

Multidimensional Analysis of Stunting Incidence among Children Aged 24–59 Months in Stunting Locus Areas of South Aceh

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ABSTRACT

South Aceh Regency has recorded an unusual rise in child stunting that runs counter to Indonesia's declining national trend, reaching 40.2% in 2023 before easing slightly to 34.2% in 2024. This study examined the influence of household resources, dietary intake, and caregiving quality on stunting incidence among children aged 24–59 months in the designated stunting-locus sub-districts of South Aceh. A quantitative cross-sectional design was applied to 372 respondents selected through the Slovin formula from a population of 4,686 children, and the structural relationships were estimated using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that household resources, dietary intake, and caregiving quality each exerted a significant positive influence on children's growth status, together accounting for a substantial proportion of variance in stunting incidence ($R^2 = 0.806$). Dietary intake exhibited the strongest effect, followed by household resources and caregiving quality. These findings underline nutrition-sensitive resource strengthening and responsive caregiving as priority intervention entry points in high-burden stunting areas.

INTRODUCTION

Childhood stunting remains one of the most persistent public health challenges worldwide, reflecting chronic nutritional deprivation with lasting consequences for cognitive development, productivity, and the long-term quality of human capital (Mulyani et al., 2025). In Indonesia, the government has placed stunting reduction among its highest development priorities, targeting a national prevalence of 14.4% by 2029 and 5% by 2045 as mandated by Law No. 59 of 2024 on the 2025–2045 National Long-Term Development Plan (Kementerian Sekretariat Negara RI, 2024). Despite this national commitment, progress at the subnational level remains uneven, and several regions continue to record prevalence levels far above the threshold considered a public health crisis by the World Health Organization.

South Aceh Regency illustrates this disparity. While national and provincial stunting rates declined steadily between 2021 and 2024, South Aceh moved in the opposite direction, climbing from 27.3% in 2021 to a peak of 40.2% in 2023 before only partially retreating to 34.2% in 2024 (Kemenkes, 2024). This trajectory is striking given the regency's relatively abundant agricultural and marine resources, suggesting that the burden of stunting in this area is driven less by the physical availability of food than by household-level constraints in resources, feeding practices, and caregiving. Acknowledging this concentration of risk, the Regent of South Aceh designated seven sub-districts as stunting-priority loci through Decree No. 358 of 2023, directing intervention efforts toward the areas where the problem is most entrenched.

Much of the discourse on stunting prevention concentrates on the first 1,000 days of life, yet children aged 24–59 months constitute an often-overlooked window in which stunting can still worsen as children transition from infant feeding to family diets that are frequently lower in animal protein and more exposed to environmental pathogens (Damayanti et al., 2024; Raza et al., 2025). Importantly, catch-up growth remains biologically possible beyond the age of two when nutritional and caregiving conditions improve, challenging the common assumption that stunting becomes irreversible after infancy (Laila et al., 2025; Mulyani et al., 2025). This makes the preschool period a relevant, if underexamined, target for nutrition-sensitive intervention.

Building on this gap, the present study investigates how household resources, the adequacy of children's dietary intake, and the quality of caregiving jointly shape stunting incidence among children aged 24–59 months in the stunting-locus sub-districts of South Aceh. By narrowing the analysis to these three theoretically and empirically salient determinants, the study aims to provide a parsimonious yet robust evidence base to inform more targeted nutrition and caregiving interventions in high-burden districts.

THEORETICAL FRAMEWORK

This study is grounded in Bronfenbrenner (1979) ecological systems theory, which conceptualizes child development as the product of nested and interacting environmental systems, ranging from the immediate household setting to broader community and societal structures. Within this framework, a child's growth outcome is not determined by a single risk factor but emerges from the

interplay of resources available to the family, the practices enacted within the household, and the quality of the immediate caregiving environment. This perspective offers a theoretically grounded rationale for examining household resources, dietary intake, and caregiving quality as interconnected, proximal influences on stunting, rather than treating them as isolated predictors.

At the household level, Conservation of Resources theory Hobfoll (1989) provides a useful lens for understanding the role of Resources. The theory posits that individuals and families strive to obtain, retain, and protect valued resources, including financial, material, and social assets, and that resource loss or scarcity increases vulnerability to adverse outcomes. Applied to child nutrition, households with greater access to financial, environmental, and social resources are better positioned to secure adequate food, health care, and a supportive caregiving environment for their children, thereby reducing the risk of chronic growth failure (Guo et al., 2025).

Dietary intake represents the most proximal nutritional pathway to child growth. Evidence from multiple contexts consistently shows that the quantity, quality, and diversity of a child's diet exert a direct and substantial influence on linear growth, given its role in supplying the energy, protein, and micronutrients required for skeletal and tissue development (Black & Byun, 2025; Endawkie et al., 2025). Because dietary adequacy integrates the effects of food availability and feeding practices at the point of consumption, it is expected to be among the strongest direct predictors of stunting incidence.

Caregiving quality, meanwhile, draws on the conceptualization of care in nutrition proposed by Engle and Menon (1999) and Engle et al. (2000), who define care as the set of behaviors and practices that translate available resources into a child's actual health and nutritional wellbeing, including feeding responsiveness, hygiene, health-seeking behavior, and psychosocial stimulation. Because caregiving mediates how resources and food are ultimately converted into child outcomes, its quality is hypothesized to exert an independent, direct effect on stunting incidence, consistent with prior structural evidence linking caregiving practices to reductions in child undernutrition (Issa et al., 2025; Umwali et al., 2022).

Integrating these perspectives, this study proposes a parsimonious structural model in which three determinants, Resources, Diets, and Care, are hypothesized to directly and positively influence children's growth status (i.e., to lower stunting risk), as illustrated in Figure 1.

H1: Household resources have a significant positive effect on children's growth status.

H2: Dietary intake has a significant positive effect on children's growth status.

H3: Caregiving quality has a significant positive effect on children's growth status.

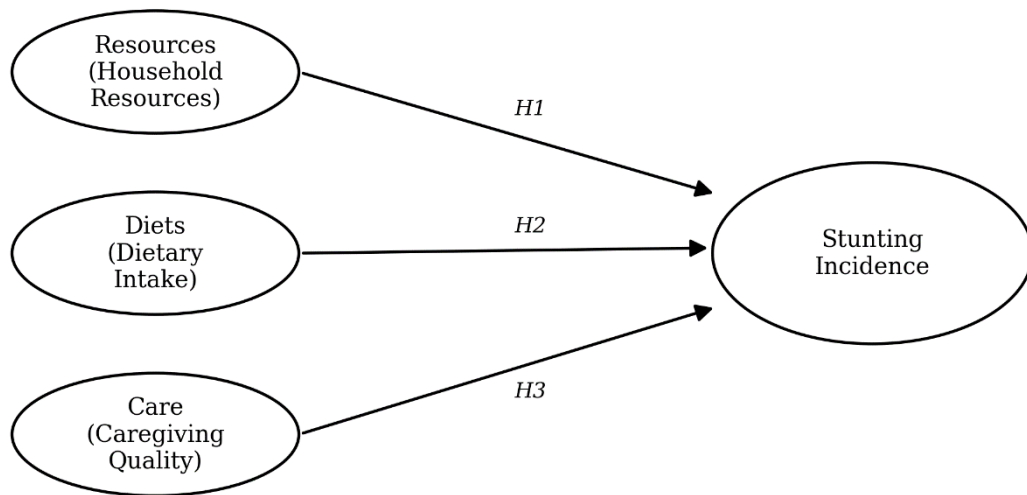


Figure 1. Conceptual Framework

METHODS

This study employed a quantitative research design with a cross-sectional approach, in which data on household resources, dietary intake, caregiving quality, and children's growth status were collected concurrently from primary respondents. Primary data were obtained directly from caregivers of children aged 24–59 months residing in the seven sub-districts designated as stunting-priority loci in South Aceh Regency under Regent's Decree No. 358 of 2023, using a structured questionnaire administered through direct interviews in March 2026.

The required sample size was determined using the Slovin formula (Guilford & Fruchter, 1973; Slovin, 1960; Yamane, 1967):

$$n = N / (1 + N(e)^2) \quad \dots\dots\dots (1)$$

where n denotes the minimum sample size, N the population size, and e the acceptable margin of error. With a total population of 4,686 children recorded across the seven locus sub-districts and a 5% margin of error, the formula yielded a minimum requirement of 369 respondents; following proportional allocation across sub-districts, the final achieved sample comprised 372 respondents.

All constructs, Resources, Diets, Care, and children's growth status (Stunting Incidence), were measured using structured, multi-item ordinal indicators, and the hypothesized structural relationships were estimated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3.29, following the two-stage evaluation procedure covering the measurement (outer) model and the structural (inner) model (Chin, 2015; Hair, 2022).

RESULTS

The measurement model was evaluated prior to structural testing to confirm that the indicators reliably represented their respective constructs. Table 1 presents the reliability and convergent validity results for the three exogenous

constructs (Resources, Diets, and Care) and the single-indicator endogenous construct, Stunting Incidence.

Table 1. Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
Resources	0.951	0.958	0.696
Diets	0.957	0.966	0.825
Care	0.840	0.893	0.677
Stunting Incidence	1.000	1.000	1.000

All constructs exceeded the recommended thresholds of 0.70 for composite reliability and 0.50 for average variance extracted (AVE), while Cronbach's alpha values exceeded 0.70, confirming adequate internal consistency and convergent validity for all measured constructs.

Overall model fit was assessed using three indices: SRMR (0.079, below the 0.10 threshold), NFI (0.837, above the 0.80 threshold), and RMS Theta (0.092, below the 0.12 threshold), jointly indicating an acceptable fit between the hypothesized model and the empirical data.

The structural model explained a substantial proportion of variance in children's growth status, with an R^2 of 0.806 (adjusted $R^2 = 0.802$), indicating that Resources, Diets, and Care jointly accounted for approximately 80 percent of the variation in stunting incidence within the study sample.

Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS, with a path considered significant when the t-statistic exceeded 1.96 at $p < 0.05$. The results are summarized in Table 2.

Table 2. Structural Path Coefficients and Hypothesis Testing

Hyp.	Path	Original Sample (O)	T Statistics	P Values	Result
H1	Resources → Stunting Incidence	0.370	5.325	0.000	Supported
H2	Diets → Stunting Incidence	0.743	29.269	0.000	Supported
H3	Care → Stunting Incidence	0.195	6.099	0.000	Supported

As shown in Table 2, all three hypothesized paths were statistically significant, confirming that household resources, dietary intake, and caregiving quality each exerted an independent, significant positive influence on children's growth status. Dietary intake showed the strongest effect ($\beta = 0.743$), followed by household resources ($\beta = 0.370$) and caregiving quality ($\beta = 0.195$), indicating that the adequacy of a child's diet was the single most influential determinant of growth outcomes within this model, although the contribution of household-level resources and caregiving quality remained substantial and independently significant.

DISCUSSION

The finding that Resources, Diets, and Care jointly explain roughly four-fifths of the variance in children's growth status suggests that, in the stunting loci of South Aceh, the determinants closest to the household and the child carry far greater explanatory weight than distal, supply-side conditions. This is consistent with an ecological reading of child growth (Bronfenbrenner, 1979), in which the immediate household environment functions as the setting where broader

structural conditions are ultimately translated, or fail to be translated, into a child's nutritional wellbeing. The paradox noted in the introduction, a resource-rich agrarian region with a rising stunting burden, is therefore better explained by how resources are allocated and converted within households than by the sheer availability of food in the wider local economy.

Dietary intake emerged as the dominant predictor, a pattern that can be understood through its position as the final common pathway through which upstream conditions, whether economic, social, or behavioral, are expressed in the child's body. Because linear growth depends directly on the sufficiency of energy, protein, and micronutrients actually consumed, any improvement in resources or caregiving that does not translate into better dietary intake is unlikely to alter a child's growth trajectory. This reasoning aligns with evidence that undernutrition in early and middle childhood is most proximately driven by dietary inadequacy rather than by any single upstream determinant in isolation (Black & Byun, 2025; Endawkie et al., 2025). Practically, this implies that nutrition-sensitive programming in South Aceh should not stop at improving household circumstances in general, but must be deliberately designed to reach the child's plate.

The significant, though comparatively smaller, effect of household resources supports the logic of Conservation of Resources theory (Hobfoll, 1989): households with greater financial, environmental, and social assets are better able to buffer children against nutritional shocks, whether by purchasing diverse foods, accessing health services, or securing a safer living environment. Rather than acting in competition with dietary intake, resources most plausibly operate as an enabling condition that widens or narrows the range of dietary and caregiving choices available to a family, a pattern broadly consistent with recent multi-country evidence linking household assets to child malnutrition risk (Guo et al., 2025).

The independent, direct effect of caregiving quality reinforces the argument that resources and food availability alone are insufficient to guarantee good child growth outcomes; how those resources are enacted through everyday caregiving, feeding responsiveness, hygiene, and health-seeking behavior, matters in its own right (Engle et al., 2000; Engle & Menon, 1999). This is consistent with structural evidence from other settings showing that caregiving-related practices retain explanatory power for child nutritional status even after accounting for material circumstances (Issa et al., 2025; Umwali et al., 2022). For South Aceh, this suggests that interventions limited to economic assistance or food distribution, without a parallel investment in caregiver knowledge and practice, are likely to yield only partial improvements in stunting outcomes.

Taken together, these findings indicate that reducing stunting in the locus areas of South Aceh is unlikely to respond to a single-lever intervention. Instead, the evidence points toward a layered strategy in which strengthening household resources creates the enabling conditions for better nutrition, while targeted efforts to improve dietary intake and caregiving practices ensure that those conditions are actually converted into improved child growth.

CONCLUSIONS AND RECOMMENDATIONS

This study found that household resources, dietary intake, and caregiving quality each exert a significant, independent, and positive influence on the growth status of children aged 24–59 months in the stunting-locus sub-districts of South Aceh, jointly explaining a substantial share of the variance in stunting incidence. Dietary intake was the strongest determinant, followed by household resources and caregiving quality, indicating that what a child actually eats remains the most decisive proximate pathway to healthy growth, even as household-level resources and caregiving practices provide the enabling and translating conditions that make adequate nutrition possible.

These findings suggest that stunting reduction programs in South Aceh should give priority to nutrition-sensitive interventions that directly improve dietary diversity and adequacy for children aged 24–59 months, while simultaneously strengthening household economic and social resources through livelihood and social protection measures. Equally important is continued investment in caregiver education and responsive-feeding counseling at the posyandu level, so that improvements in household resources are consistently translated into better feeding and care practices at home.

FURTHER STUDY

This study is limited by its cross-sectional design, which restricts causal inference regarding the directional relationships among resources, dietary intake, caregiving quality, and children's growth status. In addition, the model deliberately focused on three key determinants and did not incorporate other potentially relevant factors, such as household food security, feeding practices, health and sanitation services, and prevailing social norms, that may operate as mediating or moderating pathways. Future research is encouraged to adopt longitudinal designs capable of tracing causal sequences over time, and to test a broader set of determinants using mixed-methods approaches that combine structural modeling with qualitative inquiry into household decision-making, in order to build a more complete understanding of stunting in South Aceh and similar high-burden settings.

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