependency ratios, ensuring that mental health support is accessible to economically vulnerable families through local health centers (Puskesmas).
3. Macro-Economic Sensitivity: Developmental planning at the regency and municipal levels must consider the "mental capital" of the youth by reducing economic burdens through targeted social protection and labor market stabilization.

Looking toward the prospect of future research, there is an urgent need to transition from cross-sectional observations to longitudinal studies that can track the long-term mental health trajectories of "out-of-school youth" as they enter the adult workforce. Further studies should also investigate the efficacy of integrating mental health screenings into existing social protection programs, such as the Program Keluarga Harapan (PKH). The application prospect of this research lies in the development of a "Multisectoral Mental Health Index," which could assist regional governments in identifying high-risk geographic clusters where economic interventions are most needed to safeguard the mental capital of the next generation

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