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Analysis Of Students' Nutritional Status And Needs At Elementary School No. 8 Benoa

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ABSTRACT

This study aimed to describe the nutritional status and needs of students in grades IV, V, and VI of SD No. 8 Benoa, South Kuta District, Badung Regency, in the 2025/2026 academic year. A quantitative descriptive design with a survey method was used. The sample consisted of 48 students, comprising 22 girls (46%) and 26 boys (54%). Nutritional status was determined using the body mass index-for-age (BMI-for-age) z-score based on the WHO Child Growth Standards, and energy needs were estimated from basal metabolic rate (BMR), specific dynamic action (SDA), non-sport and sport physical activity, and additional energy for growth. The results showed that 7 students (14.58%) were very thin, 16 (33.33%) thin, 12 (25.0%) normal/ideal, 9 (18.75%) overweight, and 4 (8.33%) obese. The highest frequency fell in the thin category (16 students, 33.33%), so the nutritional status of students in grades IV, V, and VI at SD No. 8 Benoa was generally in the thin or non-ideal category. Students in the thin category tended to tire and lose enthusiasm easily during activities, which is linked to limited understanding of balanced nutrition and low-quality dietary intake at home and at school. These findings indicate the need for attention to students' nutritional intake, additional movement tasks from physical education teachers, and family involvement.

Keywords: nutritional status; elementary school students; energy needs; descriptive quantitative



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Authors' Contribution*: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection.

INTRODUCTION

Nutritional problems remain a significant public-health challenge in Indonesia and directly affect the quality of human resources (Rah et al., 2021). The country continues to face a triple burden of malnutrition that includes undernutrition, overnutrition, and micronutrient deficiency, with school-



aged children experiencing stunting, thinness, and inadequate nutrient intake at the same time (Ernawati et al., 2023). National data from the 2023 Indonesia Health Survey recorded a stunting prevalence of around 21.5%, confirming that malnutrition is far from resolved (Kementerian Kesehatan Republik Indonesia, 2023). Amid industrialisation, various types of fast food that are high in fat, sugar, and salt but low in fibre have become widely available, so children increasingly shift toward less healthy eating patterns and often consume such foods without considering their nutritional value.

Balanced and diverse food intake is therefore essential for meeting children's nutritional needs. The more varied the foods consumed, the easier it is for the body to obtain protein, carbohydrates, fats, vitamins, and minerals that support health (Wulandiani, 2023). The World Health Organization recommends the daily consumption of about 400 grams of vegetables and fruit per person to maintain health, yet many adolescents and children fall well below this target (Rukmana et al., 2023). Unhealthy eating habits can reduce appetite and hinder nutrient absorption, which are among the main causes of malnutrition, and these problems are often reinforced by limited nutritional knowledge and economic constraints.

School-aged children are particularly vulnerable to nutritional problems because they are still growing and developing, and disturbances at this stage can have long-term effects on body mass index (BMI), cognitive function, and academic performance (Khoerunida et al., 2024; Wijaya et al., 2024). Eating habits established during this period are closely related to nutritional status, so children who consume unbalanced diets tend to show non-ideal nutritional profiles (Hafiza et al., 2021; Leviana & Agustina, 2024). At the same time, children's lifestyles have become increasingly sedentary; it is estimated that around 57% of children in Indonesia are insufficiently active, largely because of screen time, gadget use, and cultural norms that prioritise academic achievement over physical activity (Hanifah et al., 2023).

Because children spend most of their time at school, physical education, sports, and health (PJOK) learning provides a strategic setting for monitoring and improving nutritional status. Through PJOK, students' nutritional status and energy needs can be calculated so that movement tasks and dietary recommendations match their developmental stage (Adiska et al., 2024; Firmansyah et al., 2022; Mashuri, 2022). In practice, however, many PJOK teachers have not adequately assessed students' nutritional status and tend to assign movement tasks without understanding each child's growth and energy requirements. Providing teachers, schools, and families with accurate data on nutritional status is therefore an important step toward supporting healthy growth.

Recent studies strengthen the rationale for this research. Analyses of primary and secondary school students report that a substantial proportion have not reached optimal nutritional status, so special attention to nutritional intake and additional movement tasks from PJOK teachers is required (Ratna et al., 2025; Assidiqi et al., 2025). A survey of lower-class elementary school students similarly found variation in nutritional status alongside differences in motor skills (Adiska et al., 2024). Based on these gaps, this study analyses the nutritional status and needs of students in grades IV, V, and VI at SD No. 8 Benoa, so that its findings can inform recommendations for students, PJOK teachers, parents, and schools.

METHOD

This study used a quantitative descriptive design with a survey method, presenting data as numbers accompanied by clear explanation of the phenomena that actually occurred. The population and sample were determined following standard sampling principles for quantitative research

(Adnyana, 2021). The subjects were 48 students in grades IV, V, and VI at SD No. 8 Benoa, consisting of 22 girls and 26 boys.

Data collection followed five sequential steps. First, permission to conduct the research was obtained from the school. Second, initial observation was carried out during PJOK learning. Third, an interview was conducted with the PJOK teacher regarding body mass index (BMI) measurement and the nutritional status and needs of students. Fourth, anthropometric measurements were taken, using a digital scale to measure body weight and a stadiometer to measure body height. Fifth, students completed a questionnaire recording their daily physical activities over one week, separated into non-sport activities (morning to noon and afternoon to evening) and sport activities, together with their duration and intensity.

The physical-activity questionnaire was adapted from instruments used in previous studies on the measurement of students' nutritional status and calorie needs (Mashuri, 2022; Adi et al., 2022), and its items were reviewed for content suitability before use. Non-sport daily activities were grouped into light, moderate, and heavy categories, each assigned an activity factor relative to basal energy needs, consistent with established relationships between physical-activity level and energy expenditure in children (Ayán-Pérez et al., 2024; Kurniawan et al., 2023). The activity factors used to calculate non-sport daily energy are shown in Table 2, and the additional energy for growth is shown in Table 3.

Table 1. Demographic characteristics of the research subjects

No	Subject category	N	Mean age	Mean weight (kg)	Mean height (cm)	Percentage
1	Female	22	11.20	44.14	149.38	46%
2	Male	26	10.72	41.96	147.23	54%
	Total	48				100%

Nutritional status was classified using the BMI-for-age (BMI/A) z-score based on the WHO Child Growth Standards, with categories of very thin, thin, normal/ideal, overweight, and obese. Basal energy needs were calculated as BMR + SDA, where BMR is the minimum energy required at rest and SDA is the energy needed to process food. Total daily activity energy was obtained by adding non-sport and sport energy, and additional energy for growth (2 kcal/kg body weight for children aged 10–14 years) was then added. Finally, total energy needs were translated into macronutrient recommendations for carbohydrate, fat, and protein.

Table 2. Classification of non-sport physical activity

Classification	Description of activity	Gender	Activity factor
Light	75% of time sitting or standing; 25% of time standing or moving.	Male	1.56
		Female	1.55
Moderate	40% of time sitting or standing; 60% of time on specific work activities.	Male	1.76
		Female	1.70
Heavy	25% of time sitting or standing; 75% of time on specific work activities.	Male	2.10
		Female	2.00

Table 3. Additional calorie needs during growth age

Age (years)	Value
10–14	2 kcal/kg body weight
15	1 kcal/kg body weight
16–18	0.5 kcal/kg body weight
>19	0 kcal/kg body weight

All variables were analysed descriptively, and the results were presented in tabular form and interpreted based on the patterns observed across the nutritional-status categories.

RESULTS

Table 4. BMR, SDA, and basic energy needs

No	Gender	Statistic	BMR (kcal)	SDA (kcal)	Basic energy needs (kcal)
1	Male	Mean	1305.23	130.52	1435.76
		SD	125.22	12.52	137.74
		Min	1062.30	106.23	1168.53
		Max	1570.20	157.02	1727.22
2	Female	Mean	1312.61	131.26	1443.87
		SD	98.25	9.83	108.08
		Min	1037.60	103.76	1141.36
		Max	1444.40	144.44	1588.84

Table 5. Distribution of non-sport physical activity

No	Gender	Category	Activity factor	Frequency
1	Male	Light	1.56	25
		Moderate	1.76	1
		Heavy	2.10	0
2	Female	Light	1.55	16
		Moderate	1.70	6
		Heavy	2.00	0
	Total			48

Table 6. Energy from non-sport and sport physical activity

No	Gender	Statistic	Non-sport energy (kcal)	Sport energy (kcal)	Total activity energy (kcal)
1	Male	Mean	2246.04	176.73	2422.77
		SD	217.52	492.66	478.20
2	Female	Mean	2315.81	130.45	2446.26
		SD	185.63	154.74	271.68

Nutritional status was first assessed by measuring BMI from body height, body weight, and age. Among the boys, 4 (15%) were very thin, 11 (42%) thin, 6 (23%) normal/ideal, 3 (12%) overweight, and 2 (8%) obese. Among the girls, 3 (14%) were very thin, 5 (23%) thin, 6 (27%) normal/ideal, 6 (27%) overweight, and 2 (9%) obese. For the whole sample, 7 students (14.58%) were very thin, 16 (33.33%) thin, 12 (25.0%) normal/ideal, 9 (18.75%) overweight, and 4 (8.33%) obese.

Based on these measurements, the students in grades IV, V, and VI at SD No. 8 Benoa were generally in the non-ideal category. The highest frequency fell in the thin category, corresponding to

a BMI-for-age z-score between -3 SD and -2 SD, with 16 students (33.33%). The distribution of BMI by gender is presented in Figure 1 (boys) and Figure 2 (girls).

After determining basal energy needs, students completed the survey questionnaire to establish their daily sport and non-sport activities. The average BMR of boys was 1305.23 kcal and SDA 130.52 kcal, giving a basic energy need of 1435.76 kcal; for girls, the average BMR was 1312.61 kcal and SDA 131.26 kcal, giving 1443.87 kcal (Table 4). Non-sport energy needs averaged 2246.04 kcal for boys and 2315.81 kcal for girls, while sport energy averaged 176.73 kcal for boys and 130.45 kcal for girls. Adding these components, the average total daily activity energy requirement (non-sport plus sport) was 2422.77 kcal for boys and 2446.26 kcal for girls (Table 6).

After accounting for basal needs, non-sport activities, and sport activities, additional nutritional energy was added to support the growth of students in grades IV, V, and VI, who are still in their growth period. The additional energy need for students aged 10–14 years is 2 kcal/kg body weight (Table 6 and Table 7).

Table 7. Calculation of additional energy for growth age

No	Gender	Statistic	Age	Activity energy (kcal)	Additional energy (kcal)	Total energy (kcal)
1	Male	Mean	10.75	2422.77	83.923	2506.70
		SD	0.68	478.20	19.187	480.89
2	Female	Mean	10.86	2446.26	88.273	2534.53
		SD	0.62	271.68	18.224	284.19

The total energy needs of students in grades IV, V, and VI at SD No. 8 Benoa are presented in Table 7. Using the theory of meal portions, calorie content, and macronutrient proportions, the total energy was translated into recommended daily amounts of carbohydrate, fat, and protein (Table 8). For boys, the average requirement was 1504.02 kcal (376.00 g) of carbohydrate, 626.67 kcal (69.63 g) of fat, and 376.00 kcal (94.00 g) of protein. For girls, the average requirement was 1520.72 kcal (380.18 g) of carbohydrate, 633.63 kcal (70.40 g) of fat, and 380.18 kcal (95.05 g) of protein.

Table 8. Macronutrient needs of students in grades IV, V, and VI at SD No. 8 Benoa

No	Gender	Statistic	Carbohydrate		Fat		Protein	
			kcal	g	kcal	g	kcal	g
1	Male	Mean	1504.02	376.00	626.67	69.63	376.00	94.00
		SD	288.53	72.13	120.22	13.36	72.13	18.03
2	Female	Mean	1520.72	380.18	633.63	70.40	380.18	95.05
		SD	170.51	42.63	71.05	7.89	42.63	10.66

DISCUSSION

This study began by calculating the BMI of students in grades IV, V, and VI at SD No. 8 Benoa. Overall, the nutritional status and energy needs of these students fell in the non-ideal category, which requires serious attention from parents, PJOK teachers, and the students themselves. The main factor keeping the results out of the normal/ideal category was the very thin category, the causes of which include genetic factors, economic constraints, and inadequate nutritional intake relative to students' needs. This pattern matters because very thin students may become weak, more susceptible to illness,

and less able to follow the learning process at school, echoing evidence that malnutrition among Indonesian school-aged children coincides with micronutrient deficiency and impaired growth (Ernawati et al., 2023; Rah et al., 2021; Wijaya et al., 2024).

The study then calculated basic energy needs using the BMR + SDA formula and classified non-sport physical activity into light, moderate, and heavy categories by gender. Of the 48 students, 25 boys were in the light category and 1 in the moderate category, while 16 girls were in the light category and 6 in the moderate category. The dominance of the light category suggests low daily movement, which is consistent with reports that many Indonesian children spend their free time on gadgets, sleeping, and watching television rather than in active play (Hanifah et al., 2023). If this sedentary lifestyle continues, the ideal category will be difficult to achieve and the risk of future non-communicable disease increases (Kurniawan et al., 2023).

The next step calculated sport energy from body weight, exercise duration, and the number of exercise sessions, followed by additional energy for growth, since students under 19 years still require extra intake (2 kcal/kg for those aged 10–14 years). Regular exercise is particularly beneficial for underweight students because it can increase appetite after activity and support physical and mental health, including maintaining ideal body weight, improving mood, strengthening the heart, and reducing chronic-disease risk (Permatasari & Pontang, 2023; Haeril, 2025). These benefits reinforce the value of pairing balanced nutritional intake with structured movement tasks in PJOK.

The final step provided recommendations for students' macronutrient needs across carbohydrate, fat, and protein. Attention to appropriate intake is crucial for helping students reach their ideal nutritional needs, and healthy foods should be consumed in amounts suited to their growth and development. This is in line with studies linking macronutrient adequacy to the nutritional status of elementary school children (Sholikhah & Rahma, 2024) and with evidence that balanced-nutrition knowledge, attitudes, and behaviour are associated with better nutritional status (Rukmana et al., 2023).

The findings are consistent with recent research on school and university populations. Analyses of primary and secondary students reported that many had not achieved optimal nutritional status and required intervention from PJOK teachers and parents (Ratna et al., 2025; Assidiqi et al., 2025; Adiska et al., 2024). Similarly, surveys of nutritional status and physical fitness show that non-ideal status is common and can affect fitness and learning (Fitria et al., 2025; Tumuloto & Ruslan, 2021; Arasy & Hariyanto, 2023). Because BMI alone does not fully capture nutritional quality, the use of BMI-for-age together with energy and macronutrient estimates—supported where possible by structured dietary assessment (Mahriani et al., 2022)—provides a more complete picture of students' nutritional condition.

CONCLUSION

The nutritional status of students in grades IV, V, and VI at SD No. 8 Benoa was generally in the thin or non-ideal category, driven mainly by the very thin group, while daily physical activity was dominated by the light category. Several recommendations follow from these findings. For students, it is hoped that they can manage their daily nutritional intake according to their body condition and exercise regularly, at least twice a week. For PJOK teachers, the information on students' BMI can guide the assignment of movement tasks that match each student's needs. For parents, it is hoped that they can support a healthy diet appropriate to their children's requirements. For SD No. 8 Benoa, routine measurement and monitoring of students' development is recommended. Finally, the results can inform government programmes such as the Free Nutritious Meals (Makan Bergizi Gratis) initiative, so that school feeding can be adjusted to students' actual nutritional needs and combined

with nutrition education for a more sustainable impact (Lubis et al., 2026; Rimbawan et al., 2023). As a descriptive study of a single school, these findings should be interpreted as an initial profile, and future research with larger samples and additional variables is recommended.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this study.

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