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Overview of Adolescent Diet and Nutritional Status During The Covid-19 Pandemic at SMAN 17 Surabaya

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ABSTRACT

Adolescents are prone to nutritional problems due to unhealthy eating habits, worsened by lifestyle changes during the COVID-19 pandemic. This study aimed to describe the eating patterns and nutritional status of adolescents at SMAN 17 Surabaya. A descriptive quantitative design was used, involving 38 randomly selected Grade XI students from November 2021 to March 2022. Data were collected through anthropometric measurements and a validated Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), then analyzed descriptively. The majority of respondents were 17 years old (63.2%) and female (73.7%). While all respondents were categorized as having good food types based on diversity, most exhibited severe macronutrient deficits, most had severe deficits in energy (73.7%), protein (42.1%), fat (52.6%), and carbohydrates (84.2%). Consumption of vegetables, fruits, and protein sources was low. All respondents (100%) had poor dietary patterns. Nutritional status showed that 68.4% were normal, 13.2% underweight, 10.5% overweight, and 7.9% obese. Schools, parents, and health professionals are encouraged to improve adolescents' nutrition through education, monitoring, and promoting balanced diets with adequate intake of fruits, vegetables, and protein.

INTRODUCTION

Nutritional problems among adolescents are generally caused by poor eating habits, specifically the mismatch between dietary intake and recommended nutritional needs. Inadequate intake can lead to undernutrition, while excessive intake may result in obesity[1]. At SMAN 17 Surabaya, social restrictions during the COVID-19 pandemic led students to study from home and engage in less physical activity. This condition affected their eating patterns in terms of meal frequency, food choices, and nutritional status, as energy expenditure was no longer optimal.

According to the 2018 Basic Health Research (Riskesdas), the national prevalence of undernutrition among adolescents aged 16–18 years was 7.9%, consisting of 1.1% categorized as severely thin and 6.8% as thin. Meanwhile, the prevalence of overweight among the same age group was 16.4%, with 11.3% categorized as overweight and 5.1% as obese[2]. These figures indicate that the double burden of malnutrition remains a significant concern among Indonesian adolescents.

Poor eating patterns in adolescents not only affect nutritional status—such as undernutrition, anemia, or obesity—but also influence physical health, mental well-being, and academic performance. Adolescents with imbalanced nutrient intake are more likely to experience concentration

difficulties, fatigue, and a decline in learning performance[3]. Deficiencies in essential nutrients such as iron, B vitamins, and omega-3 fatty acids may increase the risk of mood disorders, depression, and eating disorders[4–6].

The modern lifestyle, which is often characterized by the consumption of fast food, sugary beverages, and extreme dieting practices, further contributes to poor dietary habits among adolescents[7–9]. Therefore, nutrition education and the development of healthy eating habits should be instilled from an early age through a holistic approach involving schools, families, healthcare professionals, and social media[10,11]. Interventions such as promoting healthy breakfasts, improving nutrition knowledge, and developing functional foods suitable for adolescents are crucial in preventing nutritional problems and supporting the development of a physically, mentally, and intellectually healthy generation[12–14].

A preliminary study conducted by the author on 10 students of class XI IPA 5 at SMAN 17 Surabaya through weight and height measurements showed that 1 student (10%) had an underweight nutritional status, 6 students (60%) were in the normal category, and 3 students (30%) were categorized as obese. These findings indicate that nutritional problems—both undernutrition and overnutrition—are still present among students. This condition is suspected to be related to unhealthy eating behaviors during the COVID-19 pandemic, such as irregular meal frequency and poor food choices. Based on this background, this study aims to describe the eating patterns and nutritional status of adolescents during the COVID-19 pandemic at SMAN 17 Surabaya.

MATERIALS AND METHODS

This study employed a descriptive quantitative design and was conducted from November 2021 to March 2022 at SMAN 17 Surabaya, located at Jl. Rungkut Asri Tengah YKP, Rungkut Kidul, Rungkut District, Surabaya City, East Java Province. This research was officially approved by the Health Polytechnic of the Ministry of Health in Surabaya (Poltekkes Kemenkes Surabaya). The population consisted of all 316 students in Grade XI at SMAN 17 Surabaya during the 2021/2022 academic year. A simple random sampling technique was used to select 38 students as the sample. The inclusion criteria were Grade XI students who agreed to participate by signing a consent form and had no chronic illnesses that could affect nutritional status. The exclusion criteria were students who were absent during data collection or had incomplete data.

Data collection involved obtaining informed consent from participants, followed by anthropometric measurements and structured interviews. Anthropometric assessments included measuring body weight using a digital scale and height using a microtoise, which were then used to calculate nutritional status based on Body Mass Index-for-Age (BMI/A), according to the Indonesian Ministry of Health Regulation No. 2 of 2020. Dietary intake patterns were assessed using a Semi-

Quantitative Food Frequency Questionnaire (SQ-FFQ). The SQ-FFQ instrument had previously been validated (r > 0.7) and tested for reliability (Cronbach's alpha > 0.8), and was adapted for school-aged adolescents. The collected data were analyzed descriptively using SPSS, and the results were presented in the form of frequency distributions and percentages to illustrate the eating patterns and nutritional status of the respondents.

RESULT

Table 1. **Distribution of Age Frequency of Respondents at SMAN 17 Surabaya**

Age	n	%
16 tahun	14	36,8
17 tahun	24	63,2
Total	**38**	**100**

Source : Primary Data, 2022

Based on Table 1, the age distribution of respondents at SMAN 17 Surabaya shows that the majority were 17 years old, totaling 24 students or 63.2% of the sample. Meanwhile, 14 respondents, accounting for 36.8%, were 16 years old. This indicates that most of the participants in this study were in the late adolescence stage, which is a critical period for growth, development, and the establishment of lifelong dietary habits.

Table 2. **Frequency Distribution of Respondents' Gender at SMAN 17 Surabaya**

Gender	N	%
Laki-laki	10	26,3
Perempuan	28	73,7
Total	**38**	**100**

Source : Primary Data, 2022

Based on Table 2, the gender distribution of respondents at SMAN 17 Surabaya indicates that the majority were female, with 28 students (73.7%), while the remaining 10 students (26.3%) were male. This shows that female students made up a significantly larger portion of the sample, which may influence the study results, particularly if gender is associated with differences in dietary habits, nutritional status, or health awareness.

Table 3. **Frequency Distribution of Respondents' Nutrient Consumption Levels at SMAN 17 Surabaya**

Nutrient Consumption Rate	Nutrition							
	Energy		Protein		Fat		Carbohydrates	
	n	%	n	%	n	%	n	%
Severe Deficit	28	73,7	16	42,1	20	52,6	32	84,2
Moderate deficit	5	13,1	3	7,9	4	10,6	3	7,9
Mild deficit	2	5,3	6	15,8	3	7,9	0	0
Normal	1	2,6	6	15,8	7	18,4	3	7,9
More	2	5,3	7	18,4	4	10,5	0	0
Total	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**

Source : Primary Data, 2022

Based on Table 3, the majority of respondents at SMAN 17 Surabaya experienced a severe deficit in nutrient intake, particularly in energy (73.7%) and carbohydrates (84.2%). In terms of protein intake, 42.1% of respondents were in the severely deficient category, while 18.4% were categorized as having excess protein intake. Fat intake also showed a similar pattern, with 52.6% in severe deficit and 18.4% in the normal category. Only a small proportion of students had normal intake levels for energy (2.6%), protein (15.8%), fat (18.4%), and carbohydrates (7.9%). These findings suggest that most students had inadequate nutrient intake, which could potentially affect their nutritional status and overall health.

Table 4. Frequency Distribution of Respondents' Consumption Type Categories at SMAN 17 Surabaya

Categories Type of Consumption	n	%
Good	38	100
Enough	0	0
Less	0	0
Total	**38**	**100**

Source : Primary Data, 2022

Based on Table 4, all respondents (100%) at SMAN 17 Surabaya were categorized as having a good dietary consumption pattern. None of the students fell into the moderate or poor consumption categories. This indicates that, in terms of the variety and type of food consumed, the students generally made appropriate dietary choices, despite many of them experiencing nutrient intake deficits as shown in the previous table.

Table 5. Distribution of Frequency of Consumption of Foodstuffs of Respondents at SMAN 17 Surabaya

Frequency of Consumption	Foodstuffs																							
	Rice		Rice Porridge		Bread		Biscuit		Beef		Chicken Meat		Eggs		Tempeh		Vegetables		Fruit		Cow's Milk		Coffee		Tea	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Baik	38	100	1	2,6	2	5,3	2	5,3	1	2,6	1	2,6	3	7,9	1	2,6	0	0	0	0	11	28,9	3	7,9	3	7,9
Kurang	0	0	37	97,4	36	94,7	36	94,7	37	97,4	37	97,4	35	92,1	37	97,4	38	100	38	100	27	71,1	35	92,1	35	92,1
Total	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**

Source : Primary Data, 2022

Based on Table 5, all respondents (100%) had a good consumption frequency of rice. However, the majority showed poor consumption patterns for other food items. For example, 97.4% of respondents had low consumption of rice porridge, beef, and chicken. Additionally, 94.7% consumed biscuits and bread infrequently, and 92.1% had low intake of eggs, coffee, and tea. The most concerning findings were that 100% of respondents had poor consumption of vegetables and fruits.

While 28.9% had good intake of milk, the rest (71.1%) consumed it inadequately. These results indicate a lack of dietary diversity among the students, which may contribute to nutritional deficiencies.

Table 6. Frequency Distribution of Respondent Diet Categories at SMAN 17 Surabaya

Categories Diet	n	%
Good	0	0
Less	38	100
Total	**38**	**100**

Source : Primary Data, 2022

Table 6 shows that all respondents (100%) were categorized as having poor dietary patterns. None of the respondents were classified as having a good dietary pattern. This indicates that the overall eating habits of the students at SMAN 17 Surabaya were not aligned with recommended nutritional guidelines, which may increase their risk of nutritional imbalances and related health issues.

Table 7. Frequency Distribution of Respondents' Nutritional Status at SMAN 17 Surabaya

Nutritional Status	n	%
Less	5	13,2
Good	26	68,4
More	4	10,5
Obesity	3	7,9
Total	**38**	**100**

Source : Primary Data, 2022

Table 7 shows the nutritional status distribution of respondents at SMAN 17 Surabaya. The majority of students (68.4%) had a normal nutritional status. However, 13.2% were underweight, 10.5% were overweight, and 7.9% were classified as obese. These findings suggest that although most students were within the normal range, there is still a notable proportion experiencing both undernutrition and overnutrition, indicating a double burden of malnutrition.

DISCUSSION

The results showed that most adolescents at SMAN 17 Surabaya had good nutritional knowledge, but no significant relationship was found between this knowledge and nutritional status ($p > 0.05$; $r < 0.2$)[15]. These findings reinforce evidence that increased nutritional knowledge has not automatically translated into changes in healthy eating behaviors or improvements in nutritional status, as reported by Dewi *et al*. (2023) in post-disaster areas; Educational interventions do improve knowledge, but nutritional status does not immediately show significant changes[16]. On the other hand, the study of Zhang *et al.* (2023) from China states that although nutritional knowledge is quite good, healthy eating behaviors only occur if accompanied by contextual support such as self-efficacy and adolescent peer influence[17].

Data on macronutrient intake (energy, protein, fat, carbohydrates) showed a prevalence of weight deficits, but many respondents still had normal nutritional status or were overweight[15,16]. This is most likely due to the underreporting bias of the SQFFQ or recall method which relies heavily on the memory and honesty of respondents—especially adolescents who tend to hide the consumption of fast food or sweet snacks. In addition, social preferences and peer pressure can also affect food reporting, known as social desirability bias[18].

Physiological mechanisms such as metabolic adaptation also need to be considered: the adolescent body can lower the basal metabolic rate when the energy deficit is chronic, so that the deficit is visible even if fat accumulation persists. Findings from post-disaster nutrition show that consumption of low fiber, sugar and high fat is strongly correlated with dyslipidemia and increased body fat percentage, although total energy is not high[16].

The absence of a significant correlation between macronutrient intake and nutritional status can be expanded by considering the lifestyle variables not measured in this study. Factors such as physical activity, screen time, sleep patterns, academic stress, and snack quality have a great impact on adolescents' nutritional status[19,20]. For example, school-based eHealth interventions increased moderate-to-vigorous physical activity (MVPA) and lowered adolescent BMI percentiles within 3 months[19]. A narrative study by Lestari *et al*. (2025) confirms that the consumption of ultraprocessed foods correlates with metabolic obesity, even after total energy control[20].

Another study at the Tasikmalaya Islamic boarding school found a strong relationship between dinner habits, sedentary behavior, peer influence, and overweight status in female boarding students[21]. In addition, a study in Jakarta showed that social norms and peer pressure influence attitudes towards nutritious food and body satisfaction in urban adolescent girls[22]**.**

Methodological limitations are also crucial to discuss. IPB Conference (2025) showed that educational interventions improve knowledge and attitudes, but small samples (n=41) limited the power of statistics and generalization of results[20]. Our study also had a limited sample from only one school, so the statistical power was low to detect small effects. In addition, cross-sectional design makes causal inference impossible, in contrast to longitudinal designs that are able to capture changes in time and dynamics of nutritional determinants[17].

The Sparrow *et al*. study (2021) proposes an adolescent nutrition research agenda in Indonesia to combine representative data, dietary quality index, and socioeconomic analysis to understand the variability of nutritional status between regions[17]. The lack of variables such as UPF consumption, frequency of meals, and body composition (fat vs. muscle) in our study is an important methodological gap compared to the ideal research framework[23].

This critical analysis enriches the discussion by opening up the possibility of unmeasured mediating or moderator variables, such as peer pressure, snacking habits, or access to healthy foods.

The findings of the study in Bengkulu (2024) highlight that dinner habits and peer influence are significantly related to overweight despite low total daily calories[24].

Thus, policy implications and practical interventions need to be designed integratively. Schools should not only provide formal nutrition education, but also create a supportive environment—such as healthy canteens, structured exercise time, and parent and community involvement. Technology-based intervention programs that monitor food consumption and physical activity in real-time have been shown to be effective in lowering percentile BMI and improving the quality of students' diets[19]. In addition, there must be attention to psychosocial aspects: body image, self-efficacy, and peer support have a major influence on eating habits and physical activity[25,26].

This study may be subject to several biases. One potential bias is recall bias, as dietary intake data were collected using a semi-quantitative food frequency questionnaire (SQ-FFQ), which relies on participants' memory and honesty in reporting their food consumption. Additionally, social desirability bias may have occurred if respondents provided answers they believed to be more socially acceptable rather than entirely accurate. These biases could affect the validity of the dietary pattern data.

This study has several limitations. First, it only involved a small sample size of 38 students from a single school, which limits the generalizability of the findings to the broader adolescent population. Second, the cross-sectional design captures data at a single point in time, which makes it difficult to determine causal relationships between dietary patterns and nutritional status. Third, the study did not account for other influencing factors such as socioeconomic status, physical activity, or mental health, which may also affect nutrition and health outcomes.

CONCLUSION

The results of this study indicate that all respondents at SMAN 17 Surabaya exhibited poor eating patterns, with 68.4% classified as having normal nutritional status, 26.3% as underweight, and 34.2% as overweight or obese, reflecting the presence of both undernutrition and overnutrition among adolescents. These findings highlight the need for increased attention to adolescent nutrition, especially during and after the COVID-19 pandemic, which disrupted regular routines and contributed to unhealthy eating behaviors. It is recommended that schools, parents, and health professionals collaborate to improve adolescents' dietary patterns through comprehensive nutrition education, regular monitoring of nutritional status, and the promotion of balanced meals, particularly by increasing the intake of fruits, vegetables, and protein-rich foods.

BIBLIOGRAPHY

1. Doloksaribu LG. Gambaran Pola Makan dan Status Gizi Remaja di SMP Advent Lubuk Pakam. Wahana Inov. 2019;8(2):18–23.

2. Badan Penelitian Dan Pengembangan Kesehatan Republik Indonesia. Laporan Riskesdas 2018 Nasional. Lembaga Penerbit Balitbangkes. 2018. p. hal 156.

3. Zhou S, Zhao H, Xiao Y, Li J, Huang Q, Zhang Y, et al. Association of Breakfast Food Types with Dietary Knowledge, Attitudes, and Practices Among School-Aged Children. Nutrients [Internet]. 2025 Jul 24;17(15):2424. Available from: https://www.mdpi.com/2072-6643/17/15/2424

4. Anggraini. Hubungan Depresi dengan Status Gizi. Medula Unila. 2014;2(2):39–46.

5. Fayasari A, Lestari PW. Stres dan depresi berkaitan dengan emotional eating dan mindful eating pada mahasiswa saat pandemi Covid-19. AcTion Aceh Nutr J. 2022;7(2):127.

6. Qalbya YA, Saleky YW, Isdiany N, Mulyo GP. Hubungan Tingkat Stres Dan Eating Disorder Dengan Status Gizi. J Gizi dan Diet. 2022;1(1):1–10.

7. O'Sullivan TA, Robinson M, Kendall GE, Miller M, Jacoby P, Silburn SR, et al. A good-quality breakfast is associated with better mental health in adolescence. Public Health Nutr. 2009;12(2):249–58.

8. Eftekhari MH, Mozaffari-Khosravi H, Shidfar F. The relationship between BMI and iron status in iron-deficient adolescent Iranian girls. Public Health Nutr. 2009;12(12):2377–81.

9. Conrad A, Burns J, Sherburne L, Kaled MD, Souley H, Nielsen J. Understanding behavioural drivers of iron and folic acid supplementation and vitamin A- and iron-rich food consumption among women and adolescent girls in Niger. Public Health Nutr. 2024;27.

10. Hawkins L, Farrow C, Thomas JM. Does Exposure to Socially Endorsed Food Images on Social Media Influence Food Intake? Appetite [Internet]. 2021 Oct;165:105424. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0195666321003317

11. Kucharczuk AJ, Oliver TL, Dowdell EB. Social Media's Influence on Adolescents' Food Choices: A Mixed Studies Systematic Literature Review. Appetite [Internet]. 2022 Jan;168:105765. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0195666321006723

12. Pratiwi ZA. Bulletin of Culinary Art and Hospitality Snack Calorie Intake , Breakfast Frequency , and Nutritional Status in Adolescence Snack Calorie Intake , Breakfast Frequency , and Nutritional Status in Adolescence. 2023;3(1).

13. Úbeda N, González MP, Achón M, García-González Á, Ballestero-Fernández C, Fajardo V, et al. Nutritional Composition of Breakfast in Children and Adolescents with and without Celiac Disease in Spain—Role of Gluten-Free Commercial Products. Nutrients. 2023;15(10).

14. Fischer JAJ, Thomas J, van Zutphen-Küffer KG, Ierodiakonou D, Kraemer K, Garcia-Larsen V. PROTOCOL: Breakfast consumption, anthropometry, and nutrition-related outcomes in adolescents from low- and middle-income countries: Protocol for a systematic review and meta-analysis. Campbell Syst Rev. 2024;20(2).

15. Oddo VM, Roshita A, Khan MT, Ariawan I, Wiradnyani LAA, Chakrabarti S, et al. Evidence-Based Nutrition Interventions Improved Adolescents' Knowledge and Behaviors in Indonesia.

Nutrients [Internet]. 2022 Apr 21;14(9):1717. Available from: https://www.mdpi.com/2072-6643/14/9/1717

16. Dewi NU, Khomsan A, Dwiriani CM, Riyadi H, Ekayanti I, Hartini DA, et al. Factors Associated with Diet Quality among Adolescents in a Post-Disaster Area: A Cross-Sectional Study in Indonesia. Nutrients [Internet]. 2023 Feb 22;15(5):1101. Available from: https://www.mdpi.com/2072-6643/15/5/1101

17. Sparrow R, Agustina R, Bras H, Sheila G, Rieger M, Yumna A, et al. Adolescent Nutrition—Developing a Research Agenda for the Second Window of Opportunity in Indonesia. Food Nutr Bull [Internet]. 2021 Jun 20;42(1_suppl):S9–20. Available from: https://journals.sagepub.com/doi/10.1177/0379572120983668

18. Sari M, Merita M, Wulansari A, Faridah F, Prabowo DH. The Nutritional Problems of Adolescents among the Traditional Community of Suku Anak Dalam in the Working Area of Pematang Kabau Health Center, Sarolangun. Open Access Maced J Med Sci [Internet]. 2022 Jan 3;10(T8):74–80. Available from: http://oamjms.eu/index.php/mjms/article/view/9485

19. Benavides C, Benítez-Andrades JA, Marqués-Sánchez P, Arias N. E-Health Intervention to Improve Health Habits in the Adolescent Population: Mixed Methods Study. JMIR mHealth uHealth. 2021;9(2).

20. Widya Azhari S, Tande R, Azmi Zaqia Zulfani Z, Ramadani E, Rahmah Dinitya K, Fauziah Toruntju A, et al. Impact of Nutrition Education on Nutrition Knowledge, Attitudes, and Practices among Adolescent Girls in Bogor, Indonesia. Khomsan A, Palupi E, Loh SP, Mohd Esa N, editors. BIO Web Conf [Internet]. 2025 Jan 28;153:02008. Available from: https://www.bio-conferences.org/10.1051/bioconf/202515302008

21. Novianti S, Lina N, Gustaman RA, Hanifah AS. Risk Factors of Obesity in Adolescence : A Case Control Study. Int J Heal Sci Med Res. 2025;4(1):15–25.

22. Wangsa A, Wiradnyani LA, Deandra FI, Widyahening IS. Exploring Socioenvironmental Influences on Adolescent Girls Eating Attitudes in Jakarta. World Nutr J [Internet]. 2024 Oct 18;8(S1):36. Available from: https://worldnutrijournal.org/OJS/index.php/WNJ/article/view/WNJ.V08.S1.0035

23. Hidayanti L, Rahfiludin MZ, Nugraheni SA, Murwani R. Association of Malnutrition and Main-Meal- and Snack-Predominant Intake among Female Adolescent Students in Boarding Schools in Tasikmalaya, Indonesia. Nutr Health [Internet]. 2025 Jan 27;31(1):235–46. Available from: https://journals.sagepub.com/doi/10.1177/02601060231166224

24. Rizki G, Maigoda TC, Okfrianti Y, Witradharma TW, Sari AP, Hari Hariadi. Eating Habits, Lifestyle and Friends Associated with the Incidence of Adolescent Overnutrition at Bengkulu. Open Glob Sci J [Internet]. 2024 Aug 13;3(1):38–47. Available from: https://openglobalsci.com/index.php/OGSJ/article/view/28

25. Sriwiyanti, Hartati S, Aflika F D, Muzakar. Effectiveness of Nutritional Education on Knowledge and Adolescent Attitudes About Stunting in High School. J Appl Nurs Heal [Internet]. 2022 Jun 30;4(1):16–22. Available from: https://janh.candle.or.id/index.php/janh/article/view/30

26. Ernawati F, Efriwati, Nurjanah N, Aji GK, Hapsari Tjandrarini D, Widodo Y, et al. Micronutrients and Nutrition Status of School-Aged Children in Indonesia. Valdés-Ramos R, editor. J Nutr Metab [Internet]. 2023 Sep 5;2023:1–9. Available from: https://www.hindawi.com/journals/jnme/2023/4610038/