



ANALYSIS OF NUTRITIONAL PROBLEMS AMONG ADOLESCENT GIRLS

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ABSTRACT

Adolescent nutritional problems in Indonesia are increasingly complex due to the double burden of malnutrition, including undernutrition, overnutrition, anaemia, and chronic energy deficiency (CED). A preliminary study in Rancabungur District, Bogor Regency, indicated that many adolescent girls were at risk of anaemia and chronic energy deficiency (MUAC < 23.5 cm). Most adolescents frequently consumed fast food, had low intake of vegetables and fruits, and did not regularly consume iron supplementation. This study aimed to analyse nutritional problems among adolescent girls in Rancabungur District, particularly to identify nutritional status and the distribution of undernutrition, overweight, obesity, anaemia, and CED. A mixed-methods approach with a sequential explanatory design was employed. The quantitative phase used a cross-sectional design with bivariate and multivariate analyses, while the qualitative phase involved in-depth interviews. Among 216 adolescent girls, 62.9% experienced nutritional problems, including CED (19.4%), overweight (15.7%), undernutrition (13.4%), anaemia (6.5%), and obesity (3.2%). Teacher support (OR = 28.465), eating habits (OR = 8.948), and mass media (OR = 8.184) were significant determinants, with teacher support identified as the most dominant factor. Motivation (OR = 0.09) and health services (OR = 0.05) acted as protective factors. Qualitative findings indicated that low nutrition literacy, peer influence, and limited family and school support contribute to these issues.

Keywords: adolescent girl; anaemia; chronic energy deficiency (CED); eating behaviour; nutritional status

How to cite (in APA style)

Sugiharti, N., Rukmaini, R., & Widowati, R. (2026). Analysis of Nutritional Problems among Adolescent Girls. *Indonesian Journal of Global Health Research*, 8(4), 1387–1396. <https://doi.org/10.37287/ijghr.v8i4.1824>.

INTRODUCTION

Adolescence is a transitional period characterised by rapid physical, psychological, and social changes, during which health-related behaviours are established and may persist into adulthood (Hambali et al., 2023). One of the key determinants of adolescent health is adequate dietary intake and balanced nutrition; however, adolescents' knowledge and awareness regarding proper nutrition remain relatively low (Usdeka Muliani et al., 2023).

Rapid lifestyle changes driven by technological advancement and cultural globalisation have significantly influenced adolescents' dietary patterns and physical activity. Increased consumption of fast food and sugar-sweetened beverages, combined with sedentary behaviours, contributes to a higher risk of nutritional problems (Setyawati et al., 2022; Handayani, 2021). As a result, adolescents increasingly experience a double burden of malnutrition, encompassing undernutrition, overnutrition, and micronutrient deficiencies such as iron deficiency anaemia and chronic energy deficiency (CED) (Emilia et al., 2021). These conditions are associated with adverse health outcomes, including reduced academic performance and increased risk of non-communicable diseases (Sulistya et al., 2023).

Globally, adolescent nutritional problems remain a major public health concern, with approximately 30% of adolescent girls affected by anaemia (WHO, 2023). In Indonesia, the prevalence of anaemia among adolescent girls reached 35.4%, while obesity prevalence among adolescents was 19.3% (Kemenkes RI, 2023). Similar patterns are observed in West Java, where anaemia prevalence among adolescent girls is reported at 38.1% (USAID, 2022). These findings indicate that Indonesia is experiencing a double burden of malnutrition that requires comprehensive intervention. At the

local level, Bogor Regency faces similar challenges, particularly in Rancabungur District. Preliminary findings indicate that adolescent girls experience anaemia and demonstrate low awareness of its causes and prevention, alongside unhealthy eating behaviours characterised by low fruit and vegetable intake and reliance on processed foods. These findings suggest that nutritional problems are influenced not only by food availability but also by knowledge, behaviour, and social environmental factors.

Adolescent nutritional status is shaped by multidimensional interactions between individual and environmental determinants. The health ecology framework highlights the influence of multiple levels, including individual, family, school, and broader social environments (Saputri et al., 2021). Although various government programmes, such as iron supplementation and school-based nutrition education, have been implemented, challenges remain in terms of adherence, contextual relevance, and stakeholder involvement (Ardini, 2023). Given these conditions, a comprehensive approach is needed to better understand adolescent nutritional problems. Therefore, this study aims to analyse nutritional problems among adolescent girls in Rancabungur District, Bogor Regency, by examining nutritional status, identifying associated individual and environmental factors, and determining the dominant factors influencing these problems.

METHOD

This study employed a mixed-methods approach using a sequential explanatory design, which integrates quantitative and qualitative approaches in sequence to obtain a more comprehensive understanding of nutritional problems among adolescent girls. The first phase applied a quantitative approach using a cross-sectional design to identify the prevalence of nutritional problems and associated factors related to nutritional status among adolescent girls. This sequential explanatory design enabled the quantitative findings to be further explored through qualitative inquiry, allowing for a more in-depth interpretation of the results. The second phase utilised a descriptive qualitative approach to explore factors influencing the nutritional status of adolescent girls based on Bronfenbrenner's ecological health framework, which includes individual, microsystem, mesosystem, and macrosystem levels.

The study was conducted in three secondary schools in Rancabungur District, Bogor Regency: SMK Golden, SMA Persada, and SPM Ulya Kulliyatul Mu'allimin Al-Islamiyah. The study population consisted of all adolescent girls aged 15–18 years, totalling approximately 470 individuals. The quantitative sample included 216 respondents selected using stratified random sampling based on grade level and school, with the sample size calculated using Slovin's formula at a 5% margin of error (S Notoatmodjo, 2020). The qualitative phase involved 10 adolescent girls experiencing nutritional problems as primary informants, along with triangulation informants comprising parents, teachers, adolescent health cadres, and community health centre nutrition officers. These participants were selected using purposive sampling until data saturation was achieved.

Quantitative data were collected using a structured questionnaire to assess variables including knowledge, attitudes, motivation, eating habits, and environmental factors such as family influence, teacher support, mass media exposure, health services, and cultural aspects. Anthropometric measurements, including body weight, height, and mid-upper arm circumference (MUAC), were conducted to determine nutritional status based on Body Mass Index (BMI). Haemoglobin (Hb) levels were also measured using a digital haemoglobinometer. Prior to data analysis, the validity and reliability of the questionnaire were assessed to ensure that the instrument accurately measured the intended variables and demonstrated good internal consistency. The validity test results indicated that all questionnaire items had significant Pearson correlation coefficients at the 0.05 significance level ($p < 0.05$), confirming their validity. Furthermore, reliability testing using Cronbach's alpha showed high internal consistency across all variables, including knowledge ($\alpha = 0.951$), attitude ($\alpha = 0.869$), motivation ($\alpha = 0.852$), eating behaviour ($\alpha = 0.895$), parental support

($\alpha = 0.867$), teacher support ($\alpha = 0.787$), school environment ($\alpha = 0.887$), and mass media exposure ($\alpha = 0.887$). All values exceeded the acceptable threshold of 0.70, indicating that the instrument was reliable for measuring the study variables.

Qualitative data were collected through in-depth interviews using semi-structured interview guidelines, as well as participatory observation of dietary behaviours and the social environment of adolescent girls. Quantitative data were analysed using descriptive analysis, bivariate analysis with the Chi-square test, and multivariate analysis using logistic regression to identify dominant factors associated with nutritional problems, with a significance level of $p < 0.05$. Qualitative data were analysed using thematic analysis based on the Miles and Huberman model, which includes data reduction, data display, and conclusion drawing/verification to obtain an in-depth understanding of factors influencing adolescent nutritional status. This study adhered to ethical principles in health research, including obtaining informed consent from all participants and ensuring the confidentiality of participant identities throughout the research process.

RESULT

Respondent Characteristics

Table 1 presents the demographic characteristics of the respondents. The majority of respondents were aged 16 years (38.0%), followed by 17 years (25.9%), 15 years (22.2%), and 18 years (13.9%). Based on parental occupation, most parents were labourers (63.0%), while 23.1% were self-employed and 13.9% were civil servants. In terms of family size, the majority of respondents came from families with 1–2 children (72.2%), whereas 27.8% came from families with three or more children.

Table 1.
Demographic Characteristics of Respondents (n = 216)

Characteristics	f	%
Age (years)		
15	48	22,2
16	82	38,0
17	56	25,9
18	30	13,9
Parental Occupation		
Labourer	136	63,0
Civil servant	30	13,9
Self-employed	50	23,1
Number of Children in Family		
1-2 children	156	72,2
>2 children	60	27,8

Nutritional Status, Anaemia, and Chronic Energy Deficiency (CED)

Table 2.
Distribution of Nutritional Status, Anaemia, and Chronic Energy Deficiency (CED) Among Respondents (n = 216)

Variables	P		SK		SD		Total	
	f	%	f	%	f	%	f	%
Nutritional Status								
Undernutrition	1	0,46	27	12,5	1	0,46	29	13,4
Normal	27	12,5	116	57,7	3	1,4	146	67,6
Overweight	9	4,1	22	10,2	3	1,4	34	15,7
Obesity	0	0	4	1,8	3	1,4	7	3,2
Anaemia								
Anaemia	1	0,46	12	5,5	1	0,46	14	6,5
Non-anaemia	36	16,7	158	73,1	8	3,7	202	93,5
CED								
CED	2	0,92	39	18	1	0,46	42	19,4
Non-CED	35	16,2	131	60,6	8	3,7	174	80,6

Note: P = Islamic boarding school; SK = urban school; SD = rural school

The distribution of respondents' nutritional status showed that the majority had normal nutritional status (67.6%), while 15.7% were overweight, 13.4% were undernourished, and 3.2% were obese. Based on haemoglobin levels, most respondents were not anaemic (93.5%), while 6.5% were classified as anaemic. In addition, 19.4% of respondents experienced chronic energy deficiency (CED), whereas 80.6% did not.

Distribution of Study Variables

The distribution of study variables indicated that the majority of respondents had high levels of knowledge (66.7%), positive attitudes (50.9%), and high motivation (68.1%). Most respondents also reported good eating behaviour (59.7%), high parental support (64.8%), and strong teacher support (63.4%). A supportive school environment was reported by 70.8% of respondents, high mass media exposure by 59.7%, and high access to health services by 71.3%.

Table 3.

Distribution of Knowledge, Attitude, Motivation, Eating Behaviour, Social Support, and Environmental Factors (n = 216)

Variables	P	SK	SD	F	%
Knowledge (X1)					
Low	24	47	1	72	33,3
High	13	123	8	144	66,7
Attitude (X2)					
Negative	25	76	5	106	49,1
Positive	12	94	4	110	50,9
Motivation (X3)					
Low	28	36	5	69	31,9
High	9	134	4	147	68,1
Eating Behaviour (X4)					
Low	27	86	4	117	54,2
High	10	84	5	99	45,8
Parents (X5)					
Low	25	49	2	76	35,2
High	12	121	7	140	64,8
Teacher (X6)					
Low	17	56	6	79	36,6
High	20	114	3	137	63,4
School Environment (X7)					
Low	24	33	6	63	29,2
High	13	137	3	153	70,8
Mass Media (X8)					
Low	27	59	1	87	40,3
High	10	111	8	129	59,7
Health Services (X9)					
Low	25	31	6	62	28,7
High	13	138	3	154	71,3
Culture (X10)					
Low	20	37	4	61	28,2
High	17	133	5	155	71,8

Bivariate Analysis

The results of the bivariate analysis using the Chi-square test showed that all study variables were significantly associated with nutritional problems among adolescent girls ($p < 0.05$). The variables with the strongest associations were motivation (OR = 31.830; 95% CI: 13.280–76.294), health services (OR = 28.491; 95% CI: 11.375–71.363), and school environment (OR = 16.950; 95% CI: 7.674–37.440). In addition, knowledge (OR = 8.710), parental support (OR = 8.351), and cultural factors (OR = 15.545) also demonstrated strong associations with nutritional problems. Other variables, including attitude, teacher support, mass media exposure, and eating behaviour, were also significantly associated with nutritional problems among adolescent girls.

Table 4.
Association Between Individual and Environmental Factors and Nutritional Problems Among Adolescent Girls (n = 216)

Variables	Masalah Gizi						p-value ($\leq 0,05$)	OR	95% CI
	Yes		No		Total				
	f	%	f	%	f	%			
Knowledge									
Low	56	76,4	17	23,6	72	100,0	0,000	8,710	4,518 – 16,793
High	39	27,1	105	72,9	144	100,0			
Total	94	43,5	122	56,5	216	100,0			
Attitude									
Low	63	59,4	43	40,6	106	100,0	0,000	3,734	2,115 – 6,590
High	31	28,2	79	71,8	110	100,0			
Total	94	43,5	122	56,5	216	100,0			
Motivation									
Low	62	89,9	7	10,1	69	100,0	0,000	31,830	13,280 – 76,294
High	32	21,8	115	78,2	147	100,0			
Total	94	43,5	122	56,5	216	100,0			
Eating Behaviour									
Low	58	49,6	59	50,4	117	100,0	0,000	1,720	0,996 – 2,972
High	36	36,4	63	63,6	99	100,0			
Total	94	43,5	122	56,5	216	100,0			
Parents									
Low	57	75,0	19	25,5	76	100,0	0,000	8,351	4,400 – 15,852
High	37	26,4	103	73,6	140	100,0			
Total	94	43,5	122	56,5	216	100,0			
Teacher									
Low	53	67,1	26	32,9	79	100,0	0,000	4,773	2,633 – 8,653
High	41	29,9	96	70,1	137	100,0			
Total	94	43,5	122	56,5	216	100,0			
School Environment									
Low	54	85,7	9	14,3	63	100,0	0,000	16,950	7,674 – 37,440
High	40	26,1	113	73,9	153	100,0			
Total	94	43,5	122	56,5	216	100,0			
Mass Media									
Low	49	56,3	38	43,7	87	100,0	0,000	2,407	1,379 – 4,203
High	45	34,9	84	65,1	129	100,0			
Total	94	43,5	122	56,5	216	100,0			
Health Services									
Low	56	90,3	6	9,7	62	100,0	0,000	28,491	11,375 – 71,363
High	38	24,7	116	75,3	154	100,0			
Total	94	43,5	122	56,5	216	100,0			
Culture									
Low	52	85,2	9	14,8	61	100,0	0,000	15,545	7,046 – 34,296
High	42	27,1	113	72,9	155	100,0			
Total	94	43,5	122	56,5	216	100,0			

Multivariate Analysis

The results of the multivariate analysis using logistic regression showed that several factors were significantly associated with nutritional problems among adolescent girls ($p < 0.05$). These factors included knowledge, attitude, motivation, teacher support, school environment, health services, cultural factors, eating behaviour, and mass media exposure. Good knowledge was found to have a protective effect against nutritional problems ($OR = 0.111$; $p = 0.010$), as were high motivation ($OR = 0.090$; $p = 0.005$) and a supportive school environment ($OR = 0.138$; $p = 0.014$). Similarly, adequate health services and favourable cultural factors also demonstrated protective associations. In contrast, poor eating behaviour ($OR = 8.948$; $p = 0.007$) and higher exposure to mass media ($OR = 8.184$; $p = 0.036$) were associated with an increased risk of nutritional problems among adolescent girls.

Table 5.
Logistic Regression Analysis of Factors Associated with Nutritional Problems Among Adolescent Girls

No.	Variables	B	OR	95% CI	p-value
1	Knowledge (low)	-2,194	0,111	(0,029; 0,437)	0,010
2	Attitude (negative)	-1,137	0,321	(0,108; 0,962)	0,021
3	Motivation (low)	-2,405	0,090	(0,021; 0,383)	0,005
4	Parental support (low)*		Not significant, p-value > 0,05		
5	Teacher support (low)	3,349	28,465	(1,328; 607,705)	0,038
6	School environment (low)	-1,979	0,138	(0,027; 0,695)	0,014
7	Health services (low)	-2,994	0,050	(0,003; 0,776)	0,010
8	Cultural factors (low)	-2,245	0,106	(0,019; 0,618)	0,034
9	Eating behaviour	2,191	8,948	(2,189; 37,303)	0,007
10	Mass media exposure	2,102	8,184	(1,052; 63,406)	0,036

The variable with the strongest association was teacher support (OR = 28.465; 95% CI: 1.328–607.705; $p = 0.038$), indicating that low teacher support significantly increased the risk of nutritional problems. These findings suggest that adolescent nutritional problems are influenced by a complex interaction of individual, behavioural, environmental, and health service-related factors.

Qualitative Research Findings

The qualitative data were analysed using the interactive analysis model developed by Miles and Huberman, which includes data reduction, data display, and conclusion drawing. Based on this analytical process, six main themes were identified, reflecting the factors influencing nutritional behaviours among adolescent girls in Rancabungur District.

Table 6.
Themes and Subthemes

No.	Themes	Subthemes
1	Knowledge and Attitudes towards Nutrition	Superficial knowledge, indifferent attitudes, media influence
2	Parental and Environmental Involvement	Communication patterns, school influence, family culture
3	Perceptions of Nutritional Problems	Risk perception, beauty standards, barriers
4	Social Support	Family, teachers, health services
5	Peer Influence	Social pressure, modelling, body image
6	Nutritional Misinformation	Social media, extreme dieting, low literacy

Theme 1: Knowledge and Attitudes towards Nutritional Problems

The findings revealed that adolescent girls' nutritional knowledge was limited and largely based on memorisation, which was insufficient to drive behavioural change. Most participants were familiar with the term anaemia but lacked understanding of its health implications. One participant stated:

"I know anaemia means low blood, but I don't really think about it."

Teachers also confirmed that students tend to memorise concepts without understanding their relevance to health. In addition, adolescents' attitudes towards nutrition were generally unfavourable, as reflected in behaviours such as skipping meals and placing low priority on consuming nutritious foods. Social media emerged as a primary source of information influencing adolescents' perceptions of diet and body image.

Theme 2: Parental and Environmental Involvement

Parental involvement in adolescent nutrition was found to be limited, largely due to time constraints and non-dialogical communication patterns. Parents often provided instructions without adequate explanations. One parent stated:

"I often remind my child to eat, but she does not always comply."

Beyond the family, the school environment and peer groups played a significant role in shaping adolescents' eating behaviours. Many adolescents adjusted their dietary habits to align with their peers to maintain social acceptance.

Theme 3: Adolescents' Perceptions of Nutritional Problems

Adolescents' perception of the risks associated with nutritional problems was relatively low. Many did not associate physical symptoms, such as dizziness or fatigue, with unhealthy dietary patterns. One participant stated:

"I often feel dizzy, but I think it's just because I'm tired."

Social pressure and prevailing beauty standards also influenced adolescents' perceptions, leading them to adopt dietary practices primarily for appearance rather than health.

Theme 4: Support from Family, Teachers, and Health Services

Support from family, teachers, and health services played an important role in shaping preventive behaviours related to nutritional problems. Families generally provided basic support, such as reminding adolescents to eat or providing nutritious foods, although adherence varied among individuals. Teachers were identified as trusted sources of information. One participant stated:

"If a teacher tells me to eat healthily, I am more likely to believe it."

However, the utilisation of health services remained low, as many adolescents felt that they did not yet require nutritional consultation.

Theme 5: Peer Influence

Peer influence emerged as a strong determinant of adolescent nutritional behaviour. Many adolescents adopted eating habits or dieting practices observed within their peer groups to maintain social acceptance. One participant stated:

"If my friends buy snacks, I just follow them."

Social pressure within peer groups also influenced body image perceptions and encouraged unhealthy dieting practices.

Theme 6: Nutritional Misinformation

The findings indicated that adolescents frequently obtained nutritional information from social media, which was not always accurate. This contributed to various misconceptions regarding diet and eating patterns. One participant stated:

"I went on a diet because I saw it from an influencer."

Teachers and health professionals highlighted that low nutrition literacy made adolescents more susceptible to non-evidence-based information.

DISCUSSION

Nutritional Problems Among Adolescent Girls

The findings of this study indicate that adolescent girls in Rancabungur District are experiencing a double burden of malnutrition, characterised by the coexistence of overnutrition, chronic energy deficiency (CED), and anaemia. This condition reflects shifts in dietary patterns and lifestyles, including increased consumption of high-fat and high-sugar foods, frequent skipping of breakfast, and unhealthy dieting practices. These findings are consistent with previous studies indicating that

adolescent girls are particularly vulnerable to nutritional disorders due to increased nutritional requirements during growth (Putri et al., 2022).

In addition to biological factors, nutritional problems are also influenced by psychological and social factors. Previous studies have shown that adolescent girls often experience body image pressure, leading them to restrict food intake in order to achieve certain beauty standards (Romandani & Rahmawati, 2020). This behaviour may increase the risk of CED and anaemia. Furthermore, low nutrition literacy exacerbates the situation, as adolescents frequently obtain dietary information from social media sources that may not be evidence-based (Sari & Herlina, 2023). The school and family environments also play significant roles in shaping adolescents' dietary behaviours. Previous research has demonstrated that the availability of unhealthy food in school settings increases the risk of overnutrition. Moreover, limited parental knowledge and socioeconomic conditions influence the quality of food consumption at home. Therefore, adolescent nutritional problems represent a multidimensional phenomenon influenced by interactions among individual, family, school, and broader social environmental factors. This finding is consistent with ecological development theory, which emphasises that health behaviours are shaped by multiple interacting environmental systems (Urie, 2020).

Distribution of Overnutrition, CED, and Anaemia Among Adolescent Girls

The distribution of nutritional problems among adolescent girls reflects a double burden of malnutrition, with an overall prevalence of 62.9%. This finding suggests that adolescents are not only facing undernutrition, such as CED and anaemia, but also an increasing prevalence of overnutrition driven by modern dietary patterns. This condition aligns with national reports indicating that Indonesia is currently facing a dual burden of malnutrition due to shifts in population dietary patterns (Kemenkes RI, 2018). Overnutrition among adolescents is generally associated with the consumption of fast food and sugar-sweetened beverages, which are high in calories. The World Health Organization has reported that the rising prevalence of adolescent obesity is linked to increased consumption of ultra-processed foods and low levels of physical activity. Conversely, CED is more commonly observed among adolescents with irregular eating patterns and unhealthy dieting behaviours (Wijaya et al., 2021). Anaemia also remains a significant concern among adolescent girls, primarily due to inadequate iron intake and menstrual blood loss. Previous studies have identified iron deficiency anaemia as a common health problem among women of reproductive age (Lopez et al., 2016). Therefore, the distribution of these nutritional problems highlights the need for comprehensive and targeted nutritional interventions among adolescents.

Association Between Individual and Environmental Factors and Nutritional Problems

The findings demonstrate that individual factors, including knowledge, attitude, and motivation, are significantly associated with nutritional problems among adolescent girls. According to health behaviour theory, knowledge and attitudes are predisposing factors that influence the development of health-related behaviours (Soekidjo Notoatmodjo, 2014). Adolescents with poor nutritional knowledge are more likely to adopt unhealthy eating patterns. At the microsystem level, family and school environments play crucial roles in shaping adolescents' dietary behaviours. Evidence from global health reports suggests that adolescent dietary practices are strongly influenced by food availability at home and support from the school environment (UNICEF, 2021). In this study, teacher support was significantly associated with nutritional problems, highlighting the critical role of schools in health promotion. At the macrosystem level, cultural factors and mass media also influence adolescents' dietary behaviours. Social media exposure often promotes ideal body standards and diet trends that are not necessarily evidence-based (Amalia et al., 2024). This finding reinforces the ecological perspective that adolescent nutritional behaviour is shaped by the interaction of multiple environmental systems.

Dominant Factors Associated with Nutritional Problems

The multivariate logistic regression analysis identified teacher support as the most dominant factor associated with nutritional problems among adolescent girls, followed by eating behaviour and mass media exposure. The high odds ratio for teacher support indicates that low teacher support significantly increases the risk of nutritional problems, even after controlling for other variables. These findings highlight the strategic role of schools in shaping adolescent health behaviours. Teachers, as part of the microsystem, have a direct influence on students through education, supervision, and the creation of a supportive school environment that promotes healthy lifestyles. In addition, eating behaviour and mass media exposure also play important roles in shaping adolescents' dietary patterns. Recent global health reports have shown that digital media significantly influences dieting practices and body image perceptions among adolescent girls. Therefore, interventions aimed at improving adolescent nutrition should focus on strengthening the role of schools, promoting healthy eating behaviours, and enhancing media literacy to enable adolescents to critically evaluate nutrition-related information.

CONCLUSION

This study shows that adolescent girls in Rancabungur District experience a double burden of malnutrition, including undernutrition, overnutrition, obesity, anaemia, and chronic energy deficiency (CED), with CED as the most prevalent condition. Individual factors (knowledge, attitude, motivation, and eating behaviour) and environmental factors (teacher support, school environment, mass media, health services, and culture) were significantly associated with nutritional problems, while parental support was not. Teacher support was identified as the most dominant factor (OR = 28.465).

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