Nutritional Status Analysis of Grade 4A Students at SD 064981 Cempaka Raya Based on Height, Weight, and Snack Consumption Patterns

Sudana Fatahillah Pasaribu[1], Tuty Hertati Purba [2], Dhea Syafitri [3], Dwitri Amalia Susanti[4], Etika Lase[5], Farhatun Nurha[6], Febry Lesmana Putri[7], Tri Cahyani Lase[8]

[1] Departement Of Nutrition, Faculty Of Public Health, Insitut Kesehatan Helvetia Medan, Indonesia
e-mail : sudanafatahillah@helvetia.ac.id

[2] Departement Of Nutrition, Faculty Of Public Health, Insitut Kesehatan Helvetia Medan, Indonesia
e-mail : farhatunnurha1@gmail.com

[3-8] Departement Of Nutrition, Faculty Of Public Health, Insitut Kesehatan Helvetia Medan, Indonesia

* Corresponding Author : Sudanna Fatahillah Pasaribu

Abstract: The nutritional status of elementary school children serves as a vital indicator of their overall growth, development, and future health outcomes. Poor nutritional status, whether in the form of undernutrition or overweight, can lead to a range of health and academic performance issues. This study aimed to assess the nutritional status of Grade 4A students at SD 064981 Cempaka Raya using anthropometric measurements and to examine the association between snacking habits and nutritional categories. A descriptive quantitative research design was employed, utilizing a total sampling approach involving all 20 students in the class. Data collection consisted of direct height and weight measurements conducted according to standardized procedures. The data were then analyzed using the WHO Anthro Plus software to classify nutritional status into undernourished, normal, overweight, and obese categories. Additionally, information on students' snacking habits during school hours was obtained through structured questionnaires. The results indicated that 25% of students were undernourished, 50% had normal nutritional status, 20% were overweight, and 5% were obese. Bivariate analysis using the Chi-Square test demonstrated a statistically significant relationship ($p < 0.001$) between snacking behavior and nutritional status. Specifically, all students who reported frequent consumption of snacks at school were classified as overweight or obese, whereas those who did not engage in frequent snacking predominantly fell within the undernourished or normal categories. These findings highlight the potential role of unhealthy snacking patterns in contributing to excessive weight gain among school-age children. Based on the results, it is recommended that nutrition education programs be implemented for both students and parents, coupled with stricter regulations on the availability and sale of high-calorie snack foods within the school environment. Such measures may serve as preventive strategies to promote healthy growth, maintain optimal nutritional status, and reduce the risk of non-communicable diseases later in life.

Keywords: Nutritional Status, Anthropometry, School Snacks, BMI, Schoolchildren

1. Introduction

The nutritional status of primary school children is an important indicator that reflects individual health as well as being a predictor of the quality of human resources in the future. Imbalance in fulfilling nutritional needs in this period can result in two forms of malnutrition, namely malnutrition which has an impact on stunting and wasting, as well as overnutrition that leads to overweight and obesity.

Globally, the problem of double burden of malnutrition—undernutrition and overnutrition that occurs simultaneously in one population is still a serious challenge. UNICEF-WHO-World Bank (2021) reported that more than 149 million children experienced stunting, while child obesity continued to increase in urban areas due to a high-calorie diet and sedentary lifestyle. The World Health Organization (2006) even called childhood obesity as a new threat to the health of the world. A similar phenomenon also occurs in Indonesia, where Riskesdas 2018 data shows that the prevalence of stunting in schoolchildren reaches 27,7%, while 10.8% of children are obese. Research by Rachmi et al. (2016) confirms that the transition of consumption patterns from traditional food to fast food and high-sugar and fat snacks is one of the triggers for increasing nutritional cases in school-age children.

In the context of elementary school children, snacking habits in the school environment is one of the important factors that affect nutritional status. Snack food is generally high in energy, high in sugar, fat, and salt but low in micronutrients. Therefore, monitoring snack patterns in schools is important to identify their relationship with children's nutritional status, especially in the population aged 9–10 years who are still in the pre-puberty development phase.

Anthropometric measurement in the form of height and weight remains a practical and economical method to monitor children's nutritional status at school. Anthropometric data interpreted with the WHO Growth Reference 2007 standard through WHO Anthro Plus software can classify nutritional status into undernourished, normal, overnurished, or obese (WHO, 2006; de Onis et al., 2007). This information not only provides an objective picture of children's health, but also becomes the basis for the preparation of evidence-based intervention policies, including the supervision of snacks in schools and nutrition education for students and parents.

Starting from the urgency, this study was conducted at SD 064981 Cempaka Raya on class 4A students with the aim of obtaining a picture of children's nutritional status based on anthropometric measurements and analyzing the relationship between snack patterns at school and nutritional status categories. The results of this research are expected to be a reference in efforts to prevent nutritional problems earlier, as well as encourage the implementation of educational programs and sustainable supervision of snack consumption in schools.

2. Proposed Method

This research uses a quantitative descriptive method to analyze anthropometric data of class 4A students at SD 064981 Cempaka Raya. The research population is all students of class 4A, with the sampling technique using a relatively small total number of students. Data collection is done through anthropometric measurements, including height using a stadiometer, weight using digital scales, calculations are done using the WHO Anthro Plus application.

The data obtained was analyzed with frequency distribution to identify nutritional status patterns based on SK Anthropometry. Grouping is done into categories such as malnutrition, normal nutrition, ovzernutrition and obesity. The results of the study are presented in the form of pie diagrams and narrative descriptions, providing a comprehensive overview of the nutritional status and growth of class 4A students as a basis

3. Results and Discussion

This research was carried out to get a picture of the nutritional status of class 4A students which was measured through anthropometric parameters, namely height and weight. Student demographic data provides an important context in interpreting nutritional status measurement results because age, gender, and birth order factors can affect growth and physical development.

Table 1. Student's Birth Year Frequency School

		Frequency	Percent	Valid Percent	Cumulative Percent
Tahun	**2014**	8	**40,0**	**40,0**	40,0
	2015	12	**60,0**	**60,0**	100,0
	Total	20	**100,0**	**100,0**	

Table 2. Student Gender Frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
Laki-Laki	**12**	**60,0**	**60,0**	60,0
Perempuan	**8**	**40,0**	**40,0**	100,0
Total	**20**	**100,0**	**100,0**	

Table 3. Birth Order Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Urutan Kelahiran	**1**	**10**	**50,0**	**50,0**	50,0
	2	7	**35,0**	**35,0**	85,0
	3	2	**10,0**	**10,0**	95,0
	4	1	**5,0**	**5,0**	100,0
	Total	**20**	**100,0**	**100,0**	

From the distribution of birth years, in table 1 the majority of students are children born in 2015 as many as 12 children (60%), while the remaining 8 children (40%) were born in 2014. That is, most students are still around 9–10 years old. This relatively narrow age difference supports group homogeneity, so that the comparison of nutritional status between students is more valid because it is not much affected by significant differences in biological development stages.

The gender distribution in Table 2 shows that male students dominate class 4A, which is 12 children (60%), while female students have 8 children (40%). This ratio is important because some studies show that the growth of boys and girls can have different patterns. Boys at this age often have a slightly faster physical growth rate than girls, although the individual variation remains significant. Therefore, nutritional status analysis will consider potential gender differences in their interpretation.

Judging from the order of birth in Table 3, half of the students (50%) are the first child in the family, 35% are the second child, 10% are the third child, and 5% are the fourth child. Birth order factors are sometimes related to nutritional attention in the family and the allocation of care resources. The first child generally gains full attention in the early stages of growth, while children with a higher birth order may face greater challenges related to the sharing of attention and family nutrition, although this is greatly influenced by the socio-economic conditions of each family.

a. Normality Test

Table 4. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**Df**	Sig.
BeratBadan	**,134**	**20**	**,200***	**,849**	**20**	,005
TinggiBadan	**,110**	**20**	**,200***	**,985**	**20**	,983
IMT	**,128**	**20**	**,200***	**,912**	**20**	,069

The normality test results show that the Weight variable has a Kolmogorov-Smirnov significance value of 0,200 which is greater than 0.05, but based on the Shapiro-Wilk test, p=0.005 is obtained which is less than 0.05, so that the Weight data is declared not normally distributed according to Shapiro-Wilk. On the other hand, the Height variable shows p=0,200 in Kolmogorov-Smirnov and p=0,983 in Shapiro-Wilk, both are far above 0.05, so the Height data is normally distributed. Meanwhile, the IMT variable has p=0,200 in Kolmogorov-Smirnov and p=0,069 in Shapiro-Wilk, both of which are greater than 0.05, so the IMT data is also normally distributed. Based on this consideration, bivariate analysis involving Body Weight variables should consider non-parametric tests, while analysis of Height and BMI variables can use parametric tests.

b. Homogeneity Test

Table 5. Homogeneity Test

		Independent Samples Test	
		Levene's Test for Equality of Variances	
		F	Sig.
IMT	**Equal variances assumed**	**,095**	,762
	Equal variances not assumed		

Based on the homogeneity test output in Table 5, the variance through the Levene's Test, obtained a significance value of 0.762 (>0.05), which means the IMT variance between the male and female groups is homogeneous or the same. Furthermore, the results of the Independent Samples t-test showed a 2-tailed significance value of 0.417 on the assumption of the same variance, which is greater than 0.05, so it can be concluded that there is no significant difference in the average IMT between male and female students. The average BMI of the female group is slightly higher (17,29) compared to men (16,06), but this difference is statistically meaningless (p>0,05).

c.Independent Test Sample t test for IMT against Gender

Table 4. Bivariate Test

		Group Statistics			
	Kelamin	**N**	**Mean**	**Std. Deviation**	Std. Error Mean
IMT	**Perempuan**	**8**	**17,2875**	**3,76694**	1,33181
	Laki-Laki	**12**	**16,0583**	**2,85226**	,82338

Independent Samples Test

					t-test for Equality of Means			
		t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
IMT	Equal variances assumed	,831	18	,417	1,22917	1,47831	-1,87664	4,33498
	Equal variances not assumed	,785	12,236	,447	1,22917	1,56578	-2,17509	4,63343

Analysis of the average difference in IMT based on gender shows that the group of female students has an average IMT of 17.29 with a standard deviation of 3.77, while the male student group has a lower IMT average of 16.06 with a standard deviation of 2.85. From this data, descriptively it appears that female students tend to have slightly higher IMT scores than males. However, this average difference is not necessarily statistically significant, so further testing is needed.

To determine whether the variance of the two groups is homogeneous, the Levene's Test for Equality of Variances was carried out. The test results show a significance value of 0.762, which is far above the 0.05 limit, so it can be concluded that the IMT variance between male and female students is homogeneous. This assumption of variance homogeneity that is fulfilled allows the use of independent t-test with the assumption of equal variances assumed.

Independent Samples t-test results show a significance value (2-tailed) of 0.417, which means greater than 0.05. Thus, the average difference in BMI between male and female students is stated to be statistically insignificant. It means, although the average female BMI is higher by about 1.23 points, the difference is within a reasonable range of variation and is not strong enough to be considered meaningfully different.

Overall, this finding shows that gender is not a factor that causes a significant difference in BMI scores in the group of students in class 4A of SD 064981 Cempaka Raya. This result also confirms the importance of considering other factors, such as eating habits, physical activity, or individual health conditions, which may affect nutritional status more than gender differences alone.

d. Chi Square Test of Nutritional Category against Snack Patterns at School

Table 4. Chi Square Test

KategoriGizi * PolaJajandiSekolah Crosstabulation

Count			PolaJajandiSekolah		Total
			Tidak Jajan	**Jajan**	
KategoriGizi	**Kurang**		5	0	5
	Normal		10	0	10
	Lebih		0	4	4
	Obesitas		0	1	1
Total			15	5	20

Chi-Square Tests			
	Value	df	**Asymptotic Significanc e (2-sided)**
Pearson Chi-Square	20,000[a]	3	**,000**
Likelihood Ratio	22,493	3	**,000**
Linear-by-Linear Association	12,936	1	**,000**
N of Valid Cases	20		

a. 7 cells (87,5%) have expected count less than 5. The minimum expected count is ,25.

Based on the results of the cross-tabulation between snack patterns at school and the nutritional status category in students in class 4A of SD 064981 Cempaka Raya, the nutritional distribution was obtained as follows: from a total of 20 students, 15 students did not have snacking habits at school, while 5 students had snacking habits. In the group that did not eat, all of them showed a relatively good nutritional status, namely 5 students were undernourished and 10 students had normal nutritional status. On the other hand, in the group that has a snacking habit, no cases of malnutrition or normal nutrition were found, but all of them were in the category of overnourished (4 students) and obesity (1 student).

When reviewed as a whole, out of 20 students, 5 students (25%) were undernourished, 10 students (50%) had normal nutritional status, 4 students (20%) were overweight, and 1 student (5%) were obese. However, there is a very clear pattern that snacking habits at school are correlated with an increase in excess nutritional status. Children who have snacking habits tend to be completely in the category of more nutrition to obesity, while those who do not snack are more dominant in normal nutritional status or even undernutrition.

Chi-Square test results are used to find out if there is a significant relationship between snack patterns at school and nutritional status categories. Based on the test output, a Pearson Chi-Square value of 20,000 is obtained with degrees of freedom (df) = 3 and an asymptotic significance value (p-value) = 0.000 (< 0,05). This shows that there is a very statistically significant relationship between street food patterns at school and students' nutritional status. This finding is reinforced by the Likelihood Ratio of 22.493 (p = 0.000) and Linear-by-Linear Association of 12.936 (p = 0.000), all of which are well below the 0.05 significance threshold.

However, it should be observed that 87.5% of cells in the table have an expectation value of less than 5, and the minimum expectation value is 0.25. This condition indicates that although the results show a significant relationship, the interpretation must still be done carefully given the relatively small sample size. However, this finding gives a strong indication that snacking habits at school have the potential to increase the risk of overnutrition and obesity in elementary school children, so nutritional education and supervision of snack food consumption are needed in the school environment.

Discussion

The results of this study show that anthropometric measurements in the form of height, weight, and Body Mass Index (BMI) in class 4A students of SD 064981 Cempaka Raya are able to provide a comprehensive picture of the nutritional status of primary school-age children. A relatively homogeneous age distribution, which is mostly students aged 9–10 years, is the strength of research because it minimizes bias due to differences in biological developmental stages, according to the findings of de Onis et al. (2007) who stated that the interpretation of children's nutritional status must strictly consider chronological age for accurate classification. The dominance of male students (60%) and the distribution of the order of births, in which half is the first child, show a heterogeneity of demographic

characteristics relevant to nutritional consumption patterns and family attention (Victora et al., 2008).

The normality test shows that BMI and height data are normally distributed, while body weight is not, so an appropriate approach is needed in bivariate analysis. The results of the IMT variance homogeneity test showed that there was no significant difference in variance between gender groups, which allowed the use of independent t-tests. The average BMI difference test showed no statistically significant difference between male and female students (p=0,417), although the female average IMT was descriptively higher. This supports the findings of the Tandon et al. (2012) study, which reported that at primary school age, the difference in IMT based on gender is generally not significant because the puberty phase has not yet taken full place.

The results of the cross-tabulation between the snack pattern at school and the nutritional status category show a very clear pattern. Of the 15 students who do not have snacking habits, all of them are in the malnutrition category (5 students) and normal (10 students). On the other hand, in 5 students who have a habit of snacking at school, all of them are in the category of more nutrition (4 students) and obesity (1 student). This distribution gives a strong indication that street food patterns at school are associated with an increased risk of overnutrition in elementary school children.

Bivariate analysis with the Chi-Square test confirms the relationship statistically. Pearson Chi-Square value of 20,000 with p-value < 0.001 shows a very significant relationship between snacking habits at school and student nutritional status. This finding is in line with the literature that states that the consumption of snacks in schools, which are generally high in energy but low in micronutrients, contributes to an increased risk of overweight and obesity in children (Rachmi et al., 2016; WHO, 2006). Thus, the pattern of snack consumption in the school environment can be one of the important determinants in the nutritional transition in elementary school children.

In addition, the distribution of nutritional status categories shown in the pie diagram shows diversity ranging from malnutrition to obesity. This is in line with the global trend of double burden of malnutrition in elementary school children, where malnutrition and overnutrition occur simultaneously in one population (Black et al., 2013). This phenomenon confirms the need for comprehensive intervention efforts, not only to overcome the problem of malnutrition but also to prevent the increase in malnutrition cases due to unhealthy modern consumption patterns.

This finding reinforces the importance of periodic growth monitoring programs in elementary schools, accompanied by contextual nutrition education and strict supervision of snacks in the school environment. The role of the family is also crucial in shaping healthy eating habits and managing children's pocket money. With evidence-based interventions like this, it is hoped that children's growth can be more optimal and the risk of non-communicable diseases in the future can be minimized.

5. Conclusions

This research shows that the nutritional status of students in class 4A SD 064981 Cempaka Raya has a diversity of categories ranging from malnutrition to obesity, which reflects the nutritional transition in primary school children. The results of anthropometric measurements showed that most of the students were in the normal nutrition category (50%), but there was still a proportion of malnutrition (25%) as well as overnourition and obesity (25%), so that the double burden of malnutrition phenomenon was clearly seen in this group.

Bivariate analysis with cross-tabulation between snack patterns in schools and nutritional status categories shows a firm pattern. All students who do not have snacking habits are in the malnutrition or normal category, while all students who have snacking habits are actually in the category of overnourished and obese. The results of the Chi-Square test reinforce this finding with a value of p < 0.001, which shows a very significant relationship between snacking patterns at school and nutritional status. This finding is in line with the literature

that states that the habit of eating snacks, which are generally high in energy but low in micronutrients, increases the risk of overweight and obesity in school-age children.

The overall results of this study emphasize the importance of monitoring growth and nutritional status periodically, stricter supervision of snacks in the school environment, and balanced nutrition education for both students and parents. Evidence-based interventions like this are needed to prevent double malnutrition problems that can impact children's health and long-term development. With an integrated preventive strategy, it is hoped that children's diet can be more directed so that optimal growth and prevention of non-communicable diseases in the future can be achieved.

References

Aghadiati, F. (2019). Hubungan pengetahuan ibu dengan pola menu sarapan dan kebiasaan sarapan pada anak sekolah dasar. *Jurnal Kesehatan Terpadu (Integrated Health Journal), 10*(2), 56–62.

Al Huwaidy, A. H., Zuraida, R., & Febriani, W. (2025). Hubungan kebiasaan sarapan dengan status gizi siswa: Literature review. *Medical Profession Journal of Lampung, 14*(10), 1953–1958.

Almatsier, S. (2013). *Prinsip dasar ilmu gizi*. Jakarta: Gramedia Pustaka Utama.

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet, 382*(9890), 427–451. https://doi.org/10.1016/S0140-6736(13)60937-X

de Onis, M., Onyango, A. W., Borghi, E., Siyam, A., Nishida, C., & Siekmann, J. (2007). Development of a WHO growth reference for school-aged children and adolescents. *Bulletin of the World Health Organization, 85*(9), 660–667. https://doi.org/10.2471/BLT.07.043497

Depkes RI. (2008). *Pedoman pengukuran dan penilaian status gizi*. Jakarta: Kementerian Kesehatan RI.

Food and Agriculture Organization. (2019). *The state of food security and nutrition in the world 2019*. Rome: FAO. https://www.fao.org/3/ca5162en/ca5162en.pdf

Hardinsyah, & Supariasa, I. D. N. (2016). *Ilmu gizi untuk mahasiswa dan profesional*. Jakarta: Buku Kedokteran EGC.

Kementerian Kesehatan Republik Indonesia. (2018). *Hasil utama RISKESDAS 2018*. https://www.litbang.kemkes.go.id/laporan-rkd-2018/

Kementerian Kesehatan Republik Indonesia. (2021). *Profil kesehatan Indonesia tahun 2020*. https://pusdatin.kemkes.go.id

Khasanah, L., Rahmawati, Y. D., & Wahyani, A. D. (2023). Hubungan asupan kalori, kebiasaan sarapan, dan status gizi dengan produktivitas kerja karyawan Universitas Muhadi Setiabudi. *Jurnal Ilmiah Gizi dan Kesehatan (JIGK), 4*(2), 20–25.

Khomsan, A. (2014). *Pangan dan gizi untuk kesehatan*. Bogor: IPB Press.

Mawaddah, N. M., Netty, & Norfai. (2024). Hubungan kebiasaan sarapan pagi dan status gizi dengan prestasi belajar siswa di Madrasah Ibtidaiyah Siti Mariam Banjarmasin tahun 2023. *Jurnal Akademika Baiturrahim Jambi, 13*(2), 329–337.

Rachmi, C. N., Agho, K. E., Li, M., & Baur, L. A. (2016). Stunting, underweight and overweight in children aged 2.0–4.9 years in Indonesia: Prevalence trends and associated risk factors. *PLoS ONE, 11*(5), e0154756. https://doi.org/10.1371/journal.pone.0154756

Soetjiningsih. (2012). *Tumbuh kembang anak*. Jakarta: EGC.

Supariasa, I. D. N., Bakri, B., & Fajar, I. (2012). *Penilaian status gizi*. Jakarta: EGC.

Tandon, P. S., Zhou, C., Lozano, P., & Christakis, D. A. (2012). Preschoolers' total daily screen time at home and by type of child care. *The Journal of Pediatrics, 160*(2), 221–226.e1. https://doi.org/10.1016/j.jpeds.2011.08.043

United Nations International Children's Fund. (2021). *The state of the world's children 2021: On my mind – Promoting, protecting and caring for children's mental health*. https://www.unicef.org/reports/state-worlds-children-2021

Victora, C. G., Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L., & Sachdev, H. S. (2008). Maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet, 371*(9609), 340–357. https://doi.org/10.1016/S0140-6736(07)61692-4

World Health Organization. (2006a). *The world health report 2006: Working together for health*. Geneva: World Health Organization.

World Health Organization. (2006b). *WHO child growth standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development*. Geneva: World Health Organization. https://www.who.int/childgrowth/standards/Technical_report.pdf