ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Berinan, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 14 No. 1, Februari 2026, Hal. 262-271

RELATIONSHIP OF ULTRA-PROCESSED FOOD CONSUMPTION AND PHYSICAL ACTIVITY WITH OVER-NUTRITION STATUS AMONG STUDENTS AT SMAN 1 JEMBER

Carissa Fawwaz Daniswara [1*], Dini Ririn Andrias [1], Mahmud Aditya Rifqi [1], Intan Ria Nirmala [2]

[1] Department of Nutrition, Faculty of Public Health, Universitas Airlangga
Jl. Ir. Soekarno, Mulyorejo, Kota Surabaya, Jawa Timur 60115, Indonesia
Email: carissa.fawwaz.daniswara-2021@fkm.unair.ac.id
[2] Poltekkes Kemenkes Kendari
Jl. Jend. AH. Nasution No.G-14, Anduonohu, Kec. Kambu, Kota Kendari, Sulawesi Tenggara 93231, Indonesia

Abstract

Over-nutrition among Indonesian adolescents has increased significantly over the past decade. High consumption of ultra-processed foods (UPFs) and low physical activity are the primary contributing risk factors. Adolescents are particularly vulnerable to changes in dietary patterns and lifestyle that may affect long-term health outcomes. This study aimed to analyze the relationship between UPF consumption and physical activity with over-nutrition status among students at SMAN 1 Jember. A cross-sectional design was employed involving 89 students from grades X and XI, selected through purposive sampling. Data were collected using the SQ-FFQ and IPAQ. Nutritional status was determined based on BMI-for-age, following the standards of the Indonesian Ministry of Health. Statistical analysis was conducted using the chi-square test with a significance level of $p<0.05$. The results showed that the majority of respondents were not over-nutrition (76.4%), while 14.6% were classified as over-nutrition. A significant association was found between the frequency of UPF consumption and over-nutrition status ($p=0.001$). However, no significant association was observed between physical activity and over-nutrition status ($p=0.797$). These findings add evidence for further research on high UPF consumption on increased risk of over-nutrition in adolescents. In contrast, physical activity did not show a significant association, possibly due to the presence of other contributing factors.

Keywords: Ultra-Processed Food, Physical Activity, Over-Nutrition, Adolescents

Introduction

Adolescence is a critical transitional phase from childhood to adulthood (Kusdalinah et al., 2022), marked by rapid growth and development that increases nutritional needs. According to the Indonesian Recommended Daily Allowance, AKG 2019, adolescents aged 16–18 years require a relatively high daily energy intake, 2.650 kcal for males and 2.100 kcal for females. Unfortunately, adolescents are particularly vulnerable to nutritional problems due to imbalanced dietary patterns, sedentary lifestyles, and environmental influences. These factors can lead to both undernutrition and over-nutrition, especially when energy intake exceeds expenditure, resulting in a body mass index (BMI) above the normal threshold (BMI-for-age > +1SD).

The rising incidence of overweight and obesity among adolescents is a serious public health issue, as it can have extensive physical and mental health consequences. According to the Indonesian Basic Health Research, *Riskesdas* (2013; 2018) and Indonesian Health Survey, SKI (2023), the

Submitted: July-2025 Received: September-2025 Available Online: February-2026

prevalence of over-nutrition (overweight and obesity) among adolescents aged 16–18 years in Indonesia increased from 7.30% in 2013 to 13.5% in 2018, followed by a slight decline to 12.1% in 2023. In East Java specifically, the prevalence of overweight and obesity also showed a significant increase from 8.2% in 2013 to 16.4% in 2018, followed by a decrease to 14.9% in 2023, a rate higher than the national average. In Jember Regency, available data from 2013 and 2018 similarly indicate a rise in the prevalence of overweight and obesity, from 7.9% to 14.03%. This trend indicates that adolescent over-nutrition in East Java, especially in Jember regency, demands particular attention.

Physical activity plays a vital role in maintaining adolescents' nutritional status. It encompasses all forms of bodily movement that increase energy expenditure (Wicaksono, 2021). However, Indonesian Basic Health Research, *Riskesdas* (2018) reported that 44.99% of Indonesian adolescents aged 15–19 years have low physical activity levels. Research by Hafid & Hanafi (2019) also revealed that 75% of adolescents engage only in light physical activity, which is significantly associated with obesity. Furthermore, sedentary lifestyles, such as rarely walking or cycling to school (UNICEF, 2022), further exacerbate energy imbalance.

In addition to physical inactivity, dietary habits are also major risk factors. Ultra-processed food (UPF) products, such as packaged snacks, instant noodles, sugary beverages, and fast food, are high in calories, sugar, salt, and fat, but low in fiber and essential nutrients (Pagliai et al., 2021; Steele et al., 2016). Excessive consumption of UPFs has been linked to inflammation, metabolic disorders, and obesity (Chen et al., 2020; Hall et al., 2019). A study by Rauber et al. (2022) found that adolescents in the United Kingdom obtained up to 67.8% of their energy intake from UPFs, while in the United States the figure reached 57.9%. Such high UPF consumption may even be addictive and drive overeating behavior.

According to data from SKI and Riskesdas, the prevalence of over-nutrition among adolescents aged 16–18 years in Indonesia continues to increase, including in East Java and Jember Regency. In Sumbersari District, Jember, obesity cases are relatively high and are influenced by UPF consumption and low levels of physical activity. A preliminary study by the researchers at SMAN 1 Jember found that students consume UPFs an average of 1–3 times per week, with easy access to these foods from nearby minimarkets. In addition, tight academic schedules and reliance on private transportation contribute to low physical activity among students. These conditions formed the basis for conducting this study on the relationship between UPF consumption and physical activity with over-nutrition status among students at SMAN 1 Jember.

Methods

This study employed a quantitative approach with a cross-sectional design. This design was selected to analyze the relationship between the independent variables (ultra-processed food consumption and physical activity) and the dependent variable (over-nutrition status) at a single point in time. The research was conducted at SMAN 1 Jember, located in Sumbersari District, Jember Regency, which was chosen due to the persistently high prevalence of over-nutrition among adolescents in the area. Data collection took place in March 2025.

The study population included all 10th, 11th, and 12th grade students at SMAN 1 Jember during the 2024/2025 academic year, totaling 1,132 individuals. The sample for this study was determined using the Lemeshow formula, resulting in a total of 89 participants from 10th and 11th grade. 12th students were not included due to school permission constraints related to the examination schedule. Inclusion criteria consisted of being aged 16–18 years who were willing to participate in the study, while exclusion criteria included having chronic illnesses or being on a strict diet.

Data collection was carried out using several instruments. The Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) was used to assess the frequency of ultra-processed food (UPF)

consumption. The SQ-FFQ contain a list of 58 UPFs with six scale of frequencies, i.e. never, once per day, more than once per day, 1–3 times per month, 1–3 times per week, and 4–6 times per week. Daily frequency of UPFs consumption was then calculated. The International Physical Activity Questionnaire – Short Form (IPAQ-SF) was used to measure the duration and intensity of physical activity over the past week (IPAQ, 2005). Respondents were asked about their physical activities over the past seven days, including vigorous activity, moderate activity, walking, and sitting. The data from the questionnaire were converted into MET-minutes/week (Metabolic Equivalent of Task per minute per week). Physical activity levels were categorized as: high (>3000 MET-min/week), moderate (600-2999 MET-min/week), and low (<600 MET-min/week). Nutritional status among respondents was assessed using anthropometric measurements (body weight was measured using digital scale and body height using microtoise), followed by BMI-for-age (BMI/age) calculations using the WHO Anthro Plus application. BMI-for-age z-score > +1SD was categorized as having over-nutrition.

The collected data were then coded and analyzed descriptively. To examine the relationship between variables, normality testing using Kolmogorov-Smirnov was conducted first, followed by bivariate analysis using the chi-square test. This analysis was used to determine whether there were significant associations between UPF consumption and over-nutrition status, as well as between physical activity and over-nutrition status among students at SMAN 1 Jember.

Results

Characteristics of Respondents

In this study, respondent demographic data were collected to provide an overview of the participants involved in the research. The characteristics examined included age, gender, parental education, parental occupation, parental income, and daily pocket money.

Table 1. Distribution of Respondent Characteristics Data Among Grade X and XI Students at SMAN 1 Jember, 2025

Respondent Characteristics	N	%
Age		
16	50	56,2
17	34	38,2
18	5	5,6
Gender		
Male	34	38,2
Female	55	61,8
Parental Education		
< 9 years of formal education	1	1,1
≥9 years of formal education	88	98,9
Parental Occupation		
Private sector employee	24	27
Civil servant	21	23,6
Self-employed	25	28,1
Merchant/trader	3	3,4
Military/police (TNI/POLRI)	3	3,4
Other professions	13	14,6
Parental Income Level		
< minimum wage	26	29,2
≥minimum wage	63	70,8
Pocket Money Category		
< median	32	36
≥median	57	64

According to Table 1, most respondents were 16 years old (56.2%), followed by 17 years (38.2%) and 18 years (5.6%). The majority of respondents were female, with 55 students (61.8%) identifying as female. Regarding parental education, only one respondent (1.1%) reported that their parents had less than nine years of formal education. The remaining 88 respondents (98.9%) had parents with at least nine years of formal education. Of those with ≥ 9 years of schooling, 34 respondents (38.2%) reported that their parents had various levels of education ranging from junior high school (SMP) to postgraduate (S3).

Most respondents' parents were self-employed, accounting for 25 individuals (28.1%). Additionally, 24 parents (27%) worked as private sector employees, 21 (23.6%) as civil servants, and 13 (14.6%) were employed in other professions such as lecturers or teachers. The remaining occupations—traders and military/police (TNI/POLRI)—each accounted for 3 individuals (3.4%).

As shown in Table 1, a total of 63 parents (70.8%) had monthly incomes equal to or above the 2025 minimum wage (UMR) for Jember Regency, while 26 parents (29.2%) earned below the UMR. Data on respondents' daily pocket money were tested for normality using the Kolmogorov–Smirnov test, which indicated that the data were not normally distributed ($p < 0.001$). Therefore, the pocket money variable was presented using the median value. After identifying the median daily pocket money as IDR 15,000, the data were categorized into two groups: below the median and at or above the median. It was found that 57 students (64%) received daily pocket money equal to or above the median, while 32 students (36%) received less than the median.

Ultra-Processed Food Consumption, Physical Activity, and Nutritional Status

Table 2. Distribution of Respondents according to Frequency of Ultra-Processed Food Consumption, Physical Activity Level, and Nutritional Status Among Grade X and XI Students at SMAN 1 Jember, 2025

Variables	N	%
Ultra-Processed Food Consumption		
< median	44	49,4
≥median	45	50,6
Physical Activity Level		
High	16	18
Moderate	40	44,9
Low	33	37,1
Nutritional Status		
Severely underweight	1	1,1
Underweight	7	7,9
Normal	68	76,4
Overweight	12	13,5
Obese	1	1,1
Over-nutrition Status		
Non over-nutrition	76	85,4
Over-nutrition	13	14,6

The frequency of UPF consumption was measured using the SQ-FFQ and converted into daily frequency (Kowalkowska & Wadolowska, 2022). The median UPF consumption was 10.99 times per day, with a range between 2.11 and 36.81 times per day. A total of 50.6% of respondents consumed UPFs more frequently than the median. The highest consumption was found in the categories of "biscuits, chocolates, and candies" and "condiments, spreads, and dressings." The median energy intake from UPFs was 1,024.8 kcal, equivalent to approximately 38.6%–48.8% of the daily recommended intake for adolescents. Table 2 presents the distribution of UPF consumption among

the study respondents. Of the 89 students who participated, 44 students (49.4%) consumed UPFs less frequently than the median, while 45 students (50.6%) consumed UPFs at or above the median frequency.

The median physical activity level among respondents was 952 MET-min/week. Table 2 shows that 16 students (18%) had high levels of physical activity, 40 students (44.9%) had moderate levels, and 33 students (37.1%) had low physical activity levels.

From a total of 89 respondents, 76 students (85.4%) were categorized as non over-nutrition, while 13 students (14.6%) were classified as over-nutrition.

Relationship between Frequency of UPFs Consumption and Physical Activity Level with Over-Nutrition Status

Based on the questionnaire results distributed to grade X and XI students at SMAN 1 Jember, a significant relationship was found between the frequency of ultra-processed food (UPF) consumption and the incidence of over-nutrition among adolescents.

Table 3. Relationship Between UPFs Consumption Frequency and Physical Activity Level with Over-nutrition Status Among Grade X and XI Students at SMAN 1 Jember, 2025

Variables	Nutritional Status						*p-value*
	Non Over-nutrition		Over-nutrition		Total		
	n	%	n	%	n	%	
UPFs Consumption Frequency							
< median	43	97,7	1	2,3	44	100	0,001
≥median	33	73,3	12	26,7	45	100	
Physical Activity Level							
High	14	87,5	2	12,5	16	100	
Moderate	33	82,5	7	17,5	40	100	0,797
Low	29	87,9	4	12,1	33	100	

Table 3 shows that the majority of non over-nutrition respondents (97.7%) consumed UPFs less than the median frequency, while most over-nutrition respondents (26.7%) consumed UPFs at or above the median frequency. A chi-square test indicated a significant association between UPF consumption frequency and over-nutrition status ($p = 0.001 < 0.05$), suggesting that higher UPF intake is significantly related to increased over-nutrition risk among students at SMAN 1 Jember in 2025.

Based on questionnaire responses from grade X and XI students at SMAN 1 Jember, no significant relationship was found between physical activity levels and over-nutrition status. Table 3 illustrates that most students in both the over-nutrition and non over-nutrition categories had moderate levels of physical activity, 82.5% and 17.5%, respectively. The chi-square test yielded a p-value of 0.797 (Monte Carlo Sig., 2-sided), indicating no statistically significant association between physical activity levels and over-nutrition status at a 99% confidence level.

Discussion

This study was conducted at SMAN 1 Jember with a sample of 89 students from grades X and XI. Most respondents were 16 years old, placing them in the middle adolescence stage, which is considered a crucial period for physical and cognitive development (American Academy of Pediatrics; WHO, 2024). During this stage, adolescents are more capable of abstract thinking but are also more vulnerable to risky behaviors, including poor eating habits that can affect nutritional status (Adolescent Health Services, 2009). The predominance of female respondents (61.8%) aligns with findings by Handari (2017), which noted that adolescent girls are generally more concerned about appearance but also more prone to consuming ultra-processed foods (UPFs) as a coping mechanism for stress (Juliani et al., 2025; Wang et al., 2023).

More than half of the respondents' parents had higher education (53.9% held a D3 or bachelor's degree), and the majority had incomes at or above the regional minimum wage (70.8%). Parental education plays a significant role in shaping healthy food choices (Vereecken et al., 2004; Garg et al., 2017). However, despite having sufficient income, nutritional knowledge and awareness remain critical factors influencing UPF consumption among adolescents (Wachs, 2008). The types of parental occupations also varied, with a predominance of self-employment and private-sector work, both of which can impact household income stability and dietary habits (Williamson et al., 2020).

In addition, most students had a daily allowance of ≥ IDR 15,000, increasing the likelihood of purchasing snacks or UPFs around the school area (Desi et al., 2018). Although Cahyaning et al. (2019) reported that the amount of pocket money is not always directly associated with nutritional status, it remains a contributing factor that influences dietary patterns, particularly in choosing less nutritious, convenient food options.

Convenient and easy-to-consume UPFs tend to encourage snacking behaviors during other activities, which may interfere with satiety regulation and lead to excess food intake (Poti & Braga, 2017, as cited in Maulidina et al., 2025). Factors such as the availability of UPFs around the school environment, appealing taste and texture, as well as the psychological state of adolescents, contribute to higher UPF consumption. A study by Ginting et al. (2024) reported that 51.6% of high school students in Pontianak consumed UPFs excessively, influenced by school environment, maternal education, family income, and uncontrolled eating habits. Adolescents' preferences for instant noodles, sugary drinks, and savory snacks are often addictive, making them difficult to resist (Maulidina et al., 2025). Furthermore, according to Juliani et al. (2025), UPF consumption contributing more than 30–40% of total daily energy intake is already considered high and serves as an indicator of increased over-nutrition risk. Excessive UPF consumption not only elevates obesity risk but also reduces dietary quality in adolescents due to its low fiber, vitamin, and mineral content, nutrients essential for proper growth and health.

Physical activity plays a crucial role in maintaining adolescent health and nutritional status. WHO (2018) recommends at least 60 minutes of moderate to vigorous physical activity per day for adolescents. However, this study found that the median activity level was only 952 MET-minutes/week, equivalent to approximately 136 MET-minutes/day, meaning that most students did not meet the recommended standard. Based on the IPAQ-S instrument, most respondents fell into the moderate (44.9%) and low (37.1%) categories, with only 18% classified as having high physical activity. Most reported activities were light, such as sitting in class, walking slowly around the school area, or engaging in other low-energy daily tasks. Although some students reported jogging or cycling, both the frequency and duration were limited, particularly as data collection took place during the fasting month. Additionally, tight academic schedules and reliance on motorized transport further reduced opportunities for physical activity. This lack of physical activity aligns with national trends. Andriyani et al. (2020) found that only 12.2%–52.3% of Indonesian adolescents engaged in "sufficient" physical activity, while 24.5%–33.8% were classified as highly sedentary. Hanifah et al.

(2023) also reported that around 57% of children and adolescents in Indonesia experience significant physical activity deficits. Environmental factors such as access to facilities and social support from parents or peers have been shown to influence adolescents' active behaviors during the growth period.

Nutritional status reflects the balance between nutrient intake and the body's requirements to support growth, development, and physical activity (Kemenkes RI, 2023). An imbalance can lead to nutritional problems, either under-nutrition or over-nutrition, which in turn can cause health issues such as stunting or obesity. The prevalence of over-nutrition in this study was lower than reported in other studies, for instance, Yanti et al. (2023) found that 25.2% of students in Padang were over-nutrition, while Hanifah et al. (2023) reported a national figure of around 22.5%. Major risk factors identified in these studies include high UPF consumption, low physical activity, and environmental factors such as the availability of school canteens selling UPFs (Handari, 2017). Furthermore, the Indonesian Basic Health Research, *Riskesdas* (2018) indicated a national increase in adolescent obesity (ages 16–18) by 2.4%. Although most students in this study had normal nutritional status, the 14.6% prevalence of over-nutrition still requires attention. These findings highlight the importance of ongoing interventions and nutritional education programs focusing on healthy eating patterns and adequate physical activity to prevent the risk of metabolic diseases from an early age (Kemenkes RI, 2018).

The statistical analysis confirmed a significant relationship between UPF consumption and over-nutrition status. Most non over-nutrition students (97.7%) reported consuming UPFs below the median level, whereas a considerable portion of over-nutrition students (26.7%) consumed UPFs above the median. This finding aligns with Setyowati et al. (2022), which indicated that consuming UPFs more than four times a day increases the risk of over-nutrition by up to 2.87 times (OR = 2.87; $p < 0.001$).

High UPF intake is strongly linked to increased daily energy intake due to their high calorie content, low fiber, and density of sugar, salt, and fat (Monteiro et al., 2019; De Amicis et al., 2022). Hanifah et al. (2023) also noted that approximately 51.2% of total energy among Indonesian children comes from UPFs, highlighting adolescents' vulnerability to processed dietary patterns. Bielemann et al. (2015) further explained that the soft texture and rapid digestibility of UPFs can impair satiety signals, encouraging overeating. Excessive UPF consumption can lead to energy imbalance and fat accumulation. Moreover, the high sodium content in UPFs increases the risk of hypertension. For instance, a 100-gram increase in UPF intake has been shown to raise diastolic blood pressure by 0.28 mmHg in obese adolescents (Cortes et al., 2023). These results reinforce the importance of reducing UPF consumption as a strategy to prevent adolescent over-nutrition.

This result is consistent with Hanifah et al. (2023), who noted that physical activity alone, without concurrent energy intake regulation, is often insufficient to prevent excess body weight. Halawa et al. (2022) reported similar findings in Yogyakarta, where most adolescents had low physical activity levels, but this was not significantly associated with nutritional status ($p = 0.786$). Likewise, Ismail et al. (2021) in Malaysia emphasized that the relationship between physical activity and obesity in adolescents is not always linear; even moderate or high activity levels do not necessarily reduce risk if accompanied by high-energy diets or sedentary behaviors such as excessive screen time. Meanwhile, Perdanawati et al. (2024) found that low physical activity (<600 MET-minutes/week) significantly increases the risk of obesity. WHO (2018) recommends that adolescents engage in at least 60 minutes of moderate to vigorous physical activity daily to maintain metabolic health and prevent obesity. In practice, however, many adolescents fall short of this target, and the risk of overweight increases without a balanced diet. As noted by Bauman et al. (2012) and WHO, low physical activity also negatively impacts cardiovascular fitness and raises the risk of non-communicable diseases later in life. This study reinforces the notion that adolescent over-nutrition is influenced by multiple factors, including UPF consumption, sedentary habits, stress, and

environmental conditions. Although no statistically significant association was found, low physical activity remains an important issue in addressing over-nutrition prevention.

Conclusion

This study concluded that the frequency of UPF consumption was significantly associated to over-nutrition status (p = 0.001), while no significant association was found between physical activity level and over-nutrition status (p = 0.797). These findings highlight that UPF consumption may contribute to the risk of over-nutrition among adolescents. Further study with higher level of study design is required to confirm casual relationship. Nutrition education and efforts to reduce the intake of ultra-processed foods are potential strategies to prevent rising cases of overweight and obesity among school-aged students.

References

[1] Allen, B., & Waterman, H. *Stages of Adolescene*. American Academy of Pediatrics. 2024. https://www.healthychildren.org/English/ages-stages/teen/Pages/Stages-of-Adolescence.aspx

[2] Bauman, A.E., Reis, R.S., Sallis, J.F., Wells, J.C., Loos, R.J. and Martin, B.W. Correlates of physical activity: why are some people physically active and others not?. *The lancet*. 2012; *380*(9838): 258-271. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60735-1/

[3] Bielemann, R. M., et al. Consumption of Ultra-Processed Foods and Obesity in Brazilian Adolescents. Revista de Saúde Pública. 2015; 49: 38. https://doi.org/10.1590/S0034-8910.2015049005572

[4] Cahyaning, R. C. D., Supriyadi, & Kurniawan, A. Hubungan Pola Konsumsi , Aktivitas Fisik dan Jumlah Uang Saku dengan Status Gizi pada Siswa SMP Negeri di Kota Malang Tahun 2019. Sport Science and Health. 2019; 1(1): 22–27. http://journal2.um.ac.id/index.php/jfik/article/download/9984/4488

[5] Chen, X., Zhang, Z., Yang, H., Qiu, P., Wang, H., Wang, F., Zhao, Q., Fang, J., & Nie, J. Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. Nutrition Journal. 2020; 19(86): pp.1-10. https://doi.org/10.1186/s12937-020-00604-1

[6] Cortes, C., Brandão, J. M., Cunha, D. B., Paravidino, V. B., & Sichieri, R. Blood pressure variation in children with obesity and consumption of ultra-processed foods. European Journal of Pediatrics. 2023. https://doi.org/10.21203/RS.3.RS-2465194/V1

[7] De Amicis, R., et al. Ultra-Processed Food Intake and Health Outcomes: A Review. Nutrients. 2022; 14(2): 391. https://doi.org/10.3390/nu14020391

[8] Desi, D., Suaebah, S., & Dwi Astuti, W. Hubungan Sarapan, Uang Saku dengan Jajanan Di SD Kristen Immanuel II Kubu Raya. Jurnal Vokasi Kesehatan. 2018; 4(2): 103. https://doi.org/10.30602/jvk.v4i2.142

[9] Garg, A., Toy, S., Tripodis, Y., Silverstein, M., & Freeman, E. Influence of maternal education on food-related behaviors and diet quality. Appetite. 2017; 116: 310–315. https://doi.org/10.1016/j.appet.2017.05.031

[10] Ginting, S. M. D., Februhartanty, J., & Khusun, H. Association between consumption of ultra-processed foods and beverages with nutritional status of private senior high school students in Pontianak, West Kalimantan, Indonesia. World Nutrition Journal. 2024; 7(i2): 90–103. https://doi.org/10.25220/wnj.v07.i2.0011

[11] Hall, K.D., Ayuketah, A., Brychta, R., Cai, H., Cassimatis, T., Chen, K.Y., Chung, S.T., Costa, E., Courville, A., Darcey, V. and Fletcher, L.A. Ultra-processed diets cause excess calorie intake and weight gain: an inpatient randomized controlled trial of ad libitum food intake. Cell Metabolism. 2019; 32(4): 690. https://www.cell.com/cell-metabolism/fulltext/S1550-4131(19)302487?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS1550413119302487%3Fshowall%3Dtrue&fbclid=IwAR21JnpR1tUbcOm1jAs0d2yR-KtPWLFx7TiZol6CrdsXABb3GXZazeufqyk

[12] Handari, S. R. T., & Loka, T. Hubungan aktivitas fisik dan kebiasaan konsumsi fast food dengan status gizi lebih remaja SMA Labschool Kebayoran Baru Jakarta Selatan Tahun 2016. Jurnal Kedokteran dan Kesehatan. 2017; 13(2): 153-162. https://jurnal.umj.ac.id/index.php/JKK/article/view/1541

[13] Hafid, W., & Hanafi, S. Hubungan aktivitas fisik dan konsumsi fast food dengan kejadian obesitas pada remaja. Kampurui Jurnal Kesehatan Masyarakat. 2019; 1(1): 6-10. https://ejournal.lppmunidayan.ac.id/index.php/kesmas/article/view/49

[14] Halawa, D. A. P. T., Sudargo, T., & Siswati, T. Makan Pagi, Aktivitas Fisik, Dan Makan Malam Berhubungan Dengan Status Gizi Remaja Di Kota Yogyakarta. Journal of Nutrition College. 2022; 11(2): 135–142. https://doi.org/10.14710/jnc.v11i2.33184

[15] Hanifah, L., Nasrulloh, N., & Sufyan, D. L. Sedentary Behavior and Lack of Physical Activity among Children in Indonesia. Children. 2023; 10(8): 1283. https://doi.org/10.3390/children10081283

[16] Ismail, M. N., Wan Abdul Manan, W. M., & Baharudin, A. Physical Activity and Sedentary Behavior in Relation to Overweight and Obesity among Malaysian Adolescents. International Journal of Environmental Research and Public Health. 2021; 18(16): 8572. https://doi.org/10.3390/ijerph18168572

[17] Juliani, K. D., Dwijayanti, I., Siahaan, M. F., & Damanik, M. F. D. Hubungan Konsumsi Ultra-Processed Food dengan Status Gizi Remaja di Asia: Narrative Review. Jurnal Kesehatan Tambusai. 2025; 6(2): 4972-4980. https://journal.universitaspahlawan.ac.id/index.php/jkt/article/view/42514

[18] Kowalkowska, J., & Wadolowska, L. The 72-Item Semi-Quantitative Food Frequency Questionnaire (72-Item SQ-FFQ) for Polish Young Adults: Reproducibility and Relative Validity. Nutrients. 2022; 14(13). https://doi.org/10.3390/nu14132696

[19] Kusdalinah, K., Mutia, A., & Jumiyati, J. Pola Makan Dan Aktivitas Fisik Terhadap Kejadian Obesitas Remaja Pada Masa Pandemi Covid-19. Journal of Nutrition College. 2022; 11(1): 26-34. https://repository.poltekkesbengkulu.ac.id/1010/

[20] Maulidina, P. D., Alwi, M. K., Patimah, S., Ikhtiar, M., & Yusriani. Pengaruh Konsumsi Makanan atau Minuman Ultra Processed terhadap Kejadian Kegemukan pada Remaja Putri Peminatan Gizi, Fakultas Kesehatan Masyaraka, Universitas Muslim Indonesia. Jurnal FKM UMI. 2025; 6(2): 274–282. http://jurnal.fkm.umi.ac.id/index.php/woph/article/view/woph6206

[21] Monteiro, C.A., Cannon, G., Levy, R.B., Moubarac, J.C., Louzada, M.L., Rauber, F., Khandpur, N., Cediel, G., Neri, D., Martinez-Steele, E. and Baraldi, L.G. Ultra-processed foods: what they are and how to identify them. Public health nutrition. 2019; 22(5): 936-941. https://www.cambridge.org/core/journals/public-health nutrition/article/ultraprocessed-foods-what-they-are-and-how-to identifythem/E6D744D714B1FF09D5BCA3E74D53A185

[22] Pagliai, G., Dinu, M., Madarena, M. P., Bonaccio, M., Iacoviello, L., & Sofi, F. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. British Journal of Nutrition. 2021; 125(3): 308–318. https://www.cambridge.org/core/journals/british journal-of-nutrition/article/consumption-of-ultraprocessed-foods-and health-status-a-systematic-review-and metaanalysis/FDCA00C0C747AA36E1860BBF69A62704

[23] Perdanawati, M., Nugraheni, S. A., Syauqy, A., Noer, E. R., & Muniroh, M. Determinant factors of obesity in urban and rural studies on adolescents in Banten Province, Indonesia. Jurnal Gizi Indonesia (The Indonesian Journal of Nutrition). 2024; 12(2): 126–135. https://doi.org/10.14710/jgi.12.2.126-135

[24] Rauber, F., Martins, C.A., Azeredo, C.M., Leffa, P.S., Louzada, M.L.D.C. and Levy, R.B. Eating context and ultraprocessed food consumption among UK adolescents. British Journal of Nutrition. 2022; 127(1): 112-122. https://www.cambridge.org/core/journals/british_journal-of-nutrition/article/eating-context-and-ultraprocessed-foodconsumption-among-uk-adolescents/65F7B7FDE39B1FB911AD7D54BAAA69E8

[25] Setyowati, D., Rini, R., & Astuti, T. The Role of Ultra-Processed Food on the Risk of Obesity in Adolescents in Jambi City. Community Medicine and Education Journal (CMEJ). 2022; 5(2): 177–184. https://doi.org/10.37275/cmej.v5i2.577

[26] Steele, E.M., Baraldi, L.G., da Costa Louzada, M.L., Moubarac, J.C., Mozaffarian, D. and Monteiro, C.A. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. BMJ open. 2016; 6(3). https://bmjopen.bmj.com/content/6/3/e009892.short

[27] Vereecken, C., Keukelier, E., & Maes, L. Influence of mother's educational level on food parenting practices and food habits of young children. Appetite. 2004; 43(1): 93–103. https://doi.org/10.1016/j.appet.2004.03.002

[28] Wachs, T. D. Multiple influences on children's nutritional deficiencies: A systems perspective. Physiology & Behavior. 2008; 94(1): 48–60. https://doi.org/10.1016/j.physbeh.2007.11.012

[29] Wang, Y., Ma, Z., Lu, S., Duan, Z., Wilson, A., Jia, Y., Yang, Y., & Chen, R. Associations between sex differences, eating disorder behaviors, physical and mental health, and self-harm among Chinese adolescents. Journal of Eating Disorders. 2023; 11(1): 1–15. https://doi.org/10.1186/s40337-023-00754-7

[30] Williamson, V. G., Dilip, A., Dillard, J. R., Morgan-Daniel, J., Lee, A. M., & Cardel, M. I. The influence of socioeconomic status on snacking and weight among adolescents: A scoping review. Nutrients. 2020; 12(1): 1–18. https://doi.org/10.3390/nu12010167

[31] Wicaksono, A., dan Handoko, W. Aktivitas Fisik Dan Kesehatan. Pontianak. IAIN Pontianak Press. 2020. https://www.researchgate.net/profile/Arif-Wicaksono6/publication/353605384_Buku_Aktivitas_Fisik_dan_Kesehatan_fix/links/610555ee1e95fe241a9e488a/Buku-Aktivitas-Fisik-dan-Kesehatan-fix.pdf

[32] Yanti, A., dkk. Hubungan Pola Konsumsi dengan Kejadian Gizi Lebih pada Remaja SMA Penunjungan Kota Padang. Jurnal Gizi dan Kesehatan Indonesia. 2023. https://jurnal.unand.ac.id/index.php/jgki