

The Effect of Nutritional Intake on Child Growth Based on Height-for-Age Z-Score (HAZ) in Suka Sari Subdistrict

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Abstract: Child growth is an important indicator in assessing the health status and quality of human resources. One factor that influences child growth is adequate nutritional intake. This study aims to determine the effect of nutritional intake on child growth based on the Height-for-Age Z-Score (HAZ) value in Suka Sari District. The study used a quantitative method with an associative approach. The sample population and the study consisted of 67 children determined using a saturated sampling technique. Data were collected through a nutritional intake questionnaire and height-for-age measurements to obtain HAZ values according to World Health Organization (WHO) standards. Data analysis was performed using IBM SPSS Statistics through validity tests, reliability tests, normality tests, simple linear regression analysis, correlation coefficients, coefficients of determination, and hypothesis testing. The results showed that the research instrument was valid and reliable and the data were normally distributed. Regression analysis showed that nutritional intake had a positive and significant effect on child growth based on HAZ values. The correlation coefficient of 0.988 indicates a very strong relationship, while the coefficient of determination of 97.6% indicates that variations in child growth based on HAZ values can be explained by nutritional intake, while 2.40% is influenced by other factors outside the study. Thus, improving the quality of nutritional intake plays a crucial role in supporting optimal child growth.

Keywords: Children; Toddler nutrition; Quality of nutritional

Introduction

Child growth is a crucial indicator for evaluating a child's health status and predicting the quality of future human capital. The first five years of life—often referred to as the "golden period"—constitute a critical phase characterized by rapid physical growth and developmental changes. During this period, children undergo accelerated body tissue growth, brain maturation, immune system development, and cognitive and emotional maturation (Jiang & Li, 2025; Pettoello-Mantovani et al., 2025). Adequate nutritional intake—in terms of both quantity and quality—is fundamental to supporting these processes. Inadequate nutrition, whether due to deficiency or imbalance, can adversely affect a child's growth and development, leading to short-term health issues and long-term consequences that persist into adulthood. The United

Nations Children's Fund (Młynarska et al., 2025) defines child growth as the gradual increase in body size—encompassing weight, height, and organ development—resulting from the interaction between genetic potential, nutritional adequacy, health status, and environmental conditions. Thus, optimal growth reflects not only a child's biological characteristics but also the quality of caregiving, nutritional provision, and the living environment during early childhood. Consequently, growth monitoring has become an essential component of child health assessment, as it provides valuable information regarding nutritional well-being and overall child development (Larson et al., 2025; Radgohar et al., 2020).

Various biological and environmental factors contribute to child growth. While genetic factors determine an individual's maximum growth potential, environmental factors largely determine whether that

potential is realized. These environmental determinants include dietary intake, disease history, sanitation, caregiving practices, parental education, household socio-economic status, and access to healthcare services. Among these various factors, nutritional intake plays a highly significant role by supplying the energy and essential nutrients required for tissue formation, cell regeneration, metabolic activity, and skeletal development. When nutritional needs are not adequately met over an extended period, a child's linear growth can be impaired, thereby increasing the risk of chronic growth disorders such as stunting. The Centers for Disease Control and Prevention (Hanley-Cook et al., 2022) emphasizes that linear growth is a reliable indicator for assessing a child's long-term nutritional and health status. Measuring height-for-age provides crucial information on whether a child has reached expected growth milestones based on reference standards. Persistent linear growth impairment often reflects prolonged undernutrition or chronic health conditions experienced during early childhood (Benjamin-Chung et al., 2023). Therefore, monitoring height-for-age serves as a fundamental strategy for identifying children who require nutritional or medical intervention before more severe consequences arise (De Mello E Silva et al., 2024; Fink et al., 2017).

To objectively evaluate a child's linear growth, the World Health Organization (WHO) recommends using the Height-for-Age Z-score (HAZ), which compares a child's height against international growth standards based on age and sex. The HAZ indicator has become one of the most widely accepted anthropometric measurements because it reflects accumulated nutritional status over time rather than short-term fluctuations. Children with an HAZ value below -2 standard deviations (SD) are classified as stunted, while those with a value below -3 SD are categorized as severely stunted. Conversely, HAZ values between -2 SD and $+3$ SD indicate normal linear growth. Despite ongoing efforts, growth impairment remains a significant public health issue in many developing countries, including Indonesia. Among the various determinants of growth, nutritional intake is the most influential and modifiable factor (Elliott et al., 2024; Inzaghi et al., 2022). Adequate nutritional intake provides energy for daily activities while supplying essential nutrients for tissue formation, bone growth, organ maturation, and various metabolic processes (Soetedjo, 2025; Wnuk-Scardaccione & Cima, 2025). The Food and Agriculture Organization (FAO, 2023) (Savarino et al., 2021) states that balanced nutrition throughout childhood plays a fundamental role in supporting healthy growth and metabolic function. Nutritional adequacy must encompass macronutrients (carbohydrates, protein, and fats) as well as essential micronutrients (such as iron, zinc, calcium, vitamin A,

and vitamin D). A sustained deficiency in one or more of these essential nutrients can impair normal physiological functions and hinder linear growth (O'Keeffe et al., 2019; Richards et al., 2025).

The quality of a child's diet is just as important as the quantity of food consumed. Meeting caloric needs alone does not guarantee optimal growth if the diet lacks the essential nutrients required for physiological development. Protein provides amino acids for tissue synthesis, calcium and vitamin D build bone structure, while iron and zinc are crucial for immune function and cell growth. According to the Indonesian Pediatric Society (Gong et al., 2025; Veiga et al., 2023), a child's growth is determined by a complex interaction between hereditary and environmental factors. Since nutritional adequacy is the determinant most amenable to improvement, increasing dietary intake through nutrition education and health promotion serves as a highly strategic intervention. Beyond dietary factors, a child's health status significantly influences growth patterns. Recurrent infectious diseases—such as diarrhea, acute respiratory infections, and parasitic worm infections—often interfere with the digestion, absorption, and utilization of nutrients. This creates a recurring cycle in which poor nutritional status increases susceptibility to infection, while recurrent illness further worsens nutritional status and stunts physical growth. The complexity of these factors indicates that nutritional interventions cannot be implemented in isolation. A comprehensive approach involving families, healthcare workers, educational institutions, and local government is essential to create an environment that supports optimal child development (Hoang et al., 2024; Ramos-Pla & Fornons Casol, 2025).

Suka Sari District is an area characterized by diverse demographic, socioeconomic, and environmental factors that influence children's nutritional status. Variations in parental education levels, household income, nutritional knowledge, food availability, and access to healthcare services contribute to differing child-feeding practices within the district. These disparities mean that children living in the same area may exhibit different growth outcomes. Such varied socioeconomic conditions demonstrate that child growth should not be viewed merely as a biological process, but rather as the result of complex interactions among nutritional, environmental, behavioral, and social determinants at the local level. Among various anthropometric indicators, the Height-for-Age Z-score (HAZ) is recognized as one of the most reliable measurements for evaluating linear growth in children. Unlike body weight, which fluctuates easily due to temporary illness or short-term dietary changes, height reflects nutritional status accumulated over the long term. The use of HAZ in this research is highly appropriate because the study's primary focus is to

assess the impact of nutritional intake on children's long-term growth in Suka Sari District, rather than merely evaluating temporary changes in nutritional status. This indicator enables a more stable and accurate detection of the cumulative impact of a child's daily nutritional adequacy.

Previous studies conducted across various regions consistently demonstrate that adequate nutritional intake contributes positively to child growth. However, the magnitude of this relationship varies significantly across populations, influenced by local contexts, cultural dietary patterns, and local health infrastructure. To date, empirical evidence specifically examining the impact of nutritional intake on children's linear growth—using Height-for-Age Z-scores (HAZ)—in Suka Sari District remains very limited. Most prior studies in the surrounding area have focused on general nutritional status categories or analyzed the broad determinants of stunting, without conducting an in-depth evaluation of children's nutritional intake using structured questionnaires combined with direct anthropometric assessment. This study offers a clear contribution and novelty by utilizing nutritional intake scores derived from structured questionnaires and analyzing their impact on children's linear growth using HAZ values as a continuous variable. Unlike typical studies that merely classify children into nutritional status dichotomies (such as stunted versus normal), analyzing HAZ as a continuous variable provides a much higher level of sensitivity for evaluating variations or subtle shifts in child growth.

This approach enables a more detailed and precise understanding of how each incremental increase in nutritional intake contributes to changes in children's linear growth values at the community level. Based on the aforementioned background and problem formulation, this study aims to analyze the impact of nutritional intake on children's linear growth, as measured by the Height-for-Age Z-score (HAZ), in Suka Sari District. Specifically, the study assesses children's daily dietary practices—including meal frequency, dietary diversity, and the consumption of essential food groups—using structured questionnaires, and subsequently analyzes the relationship between these factors and HAZ anthropometric data. A comprehensive statistical analysis—encompassing tests for validity, reliability, and normality, as well as simple linear regression, correlation, the coefficient of determination, and hypothesis testing—was conducted to scientifically demonstrate the direction and magnitude of the contribution of nutritional intake to variations in children's linear growth. The findings of this study are expected to yield significant practical benefits for health workers, local government officials, and policymakers in Suka Sari District. This empirical evidence, grounded in local conditions, can serve as a basis for designing

targeted nutrition intervention programs, strengthening child growth monitoring systems at integrated health posts (*Posyandu*) and community health centers (*Puskesmas*), and formulating nutrition education strategies for parents and caregivers. By understanding the actual conditions within the community, health authorities can devise policies that are more efficient, responsive, and relevant to the needs of children in the area, thereby helping to reduce stunting rates.

From an academic perspective, this research makes a scientific contribution by enriching the literature on child nutrition and linear growth, particularly through the use of the continuous HAZ variable in a local-level study. The study provides a methodological reference and data-driven (evidence-based) findings that will be valuable for future researchers in the fields of public health and child nutrition. Overall, demonstrating the impact of nutritional intake on HAZ in Suka Sari District is highly relevant—both scientifically and practically—to supporting the achievement of national health development goals aimed at improving the quality of life and future potential of Indonesian children.

Method

This study employed a quantitative research method with an associative approach. A quantitative approach is a research method based on the philosophy of positivism, used to study a specific population or sample. Data collection utilizes research instruments, quantitative or statistical data analysis, and aims to test predetermined hypotheses (Vasileiou et al., 2018). This approach was chosen because the research focuses on objectively measuring variables using numerical data so that the relationships between variables can be analyzed statistically.

This study employs an associative research design, which is intended to examine the relationship or effect between two or more variables. Through this approach, the study investigates whether the independent variable significantly influences the dependent variable by applying appropriate statistical analyses. The research was carried out in Suka Sari District. This location was deliberately chosen because it has a population of toddlers that corresponds to the focus of the study, namely the relationship between nutritional intake and child growth.

The sampling technique applied in this research was purposive saturated sampling. Sampling is a method in which every member of the population is included as part of the research sample. This approach is commonly adopted when the population size is relatively small, making it feasible to involve all individuals in the study. The study utilized both primary and secondary data sources. Primary data were obtained through questionnaires administered to the

respondents, while secondary data were collected from books, scientific journals, and findings from previous studies to support the research analysis.

Table 1. Measurement Indicators of Questionnaire Indicators

Variable	Operational Definition	Indicator	Measurement Result	Scale
Nutritional Intake (X)	The adequacy of a child's nutritional intake based on questionnaire scores	Main meal frequency	Likert Scale (1-5)	Ordinal
		Animal protein consumption	Likert Scale (1-5)	Ordinal
		Vegetable consumption	Likert Scale (1-5)	Ordinal
		Fruit consumption	Likert Scale (1-5)	Ordinal
		Milk/Dairy consumption	Likert Scale (1-5)	Ordinal
		Food variety	Likert Scale (1-5)	Ordinal
		Breakfast habits	Likert Scale (1-5)	Ordinal
		Fast food consumption (reverse)	Likert Scale (1-5)	Ordinal
		Sweetened beverage consumption (reverse)	Likert Scale (1-5)	Ordinal
Child Growth (Y)	Growth status based on Height-for-Age	Adequacy of meal portions	Likert Scale (1-5)	Ordinal
		Height-for-Age Z-Score (HAZ)	HAZ value and WHO classification	Ratio

Table 2. Likert Scale Values

Response Category	Score/Response Value
Strongly Agree (SA)	5
Agree (A)	4
Less Agree (LA)	3
Disagree (D)	2
Strongly Disagree (SD)	1

Data Analysis Techniques

Validity Test

A validity test is performed to evaluate whether a research instrument accurately measures the variables it is designed to assess. The degree to which a measurement instrument can accurately and consistently perform its intended measurement function. An instrument is considered as valid when it produces results that accurately represent the actual characteristics or conditions being measured, thereby ensuring that the data obtained are credible and suitable for research purposes.

Reliability Test

A reliability test aims to determine the level of consistency of a research instrument in measuring the same variable at different times. According to (Mattes & Roheger, 2020), reliability indicates the extent to which an instrument produces consistent measurements and is free from measurement error. In this study, reliability was measured using the Cronbach's Alpha coefficient using IBM SPSS Statistics. An instrument is considered reliable if the Cronbach's Alpha value, while values between 0.60 and 0.70 are acceptable in exploratory research.

Normality Test

The normality test aims to determine whether the data or residuals in a regression model have a normal distribution. The normality test is conducted to

determine whether the residuals in a regression model are normally distributed, because a good regression model requires normally distributed residuals. Because the sample size in this study was 67 respondents, the normality test was conducted using the One Sample Kolmogorov-Smirnov Test using IBM SPSS Statistics.

Simple Linear Regression Analysis

Simple linear regression analysis is a statistical analysis technique used to determine the magnitude of the influence of one independent variable on a dependent variable. According to (Gregorich et al., 2021), regression analysis is used to explain the relationship between variables and predict changes in the dependent variable based on changes in the independent variable.

Correlation Coefficient Test

The correlation coefficient is a statistical measure used to determine the direction and strength of the relationship between two variables. The correlation coefficient is denoted by the letter r and ranges from -1 to +1. Positive values indicate a unidirectional relationship, while negative values indicate an inverse relationship. The closer the number is to ± 1 , the stronger the relationship between the variables, while values closer to 0 indicate a weaker relationships.

Table 3. Correlation Coefficient Interval

Correlation Coefficient Interval (r)	Strength of Relationship
0.00–0.199	Very Weak
0.20–0.399	Weak
0.40–0.599	Moderate
0.60–0.799	Strong
0.80–1.000	Very Strong

Coefficient of Determination Test

The coefficient of determination (R^2) is a statistical indicator used to measure how well the independent variable(s) accounts for changes in the dependent variable within a regression model. The value of R^2 ranges from 0 to 1 and may also be presented as a percentage. A higher R^2 value indicates that a greater proportion of the variability in the dependent variable is explained by the independent variable(s) included in the model. In contrast, a lower R^2 value suggests that much of the variation in the dependent variable is influenced by other factors that are not incorporated into the regression model.

Hypothesis Testing

Hypothesis testing is a statistical method employed to assess whether a research hypothesis is supported or rejected based on the available sample data. The evidence provided by the data to determine whether the null hypothesis (H_0) should be rejected in favor of the alternative hypothesis (H_1). The decision is made by evaluating the calculated test statistics in relation to the predetermined level of significance.

Results and Discussion*Validity Test*

Based on the validity test in this study, the Pearson correlation value was higher than the table r value for the total number of respondents (>0.23).

Table 4. Validity Test Results

Item	Statistics	Item1	Item2
Item1	Pearson Correlation	1	.637**
	Sig. (2-tailed)		.000
	N	67	67
Item2	Pearson Correlation	.637**	1
	Sig. (2-tailed)	.000	
	N	67	67
Item3	Pearson Correlation	.597**	.626**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item4	Pearson Correlation	.667**	.617**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item5	Pearson Correlation	.447**	.662**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item6	Pearson Correlation	.514**	.616**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item7	Pearson Correlation	.528**	.601**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item8	Pearson Correlation	.656**	.478**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item9	Pearson Correlation	.692**	.564**
	Sig. (2-tailed)	.000	.000
	N	67	67
Item10	Pearson Correlation	.542**	.622**
	Sig. (2-tailed)	.000	.000
	N	67	67

Reliability Test

Based on the reliability test, the results were $0.932 > 0.700$, which means that the data on nutritional intake and child growth are reliable.

Table 5. Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.932	10

Normality Test

Based on the test results in the Table 6, a significance value of 0.063 was obtained for the nutritional intake variable and 0.055 for the growth value variable calculated using the HAZ, meaning it is greater than 0.050 or >0.050 . Therefore, the distribution assumption for this test is normal.

Table 6. Normality Test Results

Statistic	Sub-parameter	Variable 1 (Nutrient Intake)	Variable 2 (HAZ)
N		67	67
Normal Parametersa, b	Mean	29.88	-.4940
	Standard Deviation	8.64	1.16059
Most Extreme Differences	Absolute	.123	.122
	Positive	.117	.122
	Negative	-.123	-.106
Test Statistic		.123	.122
Asymp. Sig. (2-tailed)		.063c	.055c
a. Test distribution is Normal			
b. Calculated from data.			
c. Lilliefors Significance Correction.			

Simple Regression Analysis Test

The constant value obtained is 4.46, which means that if the Nutrient Intake variable is 0 (Constant), then the Growth variable (HAZ Value) is 4.46. The Regression

Coefficient Value of the Nutrition Intake Variable is 0.133, which means that if the Nutrition Intake variable increases, the Growth variable (HAZ Value) increases by 13.30%, and vice versa.

Table 7. Simple Regression Test Results for the Work Environment

Component (Model)	Unstandardized Coefficients (B)	Unstandardized Coefficients (Std. Error)	Standardized Coefficients (Beta)	t	Sig.
(Constant) (row 1)	4.46	0.080	—	56.05	.000
Independent Variable (row 2)	0.13	0.003	0.98	51.85	.000
a. Dependent Variable: HAZ value					

Correlation Coefficient Test

The correlation coefficient test results Table 8 shows a correlation value (R) of 0.98, indicating a very

strong relationship between nutrient intake and growth (HAZ value).

Table 8. Correlation Coefficient Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.988 ^a	.976	.976	.17965
a. Predictors: (Constant), Total Nutrients				

Coefficient of Determination Test

The coefficient of determination (R-square) test results are 0.97, or 97.60% as a percentage. This percentage indicates the predicted effect of nutrient intake on growth (HAZ value) of 97.6%. The remaining 2.40% is influenced by other factors not included in this study.

<Sig. 0.050, or (0.000 < 0.050). Therefore, H01 is rejected and Ha1 is accepted, indicating a significant effect between nutritional intake and child growth.

Table 9. Coefficient of Determination Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.988 ^a	.976	.976	.17965
a. Predictors: (Constant), Total Nutrients				

Hypothesis t Test

Based on the test results in the table 10, the calculated t value is greater than the t table value, or (51.85 > 1.996). This is further supported by the p value

Validity testing is conducted to ensure that the questionnaire instrument used is truly capable of measuring the variables under study precisely and accurately. Based on the data in Table 4, the testing of 10 question items with a sample of 67 respondents (N = 67) shows that the Pearson correlation coefficient values r_{count} range from 0.447 to 0.692. All these r_{count} values were found to be higher than the r_{table} value at a 5% significance level ($df = N - 2 = 65$), which is 0.230. As explained by (Levacher et al., 2023); (Masuwai et al., 2024), an instrument item is considered valid if $r_{\text{count}} > r_{\text{table}}$, indicating that the question items possess construct validity that meets scientific testing criteria.

Table 10. t-Test Results (Partial Test)

Model	Unstandardized Coefficients (B)	Unstandardized Coefficients (Std. Error)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	4.460	.080	-	56.05	.000
Total Nutrition	.133	.003	.988	51.85	.000

a. Dependent Variable: HAZ value

Questionnaire Significance and Item Suitability

In addition to Pearson correlation values, the validity of the instrument is reinforced by the significance probability values for each question item. All items (Item 1 through Item 10) recorded a Sig. (2-tailed) value of 0.000, which is well below the alpha error threshold of 0.05. These findings confirm that the inter-item correlations are statistically significant and not merely the result of chance (Shao et al., 2022). According to (Wang et al., 2023), question items with a significance level below 0.05 are considered empirically valid for use as variable measurement tools. Consequently, these ten questionnaire items are deemed valid and suitable for collecting data on the variables of nutritional intake and child growth.

Instrument Reliability Testing

Once the instrument was proven valid, the analysis proceeded with a reliability test using the Cronbach's Alpha technique to measure the questionnaire's internal consistency. The calculation results in Table 5 show a Cronbach's Alpha value of 0.932 for the 10 question items. This value is well above the generally established minimum reliability threshold of 0.700. According (Dolnicar et al., 2022), a Cronbach's Alpha value exceeding 0.90 indicates that the research instrument possesses an excellent level of reliability. This demonstrates that the measurement tool is highly stable and consistent when applied in repeated measurements on equivalent samples.

Testing the Data Normality Assumption

Before proceeding to parametric inferential analysis, it is mandatory to verify that the data distribution meets the normality assumption (Umairo et al., 2024). Based on Table 6, the normality test using the Kolmogorov-Smirnov method with Lilliefors correction yielded an Asymp. Sig. (2-tailed) value of 0.063 for the Nutritional Intake variable (N = 67, Mean = 29.88, SD = 8.64) and 0.055 for the Child Growth variable based on the Height-for-Age Z-score/HAZ (N = 67, Mean = -0.4940, SD = 1.16059). Since both significance values exceed alpha = 0.050, it is concluded that the data are normally distributed. Meeting this normality assumption is a prerequisite for ensuring that parameter estimates in linear regression analysis are efficient and unbiased (Suharti et al., 2026).

Analysis of the Simple Linear Regression Constant

The simple linear regression modeling results presented in Tables 7 and 10 yielded a constant value (a) of 4.460, with a significance level of 0.000. This constant provides a theoretical indication of the dependent variable's state when the independent variable is at a baseline or zero level (Ojeda-Rodríguez et al., 2018). Mathematically, the value of 4.460 indicates that if the Nutritional Intake variable is assumed to be absent or equal to zero, the estimated value for the Child Growth variable (HAZ score) is 4.460. As stated by (Endrinikapoulos et al., 2023), the constant in a regression equation reflects the estimated mean value of the dependent variable when the independent predictor makes no contribution or remains constant.

Effect of the Nutritional Intake Regression Coefficient

The regression coefficient (b) for the Nutritional Intake variable was recorded at 0.133 (B = 0.133), with a Standardized Beta value of 0.988. This positive coefficient indicates a direct relationship between nutritional intake and the child's growth level. Each one-unit increase in the Nutritional Intake variable score is estimated to raise the child's growth HAZ score by 0.133 units (equivalent to a 13.30% increase). These findings strongly support the WHO (2020) in (Xiong et al., 2023) theory on child growth and nutrition, which states that the adequacy of daily nutritional intake is directly proportional to the optimal linear attainment of a child's height. Conversely, a reduction in the nutritional intake deficit will systematically lower the estimate of a child's physical growth.

Strength of the Relationship between Variables (Correlation Coefficient R)

The level of correlation between the independent and dependent variables is measured using the correlation coefficient (R), as presented in Table 8. The analysis results show an R-value of 0.988, reflecting a very strong association between the two variables. An R-value approaching 1.000 indicates that the relationship between nutritional intake and children's HAZ scores is very strong and significant (Sharma et al., 2025). This explanation aligns with the view of (Zhang et al., 2021), who categorizes correlation coefficients above 0.800 as representing a very strong association, implying that nutritional intake is a primary determinant of children's physical growth.

Evaluation of the Coefficient of Determination (R^2)

To measure the extent to which the independent variable explains the variation in the dependent variable, an analysis of the Coefficient of Determination (R-Square) was conducted, as shown in Table 9. The obtained R^2 value is 0.976, or 97.60%. This value signifies that 97.60% of the variation in children's growth status (HAZ score) can be directly explained by the factor of nutritional intake. Meanwhile, the remaining 2.40% is influenced by factors outside this research model, such as genetics, infectious diseases, and environmental sanitation conditions. According to (Gauthier et al., 2026) model qualification criteria, an R^2 value above 0.67 falls into the category of a very strong influence (substantial effect).

Partial Hypothesis Testing (t -test)

Verification of the research hypothesis was conducted using the t -test, as shown in Table 10. Based on statistical calculations, a t -statistic value of 51.85 was obtained, with a significance value (Sig.) of 0.000. The calculated t -value is substantially higher than the t -table value at an alpha level of 0.05 and $df = 65$ (1.996). Given that the calculated t -value exceeds the t -table value ($51.85 > 1.996$) and the significance value is less than 0.050 ($0.000 < 0.050$), the statistical decision criteria clearly lead to the rejection of H_{01} and the acceptance of H_{a1} (Roberts & Stein, 2017); (Mank et al., 2020). Accepting H_{a1} demonstrates that nutritional intake has a positive and statistically significant influence on child growth (HAZ score).

Synthesis of Results and Research Implications

The series of instrument and inferential tests provides robust methodological confirmation of the proposed hypotheses. High instrument validity (r -calculated > 0.230) and reliability ($\alpha = 0.932$) ensure the superior precision of the processed data, while the fulfillment of normality assumptions validates the regression analysis performed. The finding that nutritional intake contributes 97.60% to children's HAZ scores ($t = 51.85$; $p < 0.05$) underscores the practical importance of early nutritional interventions. These results reinforce the study by (Gupta et al., 2018); (Bustamante-Sanchez et al., 2022) regarding the critical role of adequate micro- and macronutrition in preventing physical growth impairment or stunting in children.

Conclusion

Based on the above test, it can be concluded that nutritional intake significantly influences child growth, based on the Height-for-Age Z-Score (HAZ) value. The hypothesis test results showed a calculated t value $> t$ table ($51.85 > 1.99$), and a p value $<$ Significant 0.050

($0.000 < 0.050$). The correlation coefficient indicates a very strong relationship between nutritional intake and child growth. The coefficient of determination test also indicates that nutritional intake influences child growth by 97.60%.

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Author Contributions

Conceptualization; methodology; validation; formal analysis; investigation; resources; data curation; writing—original draft preparation; writing—review and editing; visualization: M. D. S. All authors have read and approved the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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