July – September, 2025
Original Article
DOI: http://dx.doi.org/10.30867/action.v10i3.2393

AcTion: Aceh Nutrition Journal
Pages: 544 – 554 | p-issn 2527-3310; e-issn 2548-5741

The relationship between sedentary behavior and eating patterns with nutritional status of Makassar Adolescents

Hubungan perilaku sedentari dan pola makan dengan status gizi remaja di Makassar

Herani Khaerunnisa[1], Andi Irhamnia Sakinah[2*], Iip Larasati[3], Risma Irnawati[4], Arifuddin Ahmad[5]

[1] Bachelor of Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Sulawesi Selatan, Indonesia.
E-mail: heranikhrnnisa01@gmail.com
[2] Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Sulawesi Selatan, Indonesia.
E-mail: andi.irhamnia.sakinah@uin-alauddin.ac.id
[3] Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Sulawesi Selatan, Indonesia.
E-mail: ipheanca@gmail.com
[4] Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Sulawesi Selatan, Indonesia. E-mail: rinaayoeb.ri@gmail.com
[5] Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Sulawesi Selatan, Indonesia.
E-mail: arifuddin.ahmad@uin-alauddin.ac.id

***Correspondence Author:**
Medical Education Study Program, Faculty of Medicine and Health Sciences, State Islamic University Alauddin Makassar, Jl. Sultan Alauddin No.63, Mangasa, Kec. Tamalate, Kota Makassar, Sulawesi Selatan 90221, Indonesia.
E-mail: andi.irhamnia.sakinah@uin-alauddin.ac.id

Article History:
Received: January 27, 2025; Revised: March 03, 2025; Accepted: May 03, 2025; Published: September 08, 2025.

Publisher:
Politeknik Kesehatan Aceh
Kementerian Kesehatan RI

Abstract

Modern lifestyles that lead to sedentary behavior and unbalanced diets are major health concerns for adolescents. Sedentary behavior and unbalanced diets have a negative impact on nutritional status. This study aimed to identify the relationship between sedentary behavior, diet, and nutritional status in adolescents in Makassar City. This observational, analytical, quantitative, cross-sectional study was conducted on adolescents aged 14-15 years from five schools in Makassar from October to December 2024. A total of 286 respondents were selected using a Proportionate Stratified Random Sampling technique. Data were collected through questionnaires, interviews, and anthropometric measurements and then analyzed using the chi-square test. The results showed a significant relationship between sedentary behavior (p = 0,001) and diet (p = 0,031) with nutritional status. The majority had moderate sedentary behavior, poor diet, and good nutritional status. The study concluded that adolescents have diverse nutritional needs based on both direct and indirect factors.

Keywords: Sedentary behavior, eating patterns, nutritional status, adolescents

Abstrak

Gaya hidup modern yang mengarah pada perilaku sedentari dan pola makan yang tidak seimbang menjadi perhatian utama dalam masalah kesehatan remaja. Perilaku sedentari dan pola makan tidak seimbang, diketahui memiliki dampak negatif terhadap status gizi. Penelitian bertujuan untuk mengidentifikasi hubungan perilaku sedentari, pola makan, dan status gizi pada remaja di Kota Makassar. Penelitian kuantitatif analitik observasional dengan cross-ssectional dilakukan pada remaja usia 14-15 tahun dari lima sekolah di Makassar pada Oktober sampai Desember 2024. Sebanyak 286 responden diperoleh dengan teknik Proportionate Stratified Random Sampling. Data dikumpulkan melalui kuesioner, wawancara, dan pengukuran antropometri kemudian dianalisis menggunakan uji chi-square. Hasil penelitian menunjukkan hubungan yang signifikan antara perilaku sedentari (p 0,001) dan pola makan (p 0,031) dengan status gizi. Adapun mayoritas dengan perilaku sedentari sedang, pola makan kurang, dan status gizi baik. Kesimpulan bahwa remaja memiliki kebutuhan zat gizi yang beragam yang didasarkan oleh faktor langsung maupun tidak langsung.

Kata Kunci: Perilaku sedentari, pola makan, status gizi, remaja

Introduction

Adolescents undergo a complex transition toward adulthood. The World Health Organization (2018) mentions adolescents as individuals aged 10–19 years, whereas Kemenkes (2014) set the age range from 10 to 18 years. The age difference between

adolescents was within the upper age limit. Based on data from the Central Statistics Agency in 2021, the number of teenagers aged 10-14 years was 22,115,9 people, aged 15-19 years was 22,200,3 people, aged 20-24 years was 22,577,3 people (Badan Pusat Statistik Indonesia, 2020).

In recent decades, we have observed an alarming and consistent increase in overweight and obesity across all age groups, including adolescents (UNICEF, 2020). Adolescence is the transitional period between childhood and adulthood. During this period, adolescents experience many changes, including biological, physical, emotional, social, and cognitive aspects. These diverse changes will impact the nutritional needs of adolescents (Rahayu et al., 2023). Therefore, maintaining nutritional health during this crucial period is important for prioritization.

Sedentary behavior is referred to as a sedentary lifestyle. It is becoming increasingly common for children to engage in this condition, particularly through the use of electronic devices such as mobile phones, televisions, laptops, and video games in their personal spaces. In research conducted by Pengpid and Peltzer (2019) in Indonesia, recent findings showed that 27,3% of teenagers engage in sedentary activities. The Riskesdas report highlights a worrying trend, noting an increase in sedentary behavior from 26,1% in 2013 to 33,5% in 2018. Among the provinces, South Sulawesi stands out for having a highly inactive population, with 31% of individuals aged ≥ 10 years showing low levels of physical activity, exceeding the national average of 26,1%. In addition, the majority of this age group (36,2 %) participated in sedentary behavior for 3–5,9 hours every day (Kementerian Kesehatan Republik Indonesia, 2018).

However, this trend is associated with various health risks for children, raising significant concerns about their overall well-being (Silwanah & Amaliah, 2019). In children and adolescents, high levels of sedentary life have been associated with a variety of negative health consequences, including an increased prevalence of overweight and obesity, decreased cardiometabolic health, lower levels of physical fitness, decreased prosocial behavior, and decreased sleep duration (World Health Organization, 2020).

In 2019 and 2020, Indonesian food consumption surveys revealed a worrying trend, namely a marked decline in daily calorie intake from vegetables and fruits. Riskesdas (2018) showed that 95,5% of the Indonesian population did not meet the recommended intake of vegetables and fruits (Kementerian Pertanian, 2021). Furthermore, a global study involving 153,496 adolescents in 54 countries found that approximately 55,2% of these young individuals consumed fast food at least once a week, with 10,3% enjoying it four–seven days a week (Li et al., 2020). A separate survey conducted among 421 Kuwait students aged 14 to 20 years revealed that 81,4% of students consumed fast food more than twice a week (Shaban & Alkazemi, 2019).

Nutritional status is a determinant of health that reflects the condition of an individual or population as a result of the intake, absorption, and utilization of food nutrients (Rokhmah et al., 2022). Nutritional status is greatly influenced by sedentary behavior, accounting for 36,4% of the variation (Hartanti et al., 2020). In addition, the consumption of processed foods is thought to increase the risk of being overweight by up to 39% (Pagliai et al., 2021). The prevalence of nutritional problems in adolescents in Indonesia is a serious concern. According to Riskesdas (2018), the rate of overweight and obesity was 16.0% in the 13-15 year age group and 13,5% in the 16-18 year age group. In South Sulawesi Province, approximately 6,3% of adolescents aged 13-15 years are classified as overweight or obese, with 2,6% living in Makassar City (Kementerian Kesehatan Republik Indonesia, 2018). Rizona et al. (2020) identified several factors that directly cause obesity, including consumption of high-calorie and low-nutrient foods, lack of physical activity, and the prevalence of sedentary behavior, such as long-term smartphone use.

Obesity is a complex condition characterized by excess body weight, mainly due to fat accumulation, which can have a significant impact on health. In adolescents, obesity assessment is often performed using Body Mass Index (BMI), which helps to measure nutritional status. Specifically, adolescents are classified as obese if their BMI Z-score exceeds +2 for their age group (Rahayu et al., 2023).

The World Obesity Federation (WOF) in 2019 showed that by 2025, there could be approximately 206 million people aged 5 to 19 years who are obese, with this number potentially increasing to 254 million by 2030. By 2030, the most affected countries are expected to be China, India, the United States, Indonesia, and Brazil (Lobstein & Brinsden, 2019). The

prevalence of obesity among adolescents in Indonesia increased from 4,9% in 2000 to 5,6% in 2017, reflecting an increase of 0,7% (UNICEF, 2020).

Adolescents with sedentary behavior and poor eating behavior can have significant long-term consequences in old age. These obesity risk factors can make individuals susceptible to various degenerative diseases, including type 2 diabetes, hypertension, and heart disease. Additionally, they may experience reproductive problems such as irregular menstrual cycles and polycystic ovary syndrome (PCOS). In addition to physical health, there is also the potential for skin conditions, such as acne, as well as psychological challenges, including depression, eating disorders, sleep disturbances, and reduced self-esteem. It is important to recognize the interrelationship between these factors and the importance of fostering a healthier lifestyle during adolescence to reduce these risks (Rahayu et al., 2023).

Based on the above description, obesity has become a global pandemic throughout the world. The obesity rate among some adolescents in Indonesia remains high, and there is still a lack of research conducted in Makassar City, especially among junior high school adolescents.

Methods

Observational analytical research, using a cross-sectional approach, was conducted from October to December 2024. The population of this study was all students of SMP Negeri 4 Makassar, SMP Negeri 11 Makassar, SMP Negeri 21 Makassar, SMP Negeri 24 Makassar, and SMP 23 Makassar in grade IX totaling 1.100 people. Five schools were selected based on the Makassar zoning division, representing each region. The sample in this study was a group of adolescents who met the inclusion and exclusion criteria. The inclusion criteria were students aged 14-15 years, with good physical and mental health, present at the location when data collection was carried out, and willing to participate in the research until completion, while the exclusion criteria were those who were currently taking weight gain or slimming drugs, or both parents or one of them being obese as measured using a silhouette scale (Pulvers et al., 2004). The sample size was calculated using the Isaac and Michael tables, so that the number of samples was 286, with a sampling error of 5%. The sampling technique used the Proportionate Stratified Random Sampling method, with the following formula:

$$Mi=Ni/(N \times M)$$

Information:
Mi : Number of samples by strata
M : Number of samples (286)
Ni : Population size by strata
N : Total population (1.100)

Determination of respondents' nutritional status based on Ministry of Health Regulation Number 2 of 2020 concerning children's Anthropometric Standards with body mass index/age (BMI/U) parameters. Undernutrition, good nutrition, overnutrition, and obesity were classified according to BMI/U standards. The BMI/A index shows higher sensitivity in identifying overweight or obese children (Kementerian Kesehatan RI, 2020). The International Physical Activity Questionnaire (IPAQ) consists of seven questions covering vigorous, moderate, and light activity. The overall activity was measured in metabolic equivalent minutes (METs) per week. >3000 MET minutes/week = low sedentary behavior, >600-3000 MET minutes/week = moderate sedentary behavior, and 600 MET minutes/week = high sedentary behavior. Janatin Hastuti tested the Indonesian version of the IPAQ, titled "Anthropometry and Body Composition of Indonesian Adults: An Evaluation of Body Image, Eating Behaviors, and Physical Activity"(Hastuti, 2013). A semi-quantitative food frequency questionnaire (SQ FFQ) was used to measure the amount of food and drink consumed by respondents. Analysis of the SQ-FFQ measurements included aggregating food consumption scores from all respondents and utilizing the total consumption column score for each reported food item. The interpretation of this score depended on the average value obtained from the food consumption score. Diet is considered good if an individual's score meets or exceeds the average total score. Conversely, if it was less than the average, it was included in the poor category. The validity of the SQ-FFQ was tested by Makuituin et al. with a study entitled "Validation Study of the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) with 24-hour Food Recall on

Macronutrient Intake of Adolescents at SMA Islam Athira Makassar" (Makuituin et al., 2013). Data were collected using questionnaires, interviews, and anthropometric measurements of body weight and height. During research activities, data from respondents will be kept confidential and used only for research purposes.

Data analysis was performed using the chi-square test to analyze this study. Health Research Ethics Commission at the Faculty of Medicine and Health Sciences, Alauddin State Islamic University, Makassar, no.072/KEPK/FKIK/X/2024.

Result and Discussion

Table 1 describes the sociodemographic characteristics of the respondents, such as age, gender, ethnicity, number of family members, parents' occupation, and parents' education. The average age of the respondents was 14,30±0,46 years. Most respondents showed good nutritional status at 14 (66,2%) and 15 years (75,0%). In terms of sex distribution, the majority of patients showed good nutritional status. The ethnic composition showed that the Makassar group was the most represented (50,7%), with (66,9%) having good nutritional status.

Table 1. Distribution of respondent characteristics

Characteristics	Nutritional Status								Total		p value
	Malnutrition		Good nutrition		Overweight		Obesity				
	n	%	n	%	n	%	n	%	n	%	
Age											0,012
14 years	6	2,9	139	66,2	26	12,3	39	18,5	210	70,5	
15 years	7	8,0	66	75,0	8	9,0	7	7,9	88	29,5	
Gender											0,002
Male	12	8,6	96	68,6	16	11,4	16	11,4	140	47,0	
Female	1	0,6	109	69,0	18	11,3	30	18,9	158	53,0	
Ethnic											0,742
Makassar	11	7,3	101	66,9	17	11,2	22	14,5	151	50,7	
Bugis	2	1,7	80	69,6	13	11,3	20	17,3	115	38,6	
Toraja	0	0	12	75,0	1	6,2	3	18,7	16	0,3	
Mbojo	0	0	1	100	0	0	0	0	1	0,3	
Caniago	0	0	1	100	3	300	0	0	1	0,3	
Jawa	0	0	9	69,2	4	30,7	1	7,6	13	4,4	
Kajang	0	0	1	100	0	0	0	0	1	0,3	
Family members											0,667
2 persons	0	0	2	50,0	1	25,0	1	25,0	4	1,3	
3-5 persons	8	4,0	136	68,3	22	11,0	33	16,5	199	66,8	
>5 persons	5	5,3	67	70,5	11	11,5	12	12,6	95	31,9	
Parent education											0,648
Elementary school	0	0	10	76,9	2	15,3	1	7,6	13	4,4	
Junior high school	0	0	10	76,9	1	7,6	2	15,3	13	4,4	
Senior high school	9	4,4	144	71,0	24	11,8	26	12,8	203	68,1	
Diploma/Bachelor	4	6,8	36	61,0	3	5,0	16	27,1	59	19,8	
Master degree	0	0	5	50,0	4	40,0	1	10,0	10	3,3	
Parent occupation											0,682
Civil servant	0	0	16	59,3	2	7,4	9	33,3	27	9,1	
Self employed	3	5,8	36	69,2	5	9,6	8	13,3	52	17,4	
Enterpreneurs	1	1,9	35	67,3	12	23,0	4	7,6	52	17,4	
Indonesian national military/Police	1	7,7	10	76,9	2	15,3	0	0	13	4,4	
Housewife/Out of office	0	0	1	100	0	0	0	0	1	0,3	
Another	8	5,2	107	69,9	13	8,4	25	16,3	153	51,4	

Analysis of the number of family members showed that most respondents came from families with groups of 3-5 members (66,8%), with (68,3%) having good nutritional status. Parental occupation data shows that the majority (51,3%) fall into the "other" category, which includes occupations such as daily laborers, drivers, craftsmen, and delivery workers, and this category also shows good nutritional status (69,9%). Regarding parental education, the majority (68,1%) had parents with education up to the high school/vocational school level and showed good nutritional status (71,0%). From this comprehensive analysis, it can be concluded that most respondents maintained a good nutritional status.

Setiyo (2020) found that younger individuals, especially those under 14 years of age, have a higher risk of obesity. This vulnerability may be related to a lack of concern regarding body image in this age group. Conversely, individuals become more concerned with their physical appearance as they age, particularly to attract potential romantic partners. A study revealed that students aged 13 years and above were 1,5 times more likely to engage in sedentary activities for more than six hours each day than their younger peers, putting them at risk of overnutrition and obesity (Nafi'ah, 2022).

Women have a higher risk of obesity, a phenomenon influenced mainly by sex differences in body composition based on gender. Body fat percentage tends to be higher in women, primarily because of hormonal variations and their biological predisposition to motherhood (Gifari et al., 2020). Additionally, women generally exhibit slower metabolic rates than men, with their basal metabolic rate approximately 10% lower than that of men (Lubis et al., 2020). Another study showed that adolescent girls in Arab countries were more likely to engage in sedentary activities than adolescent boys, with a participation rate of 53,4% for girls compared to 46,6% for boys. This trend may be linked to cultural norms that often discourage women from participating in physical activity, putting them at risk of overnutrition and obesity (Nafi'ah 2022).

A culture's tendency toward certain dietary practices is primarily influenced by its natural resources and prevailing agricultural conditions. For example, the staple foods of the Javanese people are very different from those of the Timorese people, highlighting the need for each ethnic group to cultivate its own unique staple foods (Banudi & Imanuddin, 2017).

The findings of this study revealed that most respondents lived in households with three to five people. The total number of family members living on one roof significantly affected household food needs. The increase in the number of family members is directly proportional to the greater demand for staple foods. By contrast, smaller households face less demand, allowing them to allocate financial resources to procuring higher-quality food. As a result, a larger family size results in a greater burden on the family, as they struggle to meet their daily needs (Budiana & Supriadi, 2021).

According to Galgamuwa et al. (2017), research focusing on school-age children showed a correlation between family income, maternal education, and nutritional status. Health services and healthy food are more accessible to households with higher income. Higher education increases knowledge and environmental development, and positively affects children's health. Educated mothers are better prepared to inform their children about the nutritional benefits of food and understand their physical and cognitive development. However, this differs from research conducted by Jum et al (2022), which found that there is no relationship between children's nutritional status and maternal education.

Table 2. Sedentary behavior, eating patterns, and nutritional status of respondents

Category	n	%	MET	IMT
Sedentary behavior				
Low	38	12,8	74,848	786,6
Moderate	200	67,1	393,940	4,140
High	60	20,1	118,182	1,242
Eating patterns				
Good	127	42,6	250,151	2,629
Poor	171	57,4	336,699	3,539
Nutritional status				
Malnutrition	13	4,4	25,597	269
Good nutritional	205	68,8	403,645	4,243
Overweight	34	11,4	66,946	703,8
Obesity	46	15,4	90,574	952,2

Based on Table 2, most respondents have moderate physical activity (67,1%), with an average metabolic equivalent (MET) of respondents of 1969,75±1077,23 MET minutes/week. As for the eating pattern category, most of them had a poor eating pattern (57,4%), with an average eating pattern score of 106,24±23,34. In the nutritional status category, the majority had good nutritional status (68,8%). The mean body mass index (BMI) is 20,755±4,036.

In this study, it was observed that the majority of respondents engaged in moderate levels of physical activity, with a large number exhibiting low levels of physical activity, which is generally referred to as sedentary behavior. This inactive state causes excess unused energy, which inhibits the efficiency of metabolic processes and results in the accumulation of energy reserves. Consequently, this condition can lead to the formation of adipose tissue and uncontrolled weight gain (Rizona et al., 2020).

The study findings revealed that the respondents engaged in various sedentary activities throughout the day, particularly smartphone use. Furthermore, even with relatively short distances to school, many children choose motorized transportation, either driven by their parents or online motorbike services, rather than walking.

Regarding eating habits, most respondents showed less-than-optimal eating patterns. Today's teenagers often prefer fast food, ignoring the importance of a balanced diet that includes essential nutrients. A study conducted by Najdah et al. (2024) showed that adolescents with poor eating habits showed significantly higher levels of overnutrition and obesity than adolescents with healthy eating patterns.

Analysis of the nutritional status data showed that most respondents were in the good nutrition category. Research conducted by Siswanto and Lestari (2021) showed that optimal or adequate nutritional status was the most significant outcome of the study, whereas other participants faced nutritional challenges, particularly overweight and obesity. These disparities may be attributed to variations in eating habits, physical activity levels, and the physiological demands associated with growth and development. Each adolescent has unique nutritional needs that are influenced by gender, age, and other characteristics. As a result, adolescents have diverse nutritional needs.

Table 3. The relationship between sedentary behavior and eating patterns with nutritional status of Makassar Adolescents

Category	Nutrition Status				Total	p Value
	Malnutrition	Normal	Overweight	Obesity		
	n (%)	n (%)	n (%)	n (%)	n (%)	
Sedentary behavior						
Low	1 (2,6)	35 (92,1)	0 (0)	2 (5,3)	38 (100)	0,001*
Moderate	9 (4,5)	139 (69,5)	21 (10,5)	30 (15,5)	200 (100)	
High	3 (5)	31 (51,6)	13 (21,7)	13 (21,7)	60 (100)	
Eating Patterns						
Good	6 (4,7)	97 (76,4)	13 (10,2)	11 (8,7)	127 (100)	0,031*
Poor	7 (4,1)	108 (63,1)	21 (12,3)	35 (20,5)	171 (100)	

**Fisher's Exact Test*

Table 3 presents the results of the cross-tabulation and chi-square tests examining the relationship between sedentary behavior, eating patterns, and nutritional status in adolescents in Makassar City. The data showed that most respondents (92,1%) showed good nutritional status among those involved in high physical activity, while a smaller segment (5,3%) was classified as obese. In the moderate physical activity category, a significant proportion of the respondents also fell into the well-nourished classification (69,5%), with (15,5%) identified as obese. In contrast, the low physical activity group (51,6%) was categorized as having good nutrition, along with (21,7%) being classified as overweight, and (21,7%) identified as obese. Statistical analysis using the chi-square test produced a p-value of 0,001 (as determined by Fisher's Exact Test), which is lower than the significance level of α=0,05 ($p<0,05$), leading to the rejection of the null hypothesis. These findings strengthen the significant association between sedentary activity and nutritional status.

Among the 127 respondents who followed a healthy diet, the majority (76,4%) showed

good nutritional status. In contrast, respondents classified as obese represented 8,7% of this group. Those identified with poor eating habits (63,1%) also maintained a good nutritional status, while (20,5%) were categorized as obese. Statistical analysis conducted using the Chi-square test produced a p-value of 0,031, which was obtained from the Pearson Chi-Square test, which was below the significance threshold of α = 0,05 (p <0,05). These results lead to the rejection of the null hypothesis, which shows a statistically significant relationship between diet and nutritional status. .

This study, in line with Pribadi and Nurhayati (2018), showed a significant correlation between sedentary behavior and the nutritional status of adolescents. Furthermore, this is in line with the findings of Rahma and Wirjatmadi (2020); adolescents who are categorized as having low levels of physical activity are 0,218 times more likely to have a higher nutritional status. The results of this study are also in line with Dewita (2021), who showed a correlation between eating habits and nutritional status, indicating that diet quality plays an important and direct role in the prevalence of obesity among adolescents. Food choices are critical behavioral factors that can have a significant impact on a person's nutritional well-being. The quality and quantity of food and beverages consumed directly influence nutrient intake, thus shaping a person's overall health (Kemenkes, 2014).

Based on research conducted by Hamalding Risna Rahma Sri Susanti (2019), inadequate physical activity among overweight and obese adolescents is closely associated with a sedentary lifestyle. These individuals tend to engage in more passive activities such as watching television, using electronic devices, playing video games, and relaxing while listening to music.

According to research, Sumilat and Fayasari (2020) show that sedentary behavior is mostly characterized by activities carried out in front of a screen while sitting. This shift occurred because traditional reading activities have largely been replaced by screen-oriented technology, especially laptops and other electronic devices. In this study, one of the sedentary behaviors that respondents often used was using smartphones. The development of technological science has led to an increase in sedentary behavior. Every teenager followed this progress, such as playing with smartphones or laptops to do schoolwork or having fun.

Meanwhile, Kamaruddin et al. (2021) showed no significant relationship between sedentary behavior and nutritional status in adolescents at SMP Negeri 4, Samarinda City. The results of this study showed that increased sedentary behavior, characterized by limited physical movement, did not significantly impact body weight in this demographic group. This conclusion aligns with the research conducted by Ubaidilah and Nurhayati (2019), who also found no substantial correlation between sedentary behavior and nutritional status. Sherina Dika Aprillia et al. (2024) found no significant relationship between physical activity and nutritional status in children.

For those aged 5–17 years, moderate to vigorous physical activity is recommended, with a cumulative total of at least 60 minutes every day at least three times a week, both during and outside school hours. The recommended activities include cycling, swimming, and jogging. (Gondhowiardjo SA et al., 2019).

The study results show that teenagers generally prefer snacks, such as fried foods, meatballs, fried chicken, ice cream, candy, chocolate, and instant noodles, as the results show that the respondents' eating patterns are classified as lacking. In addition, the drinks that respondents frequently consumed included sweet, carbonated, caffeinated, and other drinks. Furthermore, a study showed that teenagers with higher nutritional status, such as fried foods such as *bakwan*. This eating pattern increases the risk of overnutrition among teenagers (Amrynia and Prameswari 2022).

Peer influence and the large number of food advertisements in print and digital media greatly influence adolescent dietary behavior related to fast-food consumption. Many teenagers believe that enjoying fast-food increases their social status and prestige. However, fast foods often fail to provide the satiety and essential nutrients necessary for healthy adolescent development, potentially leading to overnutrition and various related health problems (Pamelia 2018).

Fast food has gained wide popularity among individuals from various demographic groups, including children, teenagers, adults, and the elderly. This trend can be attributed to technological advancements and the shifting of social norms. The rise of fast-food restaurants in urban centers and even rural areas has

influenced changes in eating habits. Today's teenagers often prefer fast food to healthier options (Rahmalia & Karjoso, 2023).

Irregular fluctuations in fast-food consumption among adolescents may lead to increased calorie intake, which is not adequately offset by energy expenditure. Being overweight or obese can interfere with adolescents' physical abilities, thus inhibiting their ability to exercise and perform daily activities. Furthermore, obesity can have a negative impact on body image, resulting in reduced self-esteem due to perceived physical imbalance. Consequently, adopting a balanced diet and minimizing the frequency of fast-food consumption have emerged as important strategies to prevent obesity in this demographic group (Rahmalia & Karjoso, 2023). In contrast, another study found no correlation between eating habits and nutritional status of female adolescents at SMAN 1 Batui Selatan. In particular, many of these adolescents maintained a normal nutritional status despite consuming only two meals per day. It is important to note that eating habits can vary significantly among individuals (Alwi et al. 2024).

Conclusion

The study shows that there is a relationship between sedentary behavior and eating patterns and nutritional status in junior high school adolescents aged 14-15 years in Makassar City, with the majority of students aged 14-15 years showing moderate sedentary behavior with a picture of good nutritional status followed by low sedentary behavior with a picture of good nutritional status. In terms of eating patterns, most adolescents showed poor eating patterns but had good nutritional status, whereas, in terms of nutritional status, the majority had good nutritional status. Several factors, such as gender, age, and other respondent characteristics, influenced the variables in this study. As a result, it can be concluded that adolescents' nutritional needs are diverse and affect their nutritional status.

It is recommended that teenagers engage in physical activity for at least 60 min every day, at least three times a week, both during and outside school hours. Through schools, the Makassar Education Office is expected to creatively involve students in various sports activities, such as physical education and health learning, extracurricular sports activities, and providing and completing sports facilities and infrastructure.

Acknowledgment

The researchers would like to thank all parties involved and who contributed to this research.

References

Alwi, J., Fandir, A., Anwar, R., & Dahlia, B. (2024). *Hubungan Suku dan Kebiasaan Makan dengan Status Gizi pada Remaja Putri*. https://journal-mandiracendikia.com/jikmc

Amrynia, S. U., & Prameswari, G. N. (2022). Hubungan Pola Makan, Sedentary Lifestyle, dan Durasi Tidur dengan Kejadian Gizi Lebih Pada Remaja (Studi Kasus di SMA Negeri 1 Demak). *Indonesian Journal of Public Health and Nutrition*, *2*(1), 112–121. https://doi.org/10.15294/ijphn.v2i1.52044

Andriyani, A. (2019). Kajian Literatur pada Makanan dalam Perspektif Islam dan Kesehatan. *Jurnal Kedokteran Dan Kesehatan*, *15*(2), 178. https://doi.org/10.24853/jkk.15.2.178-198

Badan Pusat Statistik Indonesia. (2020). Jumlah Penduduk Menurut Kelompok Umur dan Jenis Kelamin. In *Https://Www.Bps.Go.Id* (p. 1). https://pasuruankota.bps.go.id/statictable/2018/05/03/2119/jumlah-penduduk-menurut-kelompok-umur-dan-jenis-kelamin-di-kecamatan-purworejo-2016

Banudi, L., & Imanuddin. (2017). *Sosiologi dan Antropologi Gizi*.

Budiana, T. A., & Supriadi, D. (2021). Hubungan Banyaknya Anggota Keluarga, Pendidikan Orangtua dan Kepesertaan Jaminan Kesehatan Anak dengan Kejadian Berat Badan Kurang pada Balita 24-59 bulan di Puskesmas Cimahi Selatan. *Jurnal Ilmu Kesehatan Bhakti Husada: Health Sciences Journal*, *12*(1), 38–50. https://doi.org/10.34305/jikbh.v12i1.256

Dewita, E. (2021). *Hubungan Pola Makan dengan Kejadian Obesitas pada Remaja di SMA*

Negeri 2 Tambang. *2*(1). https://doi.org/10.31004/jkt.v2i1.1554

Galgamuwa, L. S., Iddawela, D., Dharmaratne, S. D., & Galgamuwa, G. L. S. (2017). Nutritional Status and Correlated Socio-Economic Factors Among Preschool and School Children in Plantation Communities, Sri Lanka. *BMC Public Health*, *17*(1). https://doi.org/10.1186/s12889-017-4311-y

Gifari, N., Nuzrina, R., Ronitawati, P., Sitoayu, L., & Kuswari, M. (2020). Edukasi Gizi Seimbang dan Aktivitas Fisik dalam Upaya Pencegahan Obesitas Remaja. *JMM (Jurnal Masyarakat Mandiri)*, *4*(1), 55. https://doi.org/10.31764/jmm.v4i1.1749

Gondhowiardjo SA, Arianie CP, & Taher A. (2019). Pedoman Strategi Langkah Aksi Peningkatan Aktivitas Fisik. *Komite Penanggulangan Kanker Nasional*.

Hamalding Risna Rahma Sri Susanti, H. (2019). The Association Between Lifestyle With Overweight And Obesity Status Of Female Adolescents In High School No 11 Makassar. In *Jurnal Komunitas Kesehatan Masyarakat* (Vol. 1, Issue 1). http://dx.doi.org/10.36090/jkkm.v1i1.240

Hartanti, D., Rima Mutmainah Mawarni Program Studi Gizi, D., & Psikologi dan Kesehatan, F. (2020). Hubungan Konsumsi Buah dan Sayur serta Aktivitas Sedentari terhadap Kebugaran Jasmani Keolompok Usia Dewasa Muda. In *Sport and Nutrition Journal* (Vol. 2, Issue 1). https://journal.unnes.ac.id/sju/index.php/spnj/

Hastuti, J. (2013). Anthropometry and Body Composition of Indonesian Adults: An Evaluation of Body Image, Eating Behaviours, and Physical Activity. *Queensland University of Technology*.

Jum, J., Henny Fauziah, & Arlina Wiyata Gama. (2022). Hubungan Pemberian Asi Ekslusif Terhadap Status Gizi Bayi 6-12 Bulan Wilayah Kerja Puskesmas Paccerakkang. *Alami Journal (Alauddin Islamic Medical) Journal*, *6*(1), 12–20. https://doi.org/10.24252/alami.v6i1.27053

Kamaruddin, I., Anwar, F., Kustiyah, L., & Riyadi, H. (2021). *Perilaku Makan dan Aktivitas Sedentari pada Remaja Gizi Lebih di SMP Negeri 4 Kota Samarinda: Studi Potong Lintang*. https://doi.org/10.25047/j-kes

Kementerian Kesehatan Republik Indonesia. (2014). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 25 Tahun 2014*. https://peraturan.bpk.go.id/Details/117562/permenkes-no-25-tahun-2014

Kementerian Kesehatan Republik Indonesia. (2018). *Hasil Riset Kesehatan Dasar (Riskesdas) 2018*.

Kementerian Kesehatan RI. (2014). Proses Asuhan Gizi Terstandar (PAGT). *Kementerian Kesehatan Republik Indonesia 2014*. http://repo.upertis.ac.id/1094/1/10 Pedoman Asuhan Gizi Terstandar.pdf

Kementerian Kesehatan RI. (2020). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020*. http://hukor.kemkes.go.id/uploads/produk_hukum/PMK_No__2_Th_2020_ttg_Standar_Antropometri_Anak.pdf

Kementerian Pertanian. (2021). *Buletin Konsumsi Pangan*.

Kusuma Rahayu, H., Nadhea Alriessyane Hindarta, Dhina Puspasari Wijaya, Happy Cahyaningrum, Muhammad Evan Takamitsu Kurniawan, & Tsabita Azza Faiza. (2023). *Gizi dan Kesehatan Remaja*. https://reposister.almaata.ac.id/id/eprint/88/1/Gizi dan Kesehatan Remaja.pdf

Li, L., Sun, N., Zhang, L., Xu, G., Liu, J., Hu, J., Zhang, Z., Lou, J., Deng, H., Shen, Z., & Han, L. (2020). Fast Food Consumption Among Young Adolescents Aged 12–15 Years in 54 Low- and Middle-Income Countries. *Global Health Action*, *13*(1). https://doi.org/10.1080/16549716.2020.1795438

Lobstein, T., & Brinsden, H. (2019). *Atlas Childhood Obesity*. www.worldobesity.org

Lubis MY, Hermawan D, Febriyani U, & Farich A. (2020). Hubungan antara Faktor Keturunan, Jenis Kelamin, dan Tingkat Sosial Ekonomi Orang Tua dengan Kejadian Obesitas pada Mahasiswa di Universitas Malahayati tahun 2020. *J Hum Care*. http://dx.doi.org/10.32883/hcj.v5i4.744

Makuituin, F., Jafar, N., & Nadjamuddin, U. (2013). *Studi Validasi Semi-Quantitatif*

Food Frequency Questionnaire (SQ-FFQ) dengan Food Recall 24 jam pada Asupan Zat Gizi Makro Remaja di SMA Islam Athira Makassar. http://repository.unhas.ac.id:443/id/eprint/9178

Nafi'ah, N. dkk. (2022). Perilaku Sedentari dan Determinannya : Literature Review. *The Indonesian Journal of Health Promotion*, *5*. https://doi.org/10.31934/mppki.v2i3

Najdah, N., Nurbaya, N., & Irwan, Z. (2024). Kebiasaan Makan dan Status Gizi pada Remaja di Mamuju menggunakan Adolescents' Food Habits Checklist. *Jurnal SAGO Gizi Dan Kesehatan*, *5*(2), 540. https://doi.org/10.30867/gikes.v5i2.1678

Pagliai, G., Dinu, M., Madarena, M. P., Bonaccio, M., Iacoviello, L., & Sofi, F. (2021). Consumption of Ultra-Processed Foods and Health Status: A Systematic Review and Meta-Analysis. In *British Journal of Nutrition* (Vol. 125, Issue 3, pp. 308–318). Cambridge University Press. https://doi.org/10.1017/S0007114520002688

Pamelia, I. (2018). Perilaku Konsumsi Makanan Cepat Saji pada Remaja dan Dampaknya bagi Kesehatan. *IKESMA*, *14*(2), 144. https://doi.org/10.19184/ikesma.v14i2.10459

Pengpid, S., & Peltzer, K. (2019). High Sedentary Behaviour and Low Physical Activity are Associated with Anxiety and Depression in Myanmar and Vietnam. *International Journal of Environmental Research and Public Health*, *16*(7). https://doi.org/10.3390/ijerph16071251

Pribadi, P. S. A., & Nurhayati, F. (2018). *Hubungan Antara Aktivitas Sedentari Dengan Status Gizi Siswa Kelas X MAN Kota Mojokerto*. http://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/issue/archive

Pulvers, K. M., Lee, R. E., Kaur, H., Mayo, M. S., Fitzgibbon, M. L., Jeffries, S. K., Butler, J., Hou, Q., & Ahluwalia, J. S. (2004). Development of A Culturally Relevant Body Image Instrument Among Urban African Americans. *Obesity Research*, *12*(10), 1641–1651. https://doi.org/10.1038/oby.2004.204

Rahma, E. N., & Wirjatmadi, B. (2020). *Hubungan antara Aktivitas Fisik dan Aktivitas Sedentari dengan Status Gizi Lebih pada Anak Sekolah Dasar*. https://doi.org/10.2473/amnt.v4i1.2020

Rahmalia, V., & Karjoso, T. K. (2023). Pengaruh Konsumsi Fast Food terhadap Kejadian Obesitas pada Remaja : Literature Review. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, *6*(9), 1753–1759. https://doi.org/10.56338/mppki.v6i9.3665

Ritonga, H. J. (2019). *Manajemen Waktu dalam Islam*.

Rizona, F., Herliawati, H., Latifin, K., Septiawati, D., Astridina, L., Sari, U. M., & Fadhilah, N. F. (2020). Distribusi Karakteristik Faktor Penyebab Obesitas pada Siswa Sekolah Dasar. *Jurnal Keperawatan Sriwijaya*, *7*(1), 54–58. https://doi.org/10.32539/jks.v7i1.12247

Rokhmah, L. N., Ryan Budi Setiawan, Deasy Handayani Purba, Novia Anggraeni, Sari Suhendriani, Ahmad Faridi, Martina Widhi Hapsari, Yohanes Kristianto, Laeli Nur Hasanah, Niken Bayu Argaheni, Anto, Tri Handayani, & Rasmaniar. (2022). Pangan dan Gizi. *Yayasan Kita Menulis*. http://repository.uhamka.ac.id/id/eprint/14471/1/FullBook Pangan dan Gizi .pdf

Setiyo, P. N. (2020). Jenis Kelamin dan Umur Berisiko terhadap Obesitas pada Remaja di Indonesia. *Jurnal Kesehatan Masyarakat*, *7*(2), 110–114. https://ojs.uniska-bjm.ac.id/index.php/ANN/article/view/3581

Shaban, L., & Alkazemi, D. (2019). Trends in Fast-Food Consumption Among Kuwaiti Youth. *International Journal of Preventive Medicine*, *10*(1), 1–7. https://doi.org/10.4103/ijpvm.IJPVM_480_18

Sherina Dika Aprillia, Rosdianah Rahim, Utami Murti Pratiwi, & Abdul Rahman. (2024). Hubungan Aktivitas Fisik dengan Status Gizi Anak Sekolah Dasar pada Masa Pandemi Covid-19 di SD Negeri Maradekayya 2 Kota Makassar. *Alami Journal (Alauddin Islamic Medical) Journal*, *8*(1), 24–30. https://doi.org/10.24252/alami.v8i1.39107

Silwanah, A. S., & Amaliah, A. (2019). *Hubungan Aktivitas Sedentari dengan Kejadian Obesitas pada Anak Usia Sekolah Dasar di*

SD Frater Thamrin Makassar. *9*(2).

Siswanto, Y., & Lestari, I. P. (2021). Gambaran Status Gizi Remaja Siswa Di Kabupaten Semarang. In *Pro Health Jurnal Ilmiah Kesehatan* (Vol. 3, Issue 1). https://doi.org/10.35473/proheallth.v3i1.837

Sumilat, D. D., & Fayasari, A. (2020). *Association of Sedentary Behavior and Overweight in College Students at Nasional University* (Vol. 1, Issue 1). https://doi.org/10.54771/jakagi.v1i1.115

Ubaidilah, M., & Nurhayati, F. (2019). *Hubungan Antara Aktivitas Sedentari Dengan Status Gizi Hubungan Antara Aktivitas Sedentari Dengan Status Gizi Pada Peserta Didik Kelas VII SMPN 1 Semen Kabupaten Kediri*. https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/issue-archive

Unicef. (2020). *Situasi Anak di 2020 Indonesia - Tren, Peluang, dan Tantangan dalam Memenuhi Hak-Hak Anak*.

World Health Organization. (2018). *Guidance on Ethical Considerations in Planning and Reviewing Research Studies on Sexual and Reproductive Health in Adolescents*.

World Health Organization. (2020). *World Health Organization Guidelines on Physical Activity and Sedentary Behavior*. https://www.who.int/publications/i/item/9789240015128