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Factors Influencing the Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

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ABSTRACT

The nutritional status of primary school children remains a public health concern, particularly in rural areas where socioeconomic constraints and limited access to nutritious food persist. Understanding the factors associated with children's nutritional status is essential to support effective and context-specific interventions. This study aimed to analyze factors associated with the nutritional status of primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Municipiu Ermera, Timor-Leste. A quantitative cross-sectional study was conducted among 384 primary school children using total sampling. Data were collected through structured interviews with parents or guardians and anthropometric measurements of children. The variables analyzed included age, sex, parental education, household economic status, daily dietary intake, and children's health history. Data analysis was performed using Chi-Square tests and multinomial logistic regression. The proportion of children with normal nutritional status was 47.7%. Bivariate analysis showed no significant association between age ($p = 0.956$) or sex ($p = 0.936$) and nutritional status. Significant associations were observed between nutritional status and maternal education ($p = 0.000$), paternal education ($p = 0.007$), household economic status ($p = 0.029$), daily dietary intake ($p = 0.000$), and health history ($p = 0.000$). Multinomial logistic regression indicated that the model explained 50.2% of the variance in nutritional status (Nagelkerke $R^2 = 0.502$). Maternal education emerged as the most dominant factor ($\chi^2 = 87.118$; $p = 0.000$), followed by dietary intake and health history. Maternal education, daily dietary intake, and health history were the strongest factors associated with the nutritional status of primary school children, whereas age and sex were not significantly related. These findings highlight the importance of family-based approaches and improved dietary practices to enhance child nutritional outcomes in rural settings.

Keywords: Nutritional Status; Primary School Children; Maternal Education; Dietary Intake; Health History

INTRODUCTION

The nutritional status of primary school–aged children represents a critical public health issue, as it is closely linked to physical growth, cognitive development, and learning capacity. During primary school age, children undergo a crucial phase of continued growth that substantially shapes their long-term health outcomes and future productivity. Nutritional deficiencies at this stage do not merely affect anthropometric indicators such as height and weight but also compromise immune function, cognitive performance, and academic concentration. A growing body of evidence indicates that children's nutritional status is determined by a complex interaction of factors, including dietary quality, food diversity, adequacy of protein and micronutrient intake, and overall health conditions (Bailey et al., 2020; Bowman, 2020; Gaytán-González et al., 2020). Insufficient dietary diversity has been consistently associated with chronic forms of malnutrition such as stunting, which reflects prolonged nutritional deprivation (Kuche et al., 2019). Moreover, infectious diseases and anemia have been shown to exacerbate poor nutritional status by impairing nutrient absorption and increasing metabolic demands (Goosen et al., 2021). Therefore, the nutritional status of primary school children should be understood as a multidimensional issue that requires comprehensive and context-sensitive investigation.

The seriousness of the problem becomes more evident when children's nutritional status is examined in relation to long-term human capital development. Children experiencing undernutrition face a higher risk of growth retardation, reduced cognitive ability, and increased susceptibility to recurrent infections. Cross-national studies reveal that many school-aged children fail to meet recommended intakes of essential micronutrients such as iron, zinc, and vitamin A, even in contexts where food availability is relatively adequate (Bailey et al., 2020). This finding suggests that nutritional problems are not solely driven by food scarcity but are strongly influenced by dietary quality and variety. Additionally, uneven distribution of protein intake throughout the day may result in nutritional inadequacy despite apparently sufficient total intake (Gaytán-González et al., 2020; Nalaka et al., 2018). In rural settings such as Suco Catral Caraic, Posto Administrativu Letefoho, Municipiu Ermera, dietary patterns dominated by staple foods and limited variety may further increase the risk of undernutrition. Consequently, poor nutritional status among primary school children extends beyond individual health concerns and has broader implications for educational outcomes and social development.

From a policy perspective (political concern), child nutrition has long been recognized as a priority; however, interventions have predominantly targeted children under five years of age. Existing literature indicates that primary school–aged children are frequently overlooked in nutrition programs, despite their continued high nutritional needs and the direct influence of nutrition on learning and long-term health (Bailey et al., 2020). Research has demonstrated that parental education, household economic status, and dietary diversity are

key determinants of undernutrition among primary school children (Sesay et al., 2023). Nevertheless, nutrition education interventions alone may be insufficient to improve nutritional status if not accompanied by enhanced food access and household food security (Nwachan et al., 2024). Environmental factors such as seasonal variation have also been shown to influence dietary intake, particularly in communities dependent on agriculture (Curtis et al., 2024; Smith et al., 2024). In the context of Timor-Leste, especially Municipiu Ermera where subsistence farming predominates, these findings highlight the need for nutrition policies that integrate social, economic, and environmental considerations. Accordingly, this study offers empirical evidence to inform more context-specific nutrition strategies for school-aged children.

The issue of nutritional status among primary school children also reflects a strong dimension of public concern. Families and communities generally aspire to ensure that children grow healthy and perform well academically, yet structural constraints often limit their ability to provide nutritionally adequate diets. Children's eating behaviors are strongly shaped by household dietary practices, making family-level consumption patterns a critical determinant of diet quality (Chan et al., 2021). Food preferences established during childhood are largely influenced by foods routinely offered at home, which in turn affects daily nutrient adequacy (Mariani et al., 2021). Several studies indicate that micronutrient deficiencies among children are more commonly linked to monotonous diets rather than absolute food shortages (Bailey et al., 2020). In addition, health conditions such as infections and anemia remain prevalent among school-aged children and negatively affect both nutritional status and learning stamina (Goosen et al., 2021). These findings illustrate a gap between societal concern for child health and the practical capacity to meet nutritional needs, underscoring the social relevance of this research.

In terms of manageability, the research problem addressed in this study is methodologically feasible and scientifically grounded. Variables such as child age, sex, parental education, household economic status, dietary intake, and health history have been widely employed in nutritional studies and are supported by robust theoretical frameworks (Bailey et al., 2020; Kuche et al., 2019; Sesay et al., 2023). Anthropometric assessment methods and dietary intake measurements have been extensively validated and applied among school-aged populations (Bailey et al., 2020). A cross-sectional design allows efficient data collection within practical constraints of time and resources. Furthermore, analysis of meal patterns and timing has been shown to provide valuable insights into metabolic balance and nutritional outcomes (Lentjes et al., 2022). Supported by adequate data availability, methodological tools, and literature, this study is both realistic and manageable within an academic research framework.

This study is particularly important due to the substantial research gap concerning the nutritional status of primary school children in Timor-Leste. Much of the existing literature originates from high- and middle-income countries or selected African contexts, while empirical evidence from Timor-

Leste remains scarce. Moreover, many previous studies have examined nutritional determinants in isolation, focusing on single factors such as dietary intake or parental education without integrating health, behavioral, and socioeconomic dimensions (Sesay et al., 2023). However, current evidence emphasizes that children's nutritional status results from complex interactions among dietary, health, behavioral, and environmental factors (Bailey et al., 2020; Goosen et al., 2021; Curtis et al., 2024). Addressing this gap, the present study adopts a multidimensional approach tailored to local conditions.

The objective of this study is to analyze the factors influencing the nutritional status of primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Municipiu Ermera, Timor-Leste. Specifically, the study aims to examine the relationships between child age, sex, maternal and paternal education, household economic status, dietary intake, health history, and nutritional status, as well as to identify the most dominant contributing factors. These objectives align with existing recommendations emphasizing comprehensive analysis of nutritional determinants among school-aged children (Bailey et al., 2020; Sesay et al., 2023). Overall, this study is firmly grounded in the existing literature. The importance of dietary quality and protein adequacy has been emphasized in prior studies (Bowman, 2020; Gaytán-González et al., 2020), while the roles of dietary diversity and health conditions have been well documented among school-aged populations (Kuche et al., 2019; Goosen et al., 2021). Additionally, family eating behaviors, meal timing, and environmental factors such as seasonality further enrich current understanding of nutritional determinants (Chan et al., 2021; Lentjes et al., 2022; Curtis et al., 2024; Smith et al., 2024). By integrating these perspectives within the local context of Timor-Leste, this study contributes meaningful empirical evidence and supports the development of more effective and sustainable nutrition interventions for primary school children.

METHOD

This study employed a quantitative approach with an analytical observational design using a cross-sectional method. This design was selected because it allows the simultaneous assessment of the nutritional status of primary school children and its associated factors within a single observation period, as commonly applied in child nutrition research (Bailey et al., 2020; Kuche et al., 2019; Sesay et al., 2023). The study was conducted in Suco Catral Caraic, Posto Administrativu Letefoho, Municipiu Ermera, Timor-Leste, a rural area where the majority of the population relies on subsistence agriculture. Data collection was carried out during the active school period to minimize attendance-related bias.

The study population consisted of all primary school children enrolled and actively attending schools in the study area. Eligible participants were children aged 6–12 years who were present during data collection and whose parents or legal guardians provided written informed consent. Children with physical conditions affecting anthropometric measurements or those experiencing acute

illness at the time of data collection were excluded. A total sampling technique was applied due to the relatively small population size, allowing comprehensive representation of the target population, consistent with previous studies in rural settings (Kuche et al., 2019; Sesay et al., 2023). Collected sociodemographic data included age, sex, parental education levels, and household economic status.

Children's nutritional status was assessed through anthropometric measurements of body weight and height using calibrated equipment. Body weight was measured using a digital scale, while height was measured with a portable stadiometer, ensuring the child stood upright with the head positioned in the Frankfurt plane. Nutritional status was determined using age-appropriate anthropometric indices for school-aged children, following established approaches in prior research (Bailey et al., 2020; Sesay et al., 2023). Dietary intake was assessed using a 24-hour dietary recall method administered through interviews with children and verified with parents or guardians when necessary. This method was employed to capture dietary patterns and food diversity (Bailey et al., 2020; Kuche et al., 2019). Recent illness history was also collected to account for the potential influence of infection on nutritional status (Goosen et al., 2021).

Data collection was conducted by trained enumerators using standardized procedures. Anthropometric measurements were obtained first, followed by structured interviews addressing household characteristics, dietary intake, and health history. Data completeness and consistency were checked prior to analysis. Statistical analysis was performed in a stepwise manner, beginning with descriptive statistics to summarize participant characteristics and nutritional status distribution. Bivariate analyses were used to examine associations between independent variables and nutritional status, and variables showing statistically significant associations were included in multivariable analysis to identify dominant factors influencing nutritional status, consistent with analytical approaches used in previous studies (Sesay et al., 2023). Statistical significance was set at a conventional p-value threshold.

The study was conducted in accordance with ethical principles for research involving human participants. Approval to conduct the study was obtained from relevant local authorities and school administrators. Written informed consent was obtained from parents or legal guardians, and verbal assent was obtained from the children prior to participation. Participant confidentiality and anonymity were maintained by excluding personal identifiers from the dataset and reporting results in aggregate form.

RESULT AND DISCUSSION

RESULT

This study was conducted among 384 primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste. Data collection was carried out through structured interviews, anthropometric measurements, and questionnaires covering demographic

characteristics, socioeconomic status, dietary intake, and children's health history. All data were subsequently analyzed using bivariate and multivariate approaches to examine the relationships among variables in greater depth. Association between Age and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste.

Table 1. Cross-tabulation of nutritional status by age group among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	5–8 years n (%)	9–12 years n (%)	13–15 years n (%)	Total (n)
Normal	91 (23.7)	63 (16.4)	29 (7.6)	183
Obesity	30 (7.8)	24 (6.3)	12 (3.1)	66
Underweight	62 (16.1)	49 (12.8)	24 (6.3)	135
Total	183 (47.7)	136 (35.4)	65 (16.9)	384

Based on Table 1, the highest proportion of normal nutritional status was observed among children aged 5–8 years, accounting for 91 children (23.7%) of the total respondents.

Table 2. Chi-square test results for the association between age and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	0.659	4	0.956
Likelihood Ratio	0.659	4	0.956
Linear-by-Linear Association	0.496	1	0.481
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.956 ($p > 0.05$), indicating that there was no significant association between children's age and nutritional status among primary school children.

Association between Sex and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 3. Cross-tabulation of nutritional status by sex among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	Female (n)	Female (% of total)	Male (n)	Male (% of total)	Total (n)
Normal	97	25.3	86	22.4	183
Obesity	36	9.4	30	7.8	66
Underweight	70	18.2	65	16.9	135

Total	203	52.9	181	47.1	384

Based on Table 3, the highest proportion was observed among female children with normal nutritional status, accounting for 97 children (25.3%) of the total respondents.

Table 4. Chi-square test results for the association between sex and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	0.132	2	0.936
Likelihood Ratio	0.132	2	0.936
Linear-by-Linear Association	0.034	1	0.854
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.936 ($p > 0.05$), indicating that there was no significant association between sex and nutritional status among primary school children.

Association between Maternal Education Level and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 5. Cross-tabulation of nutritional status by maternal education level in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	No Schooling & Primary (n)	% of total	Pre-Secondary & Secondary (n)	% of total	University (n)	% of total	Total (n)
Normal	110	28.6	66	17.2	7	1.8	183
Obesity	24	6.3	42	10.9	0	0.0	66
Underweight	36	9.4	44	11.5	55	14.3	135
Total	170	44.3	152	39.6	62	16.1	384

Based on Table 5, the highest proportion of children with normal nutritional status was found among those whose mothers had no schooling or primary education, accounting for 110 children (28.6%) of the total respondents.

Table 6. Chi-square test results for the association between maternal education level and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	111.077	4	0.000
Likelihood Ratio	113.490	4	0.000
Linear-by-Linear Association	71.674	1	0.000
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.000 ($p < 0.05$), indicating a significant association between maternal education level and the nutritional status of primary school children.

Association between Paternal Education Level and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 7. Cross-tabulation of nutritional status by paternal education level among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	No Schooling & Primary (n)	% of total	Pre-Secondary & Secondary (n)	% of total	University (n)	% of total	Total (n)
Normal	78	20.3	88	22.9	17	4.4	183
Obesity	28	7.3	35	9.1	3	0.8	66
Underweight	48	12.5	59	15.4	28	7.3	135
Total	154	40.1	182	47.4	48	12.5	384

Based on Table 7, the highest proportion of children with normal nutritional status was observed among those whose fathers had pre-secondary and secondary education, accounting for 88 children (22.9%) of the total respondents.

Table 8. Chi-square test results for the association between paternal education level and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	14.107	4	0.007
Likelihood Ratio	14.133	4	0.007
Linear-by-Linear Association	5.472	1	0.019
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.007 ($p < 0.05$), indicating a significant association between paternal education level and the nutritional status of primary school children.

Association between Household Economic Status and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 9. Cross-tabulation of nutritional status by household economic status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	Economically Adequate (n)	% of total	Economically Inadequate (n)	% of total	Total (n)
Normal	95	24.7	88	22.9	183
Obesity	43	11.2	23	6.0	66
Underweight	61	15.9	74	19.3	135
Total	**199**	**51.8**	**185**	**48.2**	**384**

Based on Table 9, the highest proportion of children with normal nutritional status was found among those from households with an economically adequate status, accounting for 95 children (24.7%) of the total respondents.

Table 10. Chi-square test results for the association between household economic status and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	7.079	2	0.029
Likelihood Ratio	7.168	2	0.028
Linear-by-Linear Association	1.066	1	0.302
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.029 ($p < 0.05$), indicating a significant association between household economic status and the nutritional status of primary school children.

Association between Daily Dietary Intake and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 11. Cross-tabulation of nutritional status by children's dietary intake in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	Adequate (Diak) (n)	% of total	Sufficient (Natoon) (n)	% of total	Insufficient (Menus) (n)	% of total	Total (n)
Normal	66	17.2	66	17.2	51	13.3	183
Obesity	0	0.0	48	12.5	18	4.7	66
Underweight	48	12.5	21	5.5	66	17.2	135
Total	**114**	**29.7**	**135**	**35.2**	**135**	**35.2**	**384**

Based on Table 11, the highest proportion of children with normal nutritional status was observed among those with adequate and sufficient dietary intake, each accounting for 66 children (17.2%) of the total respondents.

Table 12. Chi-square test results for the association between dietary intake and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	76.136	4	0.000
Likelihood Ratio	92.605	4	0.000
Linear-by-Linear Association	6.286	1	0.012
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.000 ($p < 0.05$), indicating a significant association between daily dietary intake and the nutritional status of primary school children.

Association between Health History and Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 13. Cross-tabulation of nutritional status by children's health history in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste (n = 384)

Nutritional Status	History of Illness (n)	% of total	No History of Illness (n)	% of total	Total (n)
Normal	112	29.2	71	18.5	183
Obesity	40	10.4	26	6.8	66
Underweight	110	28.6	25	6.5	135
Total	**262**	**68.2**	**122**	**31.8**	**384**

Based on Table 13, the highest proportion of children with normal nutritional status was found among those with a history of illness, accounting for 112 children (29.2%) of the total respondents.

Table 14. Chi-square test results for the association between health history and nutritional status among primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Statistical Test	Value	df	p-value
Pearson Chi-Square	16.875	2	0.000
Likelihood Ratio	17.794	2	0.000
Linear-by-Linear Association	13.945	1	0.000
Valid Cases	384	—	—

The Chi-square test results showed a p-value of 0.000 ($p < 0.05$), indicating a significant association between children's health history and nutritional status.

Dominant Factors Associated with the Nutritional Status of Primary School Children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality, Timor-Leste

Table 15. Goodness-of-fit results of the multinomial logistic regression model (Pseudo R-Square)

Pseudo R-Square Measure	Value
Cox & Snell	0.437
Nagelkerke	0.502
McFadden	0.281

The model goodness-of-fit results showed a Nagelkerke R^2 value of 0.502, indicating that the regression model explained 50.2% of the variation in the nutritional status of primary school children in Suco Catral Caraic, Posto Administrativu Letefoho, Ermera Municipality. The Cox & Snell R^2 value was 0.437, while the McFadden R^2 value was 0.281. These values reflect an acceptable level of model fit based on the calculated pseudo R-square measures. Overall, the multinomial logistic regression model used in this study was statistically adequate for analyzing the relationships between independent variables and children's nutritional status.

Table 16. Partial Significance Tests of Variables Associated With The Nutritional Status of Primary School Children (Likelihood Ratio Tests)

Variable	Chi-Square	df	p-value	Interpretation
Sex	0.288	2	0.866	Not significant
Child's age	1.360	4	0.851	Not significant
Maternal education	87.118	4	0.000	Significant
Paternal education	6.576	4	0.160	Not significant
Household economic status	5.484	2	0.064	Not significant (marginal)
Dietary intake	82.578	4	0.000	Significant
Health history	11.912	2	0.003	Significant

Based on Table 16, the variable with the highest Chi-square value was maternal education ($\chi^2 = 87.118$), followed by dietary intake ($\chi^2 = 82.578$) and children's health history ($\chi^2 = 11.912$). These three variables had p-values below 0.05 and were therefore considered statistically significant in the multinomial logistic regression model. In contrast, sex, child's age, paternal education, and household economic status showed p-values greater than 0.05 and were not statistically significant. Accordingly, based on the Likelihood Ratio test results,

maternal education was identified as the most dominant factor associated with the nutritional status of primary school children in the study area.

The results presented above illustrate the relationships between nutritional status and demographic characteristics, socioeconomic factors, dietary intake, and health conditions among primary school children. The following discussion section elaborates on these findings by comparing them with previous research and relevant conceptual frameworks.

DISCUSSION

The results of this study showed that the highest proportion of children with normal nutritional status was found among those aged 5–8 years, accounting for 91 children (23.7%), followed by the 9–12-year age group with 63 children (16.4%) and the 13–15-year age group with 29 children (7.6%). Although variations in the distribution of nutritional status across age groups were observed, the Chi-square test yielded a p-value of 0.956, indicating no significant association between children's age and nutritional status. These findings suggest that age differences within the primary school range do not represent a major determinant of children's nutritional status.

Conceptually, age is often associated with changes in nutritional requirements as children grow and develop. However, during the primary school years, differences in nutritional needs across age groups are relatively modest, which may limit their influence on nutritional status. This finding is consistent with previous studies reporting that children's age is not significantly associated with nutritional status when family and environmental factors are taken into account (Sesay et al., 2023; Bailey et al., 2020).

Within the context of the study area, similarities in socioeconomic conditions, caregiving practices, and dietary patterns across age groups may have attenuated potential differences in nutritional requirements related to age. This observation is also consistent with evidence highlighting that dietary adequacy and food diversity exert a stronger influence on children's nutritional status than chronological age (Kuche et al., 2019). Therefore, in this study, age functions primarily as a background characteristic rather than a key determinant of nutritional status among primary school children.

The study results indicated that normal nutritional status was more frequently observed among female children, with 97 children (25.3%), compared to 86 male children (22.4%). Although the proportion of normal nutritional status was slightly higher among girls, the Chi-square test yielded a p-value of 0.936, indicating no significant association between sex and the nutritional status of primary school children. These findings suggest that differences in nutritional status distribution between girls and boys were not statistically strong enough to demonstrate a meaningful association.

From a theoretical perspective, sex differences are often linked to variations in nutritional requirements and growth patterns. However, during the primary school years, biological differences between boys and girls have not yet developed substantially, which may limit their influence on nutritional

status. This finding is consistent with previous studies reporting that sex is not significantly associated with children's nutritional status when family and environmental factors are taken into account (Sesay et al., 2023; Bailey et al., 2020).

Within the context of the study area, similarities in caregiving practices, dietary consumption, and access to food between female and male children may have minimized nutritional disparities related to sex. This observation also supports the view that the quality and adequacy of dietary intake play a more dominant role in determining children's nutritional status than sex differences (Kuche et al., 2019). Therefore, sex does not appear to be a primary determinant of nutritional status among primary school children in the study setting.

The results further showed that the highest proportion of children with normal nutritional status was found among those whose mothers had no schooling or primary education, accounting for 110 children (28.6%). Among children whose mothers had pre-secondary and secondary education, normal nutritional status was observed in 66 children (17.2%), while only 7 children (1.8%) with mothers holding university-level education were classified as having normal nutritional status. The Chi-square test demonstrated a significant association between maternal education level and children's nutritional status ($p = 0.000$), with a high Chi-square value ($\chi^2 = 111.077$). These findings indicate that variations in children's nutritional status were closely associated with differences in maternal education level.

From a theoretical perspective, maternal education plays an important role in shaping caregiving practices, food choices, and the management of household food resources. Mothers with different levels of education vary in their capacity to understand nutritional information and apply it in daily life. This finding is consistent with previous studies showing that maternal education is associated with children's nutritional status through feeding practices and health care behaviors (Kuche et al., 2019; Sesay et al., 2023). Bailey et al. (2020) also emphasized that maternal education contributes to a family's ability to provide adequate food for children.

In the context of the study area, the relatively high proportion of normal nutritional status among children whose mothers had primary-level education suggests that formal education alone is not the sole determinant of mothers' capacity to meet their children's nutritional needs. Practical experience, local knowledge, and mothers' roles in daily caregiving also contribute to children's nutritional outcomes. These findings indicate that while maternal education has a significant influence, its effect is highly contextual. Therefore, nutrition interventions should combine the strengthening of practical knowledge with the reinforcement of mothers' roles within the family.

The results further showed that the highest proportion of children with normal nutritional status was found among those whose fathers had pre-secondary and secondary education, accounting for 88 children (22.9%) of the total 384 respondents. The Chi-square test yielded a p-value of 0.007, indicating a significant association between paternal education level and children's

nutritional status. These findings suggest that variations in children's nutritional status are related to differences in fathers' education levels, although the magnitude of this association is smaller than that observed for maternal education.

Theoretically, paternal education is associated with fathers' roles in providing economic resources and creating a household environment that supports the fulfillment of children's basic needs. Higher paternal education may contribute to greater economic stability, which in turn influences food availability and access to health services. This finding is consistent with previous studies showing that parental education, including paternal education, contributes to children's nutritional status through household economic support (Bailey et al., 2020; Sesay et al., 2023). However, as highlighted by Kuche et al. (2019), the influence of paternal education tends to be indirect and complementary to maternal caregiving, making its role more supportive rather than a primary determinant of children's nutritional status.

The study results showed that the highest proportion of children with normal nutritional status was found among those from families with an adequate economic status, accounting for 95 children (24.7%) of the total 384 respondents. Among children from economically disadvantaged families, 88 children (22.9%) were classified as having normal nutritional status. The Chi-square test yielded a p-value of 0.029, indicating a significant association between household economic status and the nutritional status of primary school children. These findings suggest that differences in household economic conditions are associated with variations in children's nutritional status in the study area.

From a theoretical perspective, better household economic conditions enable families to meet food needs more adequately and diversely, while also supporting access to health services. Families with sufficient economic resources have greater capacity to provide food that meets children's nutritional requirements. This finding is consistent with previous studies indicating that household socioeconomic conditions influence children's nutritional status through food availability and a supportive home environment (Bailey et al., 2020; Sesay et al., 2023). However, as highlighted by Kuche et al. (2019), the effect of economic status often interacts with other factors, such as caregiving practices and feeding behaviors, and therefore does not always function as a single determining factor of children's nutritional status.

The results further showed that normal nutritional status was most frequently observed among children with dietary intake categorized as adequate and sufficient, each accounting for 66 children (17.2%) of the total respondents. In contrast, the highest proportion of underweight children was found among those with insufficient dietary intake, totaling 66 children (17.2%). The Chi-square test indicated a p-value of 0.000, demonstrating a very strong association between dietary intake and the nutritional status of primary school children. These findings indicate that variations in children's nutritional status are closely related to differences in the adequacy of daily dietary intake.

Theoretically, dietary intake is a direct determinant of children's nutritional status because it fulfills energy and nutrient requirements necessary for growth and the maintenance of bodily functions. Children with adequate dietary intake tend to have better nutritional status than those with insufficient intake. This finding is consistent with previous studies showing a strong relationship between dietary adequacy and the nutritional status of primary school children (Bailey et al., 2020; Kuche et al., 2019). Other studies have also emphasized that both the quality and quantity of food consumption are key determinants of children's nutritional status, particularly in rural settings (Sesay et al., 2023).

Overall, the findings of this study emphasize that daily dietary intake is one of the most influential factors associated with the nutritional status of primary school children in the study area. These results indicate that efforts to improve children's nutritional status should focus on enhancing both the adequacy and quality of daily food intake, particularly among children whose dietary intake remains insufficient.

The results showed that normal nutritional status was most frequently observed among children with a history of illness, accounting for 112 children (29.2%) of the total 384 respondents, whereas 71 children (18.5%) without a history of illness were classified as having normal nutritional status. In addition, the proportion of underweight children was also higher among those with a history of illness, totaling 110 children (28.6%). The Chi-square test yielded a p-value of 0.000, indicating a very strong association between health history and the nutritional status of primary school children. These findings suggest that children's health conditions are closely related to variations in nutritional status in the study area.

From a theoretical perspective, a history of illness can affect children's nutritional status through reduced appetite, impaired nutrient absorption, and increased energy requirements during periods of illness. Children who frequently experience health problems are at greater risk of nutritional deficiencies due to an imbalance between dietary intake and physiological needs. This finding is consistent with previous research demonstrating a reciprocal relationship between health status and nutritional status, whereby poor health conditions can negatively affect children's nutritional outcomes (Goosen et al., 2021).

Overall, the findings of this study confirm that health history is an important factor associated with the nutritional status of primary school children. These results indicate that efforts to improve children's nutritional status should be accompanied by disease prevention strategies and sustained health promotion, as health and nutrition are closely interconnected in shaping children's nutritional outcomes. The multinomial logistic regression analysis further demonstrated that the model used had a satisfactory ability to explain variations in children's nutritional status. The Nagelkerke R^2 value of 0.502 indicates that 50.2% of the variation in nutritional status was explained by the independent variables included in the model. The Cox & Snell R^2 value of 0.437

and the McFadden R^2 value of 0.281 also suggest an acceptable level of model fit. These findings confirm that the multinomial logistic regression model was statistically appropriate for identifying factors associated with the nutritional status of primary school children in the study area.

Based on the partial significance tests using the Likelihood Ratio Tests, three variables were found to be significantly associated with children's nutritional status, namely maternal education ($\chi^2 = 87.118$; $p = 0.000$), dietary intake ($\chi^2 = 82.578$; $p = 0.000$), and children's health history ($\chi^2 = 11.912$; $p = 0.003$). Among these variables, maternal education had the highest Chi-square value and was therefore identified as the most dominant factor associated with the nutritional status of primary school children. In contrast, sex, child's age, paternal education, and household economic status did not show significant associations in the multivariate model.

From a theoretical perspective, the dominant role of maternal education can be explained by mothers' central role as primary caregivers and key decision-makers in meeting children's nutritional needs. Maternal education influences the ability to manage household food consumption, understand health-related information, and apply appropriate feeding practices. This finding is consistent with previous studies demonstrating that maternal education has a strong influence on children's nutritional status through caregiving patterns and family feeding behaviors (Kuche et al., 2019; Sesay et al., 2023). Bailey et al. (2020) also emphasized that a family's capacity to provide adequate food is strongly shaped by mothers' knowledge and roles within the household.

In addition to maternal education, dietary intake and children's health history also played significant roles in the model. Dietary intake represents a direct factor influencing energy balance and nutrient adequacy, while health history reflects children's biological conditions that may affect nutrient utilization. The reciprocal relationship between health and nutrition has been widely documented, whereby poor health conditions can adversely affect children's nutritional status (Goosen et al., 2021). In the context of this study, these three factors interact to shape children's nutritional outcomes. Overall, the findings of this study indicate that maternal education is the most dominant factor associated with the nutritional status of primary school children in Suco Catral Caraic. These results suggest that interventions aimed at improving children's nutritional status should prioritize strengthening mothers' roles, alongside efforts to enhance dietary adequacy and maintain children's health. Through such an integrated approach, improvements in children's nutritional status in the study area are expected to be more effective and sustainable.

CONCLUSION AND RECOMMENDATION

This study demonstrates that the nutritional status of primary school children in Suco Catral Caraic is heterogeneous, with normal nutritional status representing the largest category, while a substantial proportion of children were

still classified as underweight and obese. The analysis showed that children's age and sex were not significantly associated with nutritional status. In contrast, maternal education, paternal education, household economic status, daily dietary intake, and children's health history were significantly associated with nutritional status in the bivariate analysis. These findings indicate that the nutritional status of primary school children is more strongly influenced by family-related factors, dietary practices, and health conditions than by biological characteristics. Therefore, the determinants of children's nutritional status in the study area are multidimensional and context-specific. This study provides empirical evidence on factors influencing the nutritional status of primary school children in rural areas of Timor-Leste.

Multinomial logistic regression analysis showed that the model explained 50.2% of the variation in children's nutritional status, with maternal education emerging as the most dominant factor, followed by dietary intake and children's health history. These findings highlight the critical role of mothers in childcare, household food management, and the maintenance of children's health. The main contribution of this study to the fields of nutrition and public health lies in strengthening empirical evidence that child nutrition interventions should adopt a family-centered approach, with particular emphasis on mothers, while also addressing the close relationship between nutrition and child health. In addition, this study offers valuable contextual insights by presenting data from a rural setting that remains underrepresented in the scientific literature. Accordingly, the findings are relevant as a foundation for developing family-based child nutrition improvement programs.

Future research is recommended to employ longitudinal study designs to better understand changes in children's nutritional status over time and to identify causal relationships among variables. Further studies should also incorporate additional variables such as dietary quality, physical activity, and access to health services. Expanding the geographical scope of research is suggested to allow comparisons across different socioeconomic contexts. With these advancements, future research is expected to generate more comprehensive and sustainable policy recommendations and nutrition interventions for improving child nutritional outcomes.

REFERENCES

Bailey, R. L., West, K. P., & Black, R. E. (2020). The epidemiology of global micronutrient deficiencies. Annals of Nutrition and Metabolism, 66(Suppl. 2), 22–33. https://doi.org/10.1159/000503961

Bowman, S. A. (2020). A vegetarian-style dietary pattern is associated with lower energy, saturated fat, and sodium intakes; and higher whole grains, legumes, nuts, and soy intakes. Nutrients, 12(2), 266. https://doi.org/10.3390/nu12020266

Chan, Y. Y., et al. (2021). Data-driven dietary patterns, nutrient intake, and body weight status in Singaporean children. Nutrients, 13(3), 962. https://doi.org/10.3390/nu13030962

Curtis, C. J., et al. (2024). Annual and seasonal patterns of dietary intake in Australian adults: A prospective cohort study. Nutrients, 16(3), 2718. https://doi.org/10.3390/nu16032718

Gaytán-González, A., et al. (2020). Dietary protein intake patterns and inadequate protein intake in older adults from four countries. Nutrients, 12(3), 731. https://doi.org/10.3390/nu12030731

Goosen, C., et al. (2021). Associations of HIV and iron status with nutritional and inflammatory status, anemia, and dietary intake in South African schoolchildren. Nutrients, 13(4), 1156. https://doi.org/10.3390/nu13041156

Kuche, D., et al. (2019). Factors associated with dietary diversity and length-for-age z-score in rural Ethiopia. Maternal & Child Nutrition, 15*(3), e12802. https://doi.org/10.1111/mcn.12802

Lentjes, M. A. H., et al. (2022). Face validity of observed meal patterns reported with 7-day diet diaries using diurnal variation in biomarkers. Nutrients, 14(2), 238. https://doi.org/10.3390/nu14020238

Mariani, A., et al. (2021). Dietary patterns in children with autism spectrum disorders compared to controls. Nutrients, 13(9), 3156. https://doi.org/10.3390/nu13093156

Nalaka, G. P. S., Weerasena, U. M., Ekanayake, E. A., Maduwansha, N. A. N. J., & Diunugala, H. P. (2018). Factors influencing the nutritional status of primary school children in the Estate sector.

Nwachan, C. M., et al. (2024). The effects of nutrition and health education on the nutritional status of internally displaced schoolchildren in Cameroon. Journal of Nutritional Science, 13, e12. https://doi.org/10.1017/jns.2024.12

Sesay, F., et al. (2023). Predictors of undernutrition among primary school children in Ethiopia. BMC Public Health, 23, 16736. https://doi.org/10.1186/s12889-023-16736-y

Smith, J. D., et al. (2024). Annual and seasonal dietary intake patterns in Australian adults. Nutrients, 16(3), 3816. https://doi.org/10.3390/nu16033816