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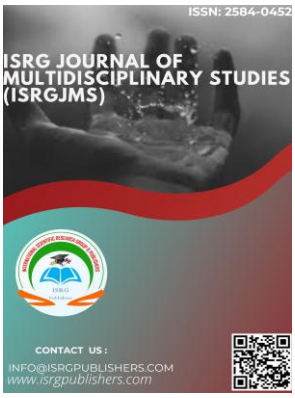

EATING PATTERNS AND NUTRITIONAL ADEQUACY LEVEL OF SCHOOL TEENAGERS IN BANDAR LAMPUNG CITY, INDONESIA

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Abstract

Teenager is a very valuable period if in good physical and psychological health, as well as good education. The aim of this research is to analyze the eating patterns and nutritional adequacy level (NAL) of school teenagers in the City of Bandar Lampung, Indonesia. The sample for this research was 56 teenage students at Daarul 'Ilmi Integrated Islamic High School (SMA IT) in Bandar Lampung. Nutritional intake data was collected using the food consumption recall method for the past 24 hours and interviews using the Food Frequency Questionnaire (FFQ). The collected data was analyzed descriptive quantitatively and statistically using t test and variance analysis. The results of the research showed that teenagers' diets have met the recommendations of the Balanced Nutrition Guidelines for food sources of energy and animal protein, but do not meet the requirements for food sources of vegetable protein, fruit and vegetables. The NAL reaches the sufficient to more category for protein, fat, iron, vitamin B and vitamin A; but there was a mild deficit in energy and carbohydrates and a severe deficit in calcium, phosphorus and vitamin C. Most of of teenagers (59%) have nutritional adequacy diversity values (NADV) in the good category (≥80%), other than that were in the fair (18%), moderate (18%) and poor (9%) categories. The teenagers NADV was influenced by class variable.

Keywords: *Eating Pattern, NAL, NADV, Teenagers*

INTRODUCTION

Teenager is a transitional period from childhood to adulthood. The age limit for teenagers, according to the Republic of Indonesia Law No. 35 of 2014 and the Minister of Health Regulation No. 25 of 2014, is between the ages of 10-24 years and unmarried. According to the Child Protection Law, teenagers are those aged between 10-18 years and are a significant population group in Indonesia (almost 20% of the population). Teenagers are Generation Z, future leaders and drivers of development Pratiwi, 2013) Based on the 2020 Population Census, the population of Indonesia in September 2020 was 270.20 million. The population of Lampung Province was 9.01 million, making it one of the eight largest in Indonesia. The age structure of the Indonesian population is dominated by the

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Millennial generation (25.87%) and Generation Z (27.94%). The Millennial generation is those born between 1981-1996, so it is estimated that they are currently aged between 25-40 years. Generation Z consists of those born between 1997 and 2012, estimated to be between 9 and 24 years old (Biro Pusat Statistik, 2021).

Teenager is a valuable time for physical and mental health, along with a good education. Teenager is characterized by a growth spurt, also known as puberty. During this phase, physical growth occurs, accompanied by mental-cognitive and psychological development, as well as reproductive growth and development that regulate sexual function. Teenager is often considered the healthiest period of life. However, physical growth in ieenagers is not always accompanied by maturity in thinking and emotional abilities. Furthermore, teenager also involves the process of self-identification, and failures in this self-awareness process can lead to various problems (Dhamayanti, 2013; Nazhifah, 2018).

Currently, several health problems are affecting and threatening the future of teenagers in Indonesia. The four most common health problems among Indonesian teenagers are iron deficiency (anemia), stunting, chronic energy deficiency (thinness), and overweight or obesity. However, only a small number of teenagers seek treatment at health facilities compared to other age groups (infants, toddlers, or the elderly). Yet, the problems faced by teenagers are complex, one of which is health (Badan Penelitian dan Pengembangan Kesehatan, 2008). The issues experienced by teenagers are quite complex, ranging from school performance to social interactions, appearance, attraction to the opposite sex, and so on. These various factors can influence teenagers' behavior and health status. Addressing teenagers' issues, including health issues, will require multidisciplinary, cross-program, cross-sector, and community involvement (Centers for Disease Control and Prevention & World Health Organization, 2015).

The COVID-19 pandemic, which began in Indonesia in March 2020, has forced the Indonesian government to implement lockdown policies and require the public to practice social and physical distancing (maintaining a safe distance between individuals and avoiding crowds). Furthermore, the Large-Scale Social Restrictions (LSSR) policy is implemented by each region, whether provincial or district/city, based on the severity of the outbreak, which is determined by the central government through the Ministry of Health. These policies have resulted in numerous changes in various sectors, particularly the economic sector, which has seen a decline in both goods and services. The COVID-19 pandemic has also led people to make various behavioral and lifestyle changes, one of which is dietary changes (Aldaco, et al., 2020; Di Renzo, 2020; Muhyidin, 2020; Sitorus, 2020;).

Research by Dieny et al. (2021) on Teenagers and adults in Indonesia showed that during the COVID-19 pandemic, there was an increase in the frequency, variety, and portion sizes of animal protein, plant protein, vegetables, and fruit consumption. Furthermore, fluid consumption, supplement consumption, and spice consumption also significantly increased, while snacking habits decreased during the pandemic.

Therefore, research on the dietary patterns of school-age teenagers is necessary, as dietary patterns during teenager will impact their future health (Biro Komunikasi dan Pelayanan Masyarakat Kementerian Kesehatan RI, 2018). In general, this study aims to analyze the dietary patterns of school-age teenagers in the new normal era in the city of Bandar Lampung. The specific objectives of the research are to evaluate eating patterns (eating frequency, types of food and their processing) in school teenagers and analyze the nutritional adequacy level of school teenagers.

METHOD AND MATERIALS

This research was conducted using a survey method, taking the case study location at Daarul 'Ilmi Integrated Islamic Senior High School (SMA IT), located at Jl. Bukit Kemiling Permai Raya Gang Persada II No. 37, Kemiling Raya Village, Kemiling District, Bandar Lampung City. Daarul 'Ilmi is a relatively new IT high school but has already achieved significant success at the provincial and national levels. The school is located in the city, adjacent to a housing complex, and is close to numerous minimarkets, snack stalls, and vendors selling various types of trendy food and beverages from carts along the road to school, allowing students to buy snacks on their way to and from school.

The study population consisted of teenagers aged 13-19 years old who were actively enrolled as students at the high school. The study sample consisted of active students who met the criteria of being healthy (not sick at the time of the interview and healthy for the past month), were willing to be interviewed, and had obtained permission from their parents to participate in this study. The total number of students (population) was 92, with the expectation that all would meet the sample criteria. Therefore, this study used a population sample. However, only 56 (61%) students met the criteria. The sample size was 56 students, consisting of both boys and girls, in grades 10-12.

The first and the second objectives were analyzed descriptive quantitatively. The first objective was measured using questionnaires containing questions about eating habits, including the type, quantity, and frequency of meals per week (Indriani, et al., 2023). The second objectives were measured by conducting a 24-hour food recall, then calculating nutritional intake and nutritional adequacy levels. The nutritional adequacy level (NAL) was calculated based on the 2019 RDA (Ministry of Health Republik Indonesia, 2019). Next, the data was analyzed using t-test statistics and analysis of variance to determine differences in nutritional adequacy diversity values (NADV) based on gender and class.

RESULT

Overview of Research Location and Teenagers Sample

This research was conducted at Daarul 'Ilmi Integrated Islamic Senior High School (SMA IT), located at Jl. Bukit Kemiling Permai Raya Gang Persada II No. 37, Kemiling Raya Village, Kemiling District, Bandar Lampung City. This relatively new school has already achieved significant success at the provincial and national levels. Its motto is "Today's Youth, Tomorrow's Leaders," with its vision being "Preparing Future Leaders in All Fields to Welcome a Golden Indonesia 2045." As of May 2023, the school had 92 students in grades 10, 11, and 12. The school is located in the city, adjacent to a housing complex, and is close to numerous minimarkets, street food stalls, and vendors selling various types of trendy food and beverages from carts along the road leading to the school. The sample of 56 teenagers' students from this school: 27 boys and 29 girls.

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Energy Consumption Patterns from Rice and Non-Rice Sources among School Teenagers

The majority of Indonesians consume rice as a staple food, which is a routine daily consumption. Consumption can be categorized into routine and temporary consumption. Consumption patterns in this study were analyzed descriptively by examining food types based on food groups (Kementerian Kesehatan Republik Indonesia, 2014). and weekly consumption frequency.

The results revealed that the most commonly consumed staple food as a source of carbohydrates by school Teenagers was rice, at 17.19 times per week. For males, rice was consumed 18 times per week, and for females, 16 times per week. When viewed from the processed rice method, the most commonly consumed rice was white rice (57.14%), followed by fried rice and white rice at 10.71%. When viewed by gender, female school students consumed more types of rice dishes, with five types (white rice, uduk rice, fried rice, chicken porridge, and lontong sayur). Meanwhile, male school students consumed four types of rice dishes (white rice, uduk rice, yellow rice, and fried rice). The amount of rice dishes consumed by male and female school students was the same, with two servings per day, but one serving was 200 grams for males and 150 grams for females.

Besides rice, the most frequently consumed carbohydrate source by Nurul Ilmi Senior High School students was white bread, consumed 3.93 times per week, and sweet potatoes were consumed least frequently, consumed 0.29 times. The number of carbohydrate-source foods consumed ranged from 0 to 8, with an average of three per week, as shown in Table 1. Table 1 shows that the three most commonly consumed carbohydrate-source foods other than rice were white bread, wet noodles, and potatoes. Female students consumed an average of four types of carbohydrate sources other than rice, more than male students, who consumed only three.

Table 1. Distribution of frequency carbohydrate sources other than rice consumption

No	Types of food	Frequency of Consumption (times/week)	Percentage (%)
1	corn	0,56	39,28
2	Potatoes	1,84	42,86
3	Wet Noodle	0,95	57,14
4	Dry Noodle	1,24	0,50
5	Vermicelli	0,37	26,79
6	White bread	3,93	57,14
7	Cassava	0,24	28,57
8	Sweet Potatoes	0,29	17,86

Consumption Patterns of Animal Protein Sources

Based on animal protein sources, the most frequently consumed food was chicken, at 4.33 times per week, and the least frequently consumed food was beef liver, at only 0.10 times per week. Based on gender, female Teenagers consumed more types of animal protein sources, with 7 types, compared to male teenagers, with 4 types consumed at least once per week (Table 2).

Based on Table 2, the most frequently consumed animal protein sources by teenagers' girls are chicken, in the form of fried chicken, consumed 4.78 times per week, followed by eggs in the form of omelets, consumed 4.02 times per week, sausages, in the form of grilled sausages, consumed 2.83 times per week, and fresh fish, in the form of fried fish, consumed 2.09 times per week. Meanwhile, the most frequently consumed protein sources by teenagers' boys are chicken eggs, consumed 4.44 times per week in the form of omelets, followed by chicken, consumed 3.82 times per week in the form of fried chicken, and fresh fish, consumed 1.16 times per week in the form of fried fish.

Table 2. Distribution of animal protein sources consumption based on consumption frequency and gender

No	Sources of animal protein	Frequency of consumption/week	
		Boy	Girl
1	Chicken	3,82	4,78
2	Duck eggs	0,64	0,67
3	Squid	0,63	1,53
4	Meat ball	0,28	1,35
5	Beef	0,88	0,79
6	Chicken liver	0,13	0,35
7	Beef liver	0,17	0,04
8	Fresh Fish	1,16	2,09
9	Chicken eggs	4,44	4,02
10	Birth eggs	0,90	0,83
11	Shrimp	0,60	1,04
12	Duck	0,13	0,28
13	Sausage	0,67	2,83
14	Sardines	0,09	0,28
	Total	14,54	20,88

Plant-based Food Consumption Patterns

When concerning on plant-based protein sources, both teenagers' girls and boys have similar consumption habits. The most frequently consumed plant-based protein sources are tempeh and tofu, consumed 4.72 and 5.55 times per week, and 4.31 and 3.41 times per week, respectively. The most commonly consumed tempeh and tofu products are fried tempeh and tofu. Research shows that the four types of vegetables most commonly consumed

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by school-aged teenagers are spinach, bean sprouts, carrots, and cucumbers (Table 3). Based on Table 2, the types of animal protein food sources most frequently consumed by female Teenagers are chicken in the form of fried chicken as much as 4.78 times in 1 week, followed by chicken eggs in the form of omelets as much as 4.02 times in 1 week, then sausages as much as 2.83 times in a week in the form of grilled sausages and fresh fish in the form of fried fish as much as 2.09. Meanwhile, the protein food sources frequently consumed by male Teenagers are chicken eggs as much as 4.44 times a week in the form of omelets, followed by chicken as much as 3.82 times a week in the form of fried chicken and fresh fish as much as 1.16 times a week in the form of fried fish.

Plant-based food consumption patterns

When looking at plant-based protein sources, both male and female Teenagers' consumption habits were similar. The most frequently consumed plant-based protein sources were tempeh and tofu, consumed 4.72 and 5.55 times per week, and 4.31 and 3.41 times per week, respectively. The most frequently consumed tempeh and tofu products were fried tempeh and tofu. The study found that the four types of vegetables most frequently consumed by school teenagers were spinach, bean sprouts, carrots, and cucumbers (Table 3).

Table 3 shows that the most frequently consumed vegetables by teenagers' girls are spinach, carrots, bean sprouts, and long beans, consumed twice a week. Meanwhile, the most frequently consumed vegetables by teenagers' boys are spinach, cucumber, and carrots, consumed once a week. The most commonly consumed vegetable dishes by both girls and boys are clear spinach soup, stir-fries, cap cay, and soup.

Tabel 3. Distribution of vegetables consumption among school-aged teenagers based on consumption frequency and gender

No	Type of vegetables	Frequency of consumption (times/week)	
		Girls	Boys
1	Spinach	2,36	1,77
2	Cucumber	1,24	1,37
3	Sprouts	2,09	0,71
4	Carrots	2,26	1,17
5	Long beans	1,90	0,30
6	Water-spinach	1,46	0,82
7	Broccoli	1,01	0,33
8	Green mustard	1,17	0,38
9	Cabbage	1,37	0,34
10	Cauliflower	0,80	0,37
	Total	15,66	7,56

Fruit Consumption Patterns

Fruit is a food rich in vitamins, which help boost metabolism. According to the contents of my plate, the portion of fruit consumed should be equal to the portion of vegetables, at one-quarter, to maintain a healthy and active lifestyle. Bananas are the most frequently consumed fruit by teenagers' girls and boys, almost three times a week for girls and two times a week for boys. This is because bananas are relatively inexpensive and readily available. Detailed fruit consumption by school Teenagers is presented in Table 4. Based on Table 4, it can be seen that the variety of fruit types frequently consumed by female school teenagers is greater than that of male school teenagers. Likewise, female Teenagers consume more fruit frequently than male teenagers.

Table 4. Distribution of fruit consumption among school-aged teenagers based on consumption frequency and gender

Type of Fruits	Frequency of consumption (times/week)	
	Girl	Boy
1. Banana	2,95	1,86
2. Avocado	2.18	0,00
3. Orange	1,47	0,70
4. Papaya	1,28	0,81
5. Guava	0,84	0,00
6. Mango	0,77	0,00
7. Durian	0,00	0,79
8. Salak	0,00	0,79
Total		

Milk and processed food consumption patterns

Milk is a food rich in protein and fat, which serve as a source of energy and body building. However, in the Diverse, Nutritious, Balanced, and Safe diet, milk is not specifically identified as milk, as per the "4 Healthy, 5 Perfect" slogan, but is included in a variety of nutritious foods. Research shows that the most commonly consumed type of milk by school teenagers, both male and female, is powdered cow's milk, consumed twice a week. The consumption patterns of milk and processed food by school teenagers, based on gender and frequency, are presented in Table 5.

Table 5 shows that female teenagers consume more types of dairy products, consuming more than once a week, while male teenagers consume only two dairy products more than once a week. Processed foods are typically consumed as a snack or to avoid boredom. The most frequently consumed processed food by school teenagers is instant noodles, consumed at least once a week. The patterns of processed food consumption among school-aged teenagers by gender and frequency of consumption are presented in Table 5.

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Table 5. Distribution of milk and processed food consumption patterns among school teenagers based on consumption frequency and gender

Food type	Frequency of consumption (times/week)	
	Girl	Boy
Milk 1. cow milk powder	2,21	2,10
2. cow milk liquid	1,69	1,22
3. Yoghurt	1,48	0,68
4. soy milk	1,46	0,48
Processed food		
1. Hamburger	0,44	0,05
2. French Fries	0,31	0,11
3. Fried Chicken	1,04	0,28
4. Instant Noodle	1,32	1,05
5. Tea	0,43	0,26
6. Boba Tea	0,30	0,35
7. Coffee	0,17	0,42

Consumption and Nutritional Adequacy Levels of School-aged Teenagers

Data on the nutritional intake of school-aged teenagers were obtained through 24-hour food recalls and the level of Nutritional adequacy is calculated based on the nutritional adequacy standards according to age group, gender (male or female), and body weight. Table 6 presents the nutritional intake and nutritional adequacy levels, or percentages of students' nutritional adequacy levels, consisting of energy, protein, fat, carbohydrates, calcium, phosphorus, iron, vitamin A, vitamin B, and vitamin C.

Table 6 shows that many students' nutritional adequacy levels are below the adequate category, or less than 20%. Only the % adequacy level for vitamin A has reached or even exceeded the nutritional adequacy level. This illustrates that, in general, students' consumption is not meeting a balanced diet. When viewed individually, this condition becomes even more evident as more than 50% of students' macronutrient adequacy levels fall into the deficit and severe deficit categories. Table 6 shows that students experiencing mild and severe deficits for energy, protein, fat, and carbohydrates are 30 (54%), 28 (50%), 27 (48%), and 40 (71%), respectively. Similarly, at the level of micronutrient adequacy (Table 7), more than 50% of students are in the deficit category, except for vitamin A.

Tabel 6. Distribution of nutritional adequacy level (NAL) categories of macro nutrition based on gender

Category	Excess		Normal		Enough		Mild Deficit		Severe Deficit	
nutrition	B	G	B	G	B	G	B	G	B	G
Energy	1	4	6	7	4	4	4	5	12	9
Protein	4	6	0	8	7	3	4	4	12	8
Fat	3	7	9	4	3	3	1	3	11	12
Carbohydrate	1	3	3	5	2	2	5	4	16	15

Note: B= boy; G=girl

Based on each teenagers' nutritional adequacy level, their nutritional adequacy diversity values (NADV) can then be calculated. In this case, because almost all teenagers had a high %RDA (greater than 100%), the majority of their NADV, 33 teenagers (59%), were in the good category (≥80%), with the remain in the adequate (18%), moderate (18%), and poor (9%) categories. The distribution of teenagers NADV categories can be seen in Table 7.

Statistical analysis of nutritional adequacy level and VNAL

In the t-test for the gender variable, it was shown that there was no difference in the nutritional adequacy diversity values (NADV) between boy and girl.

Table 7. Distribution of nutritional adequacy diversity values (NADV) of teenagers based on school grade

NADV Category / Grade	10	11	12	Total
Good ≥80%	12	5	15	33
Adequate 70—79%	4	5	1	9
Moderate 60—69%	3	1	1	5
Poor < 60%	3	1	2	9

To determine whether the class variable had an effect on the independent variables of the level of nutritional adequacy and VNAL variance analysis was conducted. The results of this analysis showed that the class variable had a significant effect on all independent variables except the level of carbohydrate, vitamin B, and vitamin C adequacy. Table 8 shows the results of the variance analysis of the influence of class on NADV of teenagers.

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Tabel 8. Results of the analysis of variance on the influence of class variables on teenagers' NADV

(I) Klas	(J) Klas	Mean Difference (I-J)	Std. Error	Sig.
10	11	18,216*	9,789	0,07
	12	-19,131**	9,469	0,05
11	10	-18,216*	9,789	0,07
	12	-37,347***	10,236	0,00
12	10	19,131**	9,469	0,05
	11	37,347***	10,236	0,00

*. The mean difference is significant at α≤0.10

**. The mean difference is significant at α≤ 0.05

***. The mean difference is significant at α≤ 0.01

Table 8 shows that grade influences teenagers' NADV scores, with differences between the three grades all significant at the 0.01-0.10 level.

DISCUSSION

Based on the results of this study, it was found that, in terms of dietary patterns, Teenagers at Darul 'Ilmi High School (SMA Darul 'Ilmi) have a fairly good diversity in the types of food consumed by both boys and girls. Rice remains the most popular staple food as the primary energy source, with consumption reaching 17 times per week. This means rice is consumed almost three times a day, as is the typical Indonesian diet. Rice consumption is not limited to white rice, but also includes variations in processing into uduk rice, fried rice, yellow rice, lontong, and porridge. The second largest source of energy as a substitute for rice is wheat-based foods, namely white bread, dry noodles, and wet noodles. Potatoes, cassava, and sweet potatoes are also consumed. The frequency of consumption of animal protein sources among female teenagers is 14.54 times per week, and among male teenagers, 20.88 times per week. The most commonly consumed type is chicken, followed by eggs.

Consumption of animal protein sources among school-aged teenagers is also very diverse, with recommended meal frequencies of 2-4 servings per day or 14-28 servings per week. However, the frequency of eating vegetable protein sources (tofu and tempeh) for girls and boys is only 8 and 7 times per week, respectively, which is still below the recommended 14-28 times per week (Kementerian Kesehatan Republik Indonesia, 2014).

Similarly, consumption of vegetables and fruits is also still low, namely only in both girls and boys. Consumption of these types of foods that are sources of vitamins and minerals is less than 21 times per week for fruit and less than 14 times per week for vegetables, so it is still below the recommendation. This is in accordance with the 2015 Global School Health Survey Data which found that teenagers dietary patterns include: not always eating breakfast (65.2%), most teenagers consume less fiber from vegetables and fruit (93.6%), often consume flavored foods (75.7%), and also lack physical activity (42.5%).

Milk consumption is rare among both men and women, as is processed foods and beverages (snacks). Overall, the diversity of staple foods and animal protein sources among school-age teenagers meets the Balanced Nutrition Guidelines issued by the Indonesian Ministry of Health (2014), but the availability of plant-based protein sources is not yet adequate.

Based on the recommended dietary allowance (Ministry of Health Republik Indonesia, 2019).), only iron and vitamins A and B are adequately or significantly met. Calcium and vitamin C are the most deficient. This needs to be improved and addressed, as calcium and vitamin C are essential for teenagers who are still undergoing bone and tooth growth and need to conserve bone mass before reaching peak bone mass (Indriani, 2019). The school grade variable apparently has an effect on %NAL where teenagers in grade 11 have the lowest %NAL compared to grades 10 and 12, as can be seen in Figure 1. Likewise, for NADV which reflect eating patterns and the quality of the daily menu, in teenagers' students in grade 11 the values are lower compared to grades 10 and 12 as can be seen in Figure 1. The school grade variable statistically has a significant effect on VNAL.

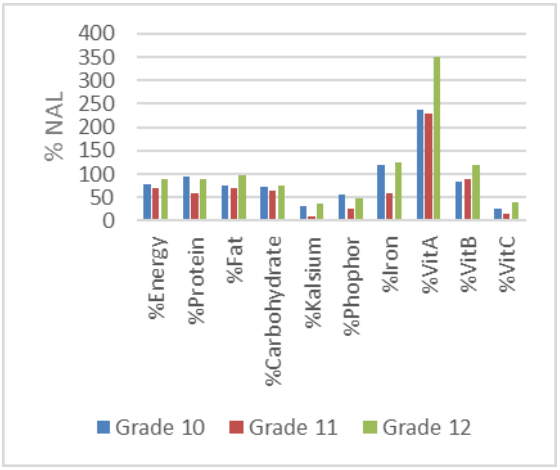

Figure 1. Comparison of average %NAL of adolescents by grade

CONCLUSION

The dietary patterns of school-aged teenagers meet the Balanced Nutrition Guidelines for energy and animal protein sources, but not for plant-based protein sources, such as fruits and vegetables. The nutritional adequacy levels of school-aged teenagers fall into the categories of excess (vitamin A), sufficient (protein and fat), normal (iron and vitamin B), mild deficit (energy and carbohydrates), and severe deficit (calcium, phosphorus, and vitamin C). The nutritional adequacy scores for most (59%) are in the good category (≥80%), with the remaining 18% in the sufficient (sufficient), moderate (18%), and poor (9%) categories. This is influenced by grade.

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