UNS UNIVERSITAS SEBELAS MARET
PLACENTUM
Laman resmi: http://jurnal.uns.ac.id/placentum
ISSN 2303-3746
e-ISSN 2620-9969
PLACENTUM Jurnal Ilmiah Kesehatan dan Aplikasinya

Distribution and Determinants of Stunting Prevention Behavior Among Adolescents

Ika Sumiyarsi Sukamto[1*], Dian Nintyasari Mustika[2], Fitria Fahma Nur Cahyani[3]

[1] *Bachelor of Midwifery, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia*

[2] *Midwifery Program, Faculty of Nursing and Health Sciences, Universitas Muhammadiyah Semarang, Semarang, Indonesia*

[3] *Master of Public Health Program, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia*

** Corresponding author:*

E-mail: ikasumiyarsi@staff.uns.ac.id

ABSTRACT

Background: Stunting remains a persistent public health concern in Indonesia, and adolescence represents a strategic period to prevent its long-term consequences. Understanding sanitation and nutritional behaviors among adolescents is essential because these behaviors contribute to stunting prevention efforts. The purpose of this study is to analyze the distribution and determinants of stunting prevention behavior in adolescents in Sukoharjo district.

Methods: This research employed a cross-sectional design to assess the relationship between individual characteristics and stunting prevention behaviors among high school students in Sukoharjo District. Data on knowledge, sanitation behavior, and balanced nutrition behavior were obtained using a validated questionnaire. Because the data were not normally distributed, bivariate analysis using Spearman's correlation test was performed to examine associations between age, pocket money, BMI, knowledge, and stunting prevention behaviors.

Result: Most adolescents demonstrated good sanitation behavior but only moderate nutritional behavior. Although knowledge levels were generally high, knowledge did not translate into improved sanitation or nutrition practices. All correlations between age, pocket money, BMI, or knowledge and sanitation or nutritional behavior were categorized as very weak, with *p*-values >0.05. Additionally, sanitation behavior did not correlate with nutritional behavior, indicating that these behaviors are shaped by different influencing factors.

Conclusions: Individual characteristics and knowledge were not significant predictors of adolescents' sanitation or nutritional behavior. The absence of meaningful associations suggests that broader social, environmental, and familial influences may play a more dominant role in shaping stunting prevention behaviors. Therefore, interventions should emphasize supportive environments, family engagement, and behavior-oriented strategies rather than relying solely on knowledge-based approaches.

Keywords: ***Adolescent; Diet Habit; Growth Disorders; Knowledge; Sanitation***

INTRODUCTION

Stunting remains a major global and national public health problem, defined as impaired linear growth caused by chronic undernutrition and recurrent infections in early childhood.[1] The most recent joint report by UNICEF, WHO, and World Bank, 2025 estimated that 149 million children under five worldwide are affected by stunting, highlighting its persistent and widespread impact.[2] In Indonesia, the 2025 Indonesian Nutrition Status Survey (SSGI) reported a stunting prevalence of 19.7%, with marked regional disparities reflecting persistent social and health inequalities.[3] Stunting has serious long-

term consequences, including impaired cognitive development, reduced productivity, and increased risk of chronic diseases in adulthood.[4,5]

Adolescents, particularly adolescent girls as future mothers, play a critical yet often overlooked role in stunting prevention. Adolescence is a period of ongoing biological maturation that requires adequate nutritional intake.[6] Poor nutritional status, anemia, short stature, and limited nutrition knowledge during adolescence increase the risk of low birth weight and intrauterine growth restriction,[7,8] which may impair nutrient transfer and increase susceptibility to infections in the next generation.[9]

In urban areas such as Kartasura, Central Java, Indonesia, adolescents represent a large and strategic population group.[10] However, studies show that stunting-preventive behaviors among Indonesian adolescents remain suboptimal, including unhealthy dietary habits, breakfast skipping, exposure to household cigarette smoke, and poor sanitation and food hygiene practices.[11,12] Household cigarette smoke exposure has been associated with inflammatory processes that may disrupt healthy growth,[13,14] while limited nutrition literacy reduces adolescents' awareness of their role in stunting prevention before pregnancy.[15,16]

The National Strategy for Stunting Prevention and Reduction (Stranas P3S) prioritizes adolescents through nutrition improvement, anemia prevention, reproductive health education, and promotion of balanced diets.[17] Nevertheless, evidence on stunting-preventive behaviors among urban adolescents remains limited. Therefore, this study aims to identify the distribution and determinants of stunting prevention behaviors among adolescents in Sukoharjo District, with the expectation of supporting the development of effective preconception stunting prevention programs.

METHODS

This study used a cross-sectional analytical design conducted in Sukoharjo District, Central Java, Indonesia from September to November 2025 at Mojolaban 1 and Kartasura 1 Senior High School. The study population comprised adolescents in Sukoharjo District, with an accessible population of 105 students from two schools.

A simple random sampling technique was employed to ensure that each student had an equal probability of being selected. The sampling frame was first established by listing all eligible students from both schools. Each student was then assigned a unique identification number. The randomization process was carried out using a computer-generated random number method (Microsoft Excel random number function). Based on the generated random numbers, participants were selected until the required sample size for the analytical study was achieved. Body weight and height were measured using scales and stadiometer, respectively.

Data were collected using a structured questionnaire consisted of three main domains: knowledge (8 items), balanced nutrition behavior (7 items), and sanitation behavior (8 items), resulting in a total of 23 items. All items were measured using a Likert scale, and the total score for each domain was calculated by summing the item scores, with higher scores indicating better knowledge and healthier behaviors. The scores were then categorized into good, moderate, and poor based on predetermined cut-off points.

Content validity of the questionnaire was assessed through expert judgment involving three experts, namely a public health specialist, a nutritionist, and a maternal and child health (MCH) lecturer. Each expert evaluated the relevance, clarity, and appropriateness of the items. Revisions were made based on their feedback. The reliability test using Cronbach's Alpha showed that all

domains had coefficients >0.70, indicating acceptable internal consistency.

Data analysis included normality testing using the Kolmogorov–Smirnov test, followed by univariate analysis to describe respondent characteristics and variable distributions. Bivariate analysis was performed using Spearman's correlation test due to non-normal data distribution, to assess the relationships between age, pocket money, BMI, and knowledge level with nutritional and sanitation behaviors. Data were analyzed using SPSS version 24. Ethical considerations, including informed consent, anonymity, and confidentiality, were ensured, and ethical approval was obtained from the Research Ethics Committee of Dr. Moewardi Hospital, Surakarta, Indonesia (No. 2.351/XI/HREC/2025).

RESULT

The respondent characteristics (Table 1) indicate that most participants were mid-adolescents aged 16–17 years, with 17-year-olds comprising the largest proportion (51.4%), followed by 16-year-olds (46.7%). Most respondents received weekly pocket money of ≤150,000 rupiah (86.7%). All respondents had a height ≥145 cm, and most weighed ≥45 kg (76.2%).

Based on BMI, half of the respondents were in the normal category (50.5%), while the remainder were underweight (29.5%), overweight at risk (10.5%), obesity I (6.7%), and obesity II (2.9%). Parents were the primary source of dietary reminders for most respondents (81.9%). Nearly all respondents reported no history of chronic disease (97.1%).

Table 1. Sample Characteristics

Characteristics	*n*	%
Age (years)		
15	2	1.9
16	49	46.7
17	54	51.4
Pocket money (per week)*		
≤150.000 IDR	91	86.7
200.000 – 300.000 IDR	12	11.4
300.000 – 400.000 IDR	0	0
>400.000 IDR	2	1.9
Height (cm)		
≥145	105	100
<145	0	0
Weight (kg)		
≥45	80	76.2
<45	25	23.8
BMI		
Underweight	31	29.5
Normal range	53	50.5
Overweight at risk	11	10.5
Obese I	7	6.7
Obese II	3	2.9
Dietary reminders		
Yourself	16	15.2
Teacher/Friend/ Healthcare Professional	3	2.9
Parents	86	81.9
History of chronic illness		
Yes	3	2.9
No	102	97.1

*1 USD = 17.302 IDR
Date of exchange rate: April 4th, 2026
Source: Primary data, 2025

Most respondents demonstrated a good level of knowledge (Table 2), accounting for 94.3%, while 5.7% had a moderate level. Knowledge scores ranged from 63 to 100, with a mean of 94.57 ± 7.78, indicating high and consistent knowledge levels.

Table 2. Frequencies of knowledge level

	n	%	Min. – Max.	Mean	Std. Deviation
Good	99	94.3	63 - 100	94.57	7.780
Moderate	6	5.7			

Source: Primary data, 2025

Regarding balanced nutritional behavior (Table 3), the majority of respondents were categorized as having moderate behavior (67.6%), while 13.3% showed good behavior and 19.0% showed poor behavior. The mean behavior score was 68.15 ± 12.34, reflecting variability in nutritional practices.

Table 3. Frequencies of balanced nutritional behavior

	n	%	Min – Max	Mean	Std. Deviation
Good	14	13.3			
Moderate	71	67.6	31 - 92	68.15	12.343
Poor	20	19.0			

Source: Primary data, 2025

Most respondents demonstrated good sanitation behavior (Table 4), accounting for 97.1%, with only 2.9% categorized as moderate. Sanitation scores ranged from 50 to 100, with a mean of 98.57 ± 8.37, indicating generally high sanitation behavior.

Table 4. Frequencies of sanitation behavior

	n	%	Min. - Max	Mean	Std. Deviation
Good	102	97.1	50 - 100	98.57	8.370
Moderate	3	2.9			

Source: Primary data, 2025

The Kolmogorov-Smirnov normality test is used as the initial step to determine data distribution. A variable is declared non-normally distributed if the significance value (*p*-value) is <0.05. Because all variables in this study showed a *p*-value <0.05, all data were categorized as non-normally distributed. Therefore, the statistical analysis used in the next stage is more appropriate using non-parametric tests, one of which is the Spearman correlation test, which is suitable for non-normally distributed data.

Table 5. Spearman's rho analysis

		Sanitary behavior	Balanced nutritional behavior	Knowledge level
Age	*p*	-0.054	-0.003	0.002
	r	0.584	0.973	0.981
Pocket money	*p*	-0.120	0.030	-0.022
	r	0.223	0.759	0.825
BMI	*p*	-0.010	0.024	-0.091
	r	0.917	0.806	0.354
Dietary reminders	*p*	-0.095	0.078	-0.033
	r	0.335	0.427	0.740
History of chronic illness	*p*	-0.029	-0.014	-0.042
	r	0.766	0.890	0.669
Knowledge level	*p*	-0.042	0.120	1.000
	r	0.669	0.224	.
Sanitary behavior	*p*	1.000	0.083	-0.042
	r	.	0.398	0.669
Balanced nutritional behavior	*p*	0.083	1.000	0.120
	r	0.398	.	0.224

Source: Primary data, 2025

Spearman correlation strength was interpreted as very weak (>0.00–0.25), moderate (0.26–0.50), strong (0.51–0.75), very strong (0.76–0.99), and perfect (1.00) (Add citation here). Based on these criteria, the Spearman test results (Table 5) showed no significant relationships between age and sanitation behavior (p = 0.584; r = –0.054), nutritional behavior (p = 0.973; r = –0.003), or knowledge (p = 0.981; r = 0.002), with all correlations classified as very weak.

Similarly, pocket money was not associated with sanitation behavior (p = 0.223; r = –0.120), nutritional behavior (p = 0.759; r = 0.030), or knowledge (p = 0.825; r = –0.022). BMI also showed no significant correlations with sanitation behavior (p = 0.917; r = –0.010), nutritional behavior (p = 0.806; r = 0.024), or knowledge (p = 0.354; r = –0.091). In addition, knowledge level was not significantly related to sanitation behavior (p = 0.669; r = –0.042) or nutritional behavior (p = 0.224; r = 0.120). The relationship between sanitation behavior and nutritional behavior was also very weak and not significant (p = 0.398; r = 0.083).

DISCUSSION

The results of this study indicate no significant relationship between age, pocket money, body mass index (BMI), or knowledge level with sanitation and nutrition behavior in adolescents. All correlations are in the very weak category, with *p*-values >0.05. This can be explained by several scientific reasons identified in various studies. Adolescent health behavior is strongly influenced by social factors, such as peer influence, family support, food preferences, and the

school environment.[18–22] Adolescents' eating behavior and health are strongly influenced by their social environment. Peers and siblings play a significant role because adolescents tend to imitate the eating choices and habits of those with whom they are emotionally close. This influence is further amplified by social media, which shapes new food norms and trends, so adolescents often follow what is considered popular within their social groups.[22]

Furthermore, family is also a determining factor through home eating patterns, shared eating habits, food-related rules, and how parents provide and introduce food. Overall, the findings from these three articles indicate that adolescents' eating habits are not only influenced by individual knowledge, but are more shaped by social dynamics such as peers, social media, and family eating culture.[18–20] Individual variables, such as age, pocket money, and knowledge, are often not strong predictors of health behavior. This is consistent with the ecological model, which emphasizes that adolescent behavior is more influenced by interpersonal and community factors than by personal factors.[23] The homogeneity of the sample in this study, for example, the majority of respondents had good knowledge, good sanitation practices, and a narrow age range, resulting in low inter-individual variability, making the relationship statistically insignificant. This phenomenon has also been found in research that the lack of diversity in sample characteristics can weaken the relationship between variables.[24,25]

The gap between knowledge and practice is a common phenomenon among adolescents. Even though adolescents have awareness and access to health information, this knowledge is not always followed by appropriate behavior.[26] Adolescents understand the importance of maintaining health and are aware of various health information, but there is a gap between knowledge and practice, evident in the low level of implementation of healthy behaviors in daily life.[26] The information they obtain from various sources is not sufficient to encourage behavioral change, so their health literacy does not automatically translate into concrete health actions.[26,27] Research in Bukittinggi shows that although teenagers understand information related to nutrition and the importance of a healthy diet, they still do not apply it consistently because they prioritize taste preferences, lifestyle demands, emotional influences related to body image, and social pressure from the environment and social media that shape their eating choices.[21]

The amount of pocket money does not affect the nutritional status or consumption patterns of adolescents, because variations in eating behavior are more influenced by other factors such as food preferences, social environment, and individual habits than the ability to buy healthy food.[22,28] BMI is also not related to current eating or sanitation behavior because BMI is a long-term accumulation influenced by genetic factors, physical activity, and past eating habits, not just current behavior.[29] In a study of adolescents' healthy lifestyle behaviors, age differences did not produce significant differences in healthy lifestyle patterns, suggesting that age is not a primary determinant in the formation of health behaviors. Research on disease prevention behaviors in North Tondano also reported that age differences were not associated with the level of adoption of preventive health behaviors. Overall, these results indicate that health behaviors are more influenced by factors other than age, such as knowledge, motivation, social environment, and access to health information.[30,31]

Adolescents' eating behavior patterns in metropolitan areas are not entirely determined by their family environment.[32] Family social support for weight-related behaviors in children and adolescents.[33] Although

family support for certain behaviors, such as eating breakfast or limiting sugary drinks, tended to align with healthier practices, this relationship was not uniform across all behaviors.[34] In some cases, moderate levels of family support were associated with less healthy practices than low or high levels of support.[34] Family support or the family environment are not always the primary factors in shaping adolescents' nutritional behaviors and healthy lifestyle habits, their influence can be weak, inconsistent, or dependent on the type of behavior assessed, with individual factors appearing to play a more dominant role.[32,33]

The results of this study indicate that sanitation behavior is not correlated with nutritional behavior. Sanitation, access to clean water, and handwashing facilities play a role in reducing the risk of infectious diseases, they do not always correlate directly with nutritional status or nutritional behavior.[35–37] Improved sanitation is effective in reducing diarrheal disease, its effect on nutritional status is inconsistent because nutritional status is more influenced by dietary intake, recurrent infections, and socioeconomic factors.[35] Household water access is not significantly associated with nutritional status, while dietary diversity is a more influential factor, so dietary quality remains a key determinant of nutritional status compared to sanitation aspects.[36] Access to clean water and sanitation does not show a significant relationship with child growth indicators, with the exception of handwashing facilities, which have a specific association with the risk of underweight.[37]

Multivariate analysis was not performed in this study because all variables in the bivariate analysis showed a *p*-value >0.25 and the correlation strength was in the very weak category. The literature on variable selection in multivariate models also emphasizes that variables are only worthy of inclusion if they have a significant relationship or are supported by strong theoretical justification, because including variables with low statistical relevance can reduce model stability and produce inaccurate estimates. Some variable selection methods even emphasize the importance of retaining only variables that pass the statistical feasibility threshold at the initial stage to avoid noise in the model.[38–40] Studies of variable selection practices in epidemiological research indicate that correct model construction relies heavily on the selection of appropriate and measurable variables. Several reviews note that many studies still include variables without a strong statistical basis, increasing the risk of inappropriate models and misleading interpretations. Other findings emphasize that including variables with high *p*-values or irrelevant relationships can lead to bias, overfitting, and reduced model quality. Therefore, rigorous variable selection and the application of sound statistical principles are crucial for building valid multivariate models.[41–43]

This study has several limitations that should be considered when interpreting the findings. The study was conducted in only two senior high schools within one district, which may limit the generalizability of the findings to broader adolescent populations with different socio-demographic backgrounds.

The homogeneity of the sample, especially in terms of age range, knowledge level, and behavioral scores, may have limited the ability to detect significant correlations between variables. Additionally, several potentially influential factors were not assessed in this study, such as peer influence, parental education, dietary intake patterns, physical activity, and exposure to social media, which may play a more substantial role in shaping adolescent health behaviors.

CONCLUSION

The study results showed no association between age, pocket money,

BMI, and knowledge with sanitation or nutritional behavior in adolescents. This finding underscores the importance of a multidimensional approach to stunting prevention from adolescence, focusing on strengthening the social environment, family support, and access to healthy food rather than solely improving knowledge.

ACKNOWLEDGEMENT

The author extends gratitude to the participating schools, students, and academic colleagues who supported this research.

REFERENCES

1. Soliman A, Sanctis V De, Alaaraj N, Ahmed S, Alyafei F, Hamed N, et al. Early and Long-term Consequences of Nutritional Stunting : From Childhood to Adulthood. Acta Biomed. 2021;92(4):1–12.
2. UNICEF, WHO, Group WB. Levels and trends in child malnutrition. 2025. 1–24 p.
3. Kemenkes. Survei Status Gizi Indonesia (SSGI). Jakarta: Kemenkes; 2025. 1–352 p.
4. Freer J, Orr J, Wells JCK, Prendergast AJ. The Impact of Early-Life Growth on Long-Term Cardiometabolic and Neurocognitive Outcomes in High-Income Countries: A Neglected Public Health Problem. Nutr Rev. 2025;00(00):1–21.
5. Stein AD, Adair LS, Donati G, Wray C, Richter LM, Norris SA, et al. Articles Early-life stature , preschool cognitive development , schooling attainment , and cognitive functioning in adulthood : a prospective study in four birth cohorts. Lancet. 2023;11:95–104.
6. WHO. WHO2. 2025. Adolescent-health. Available from: https://www.who.int/health-topics/adolescent-health
7. Nadhiroh SR, Micheala F, Tung SEH, Kustiawan TC. Association between maternal anemia and stunting in infants and children aged 0 À 60 months : A systematic literature review. Nutrition [Internet]. 2023;115(112094):1–5. Available from: https://doi.org/10.1016/j.nut.2023.112094
8. Khatun W, Rasheed S, Alam A, Huda TM, Dibley MJ. Assessing the Intergenerational Linkage between Short Maternal Stature and Under-Five Stunting and Wasting in Bangladesh. Nutrients. 2019;11(1818):1–15.
9. Budge S, Parker AH, Hutchings PT, Garbutt C. Environmental enteric dysfunction and child stunting. Nutr Rev. 2019;77(4):240–53.
10. Kemenkes. Kemenkes. 2024. Remaja. Available from: https://ayosehat.kemkes.go.id/kategori-usia/remaja
11. Diana R, Rachmayanti RD, Khomsan A, Riyadi H. Influence of eating concept on eating behavior and stunting in Indonesian Madurese ethnic group. J Ethn Foods [Internet]. 2022; Available from: https://doi.org/10.1186/s42779-022-00162-3
12. Atamou L, Rahmadiyah DC, Hassan H. Analysis of the Determinants of Stunting among Children Aged below Five Years in Stunting Locus Villages in Indonesia. Healthcare. 2023;11(810):1–12.
13. Astuti DD, Handayani TW, Astuti DP. Cigarette smoke exposure and increased risks of stunting among under- fi ve children. Clin Epidemiol Glob Heal [Internet]. 2020;8(3):943–8. Available from: https://doi.org/10.1016/j.cegh.2020.02.029
14. Cao S, Xie M, Jia C, Zhang Y, Gong J. Environmental Technology & Innovation Household second-hand smoke exposure and stunted growth among Chinese school-age children. Environ Technol Innov [Internet].

2022;27:102521. Available from: https://doi.org/10.1016/j.eti.2022.102521
15. Aji SP, Ritonga PT, Simangunsong DE, Sitorus N, Letelay AM, Syamsul M, et al. Epidemiologi Intermediate. 1st ed. Padang: PT Global Eksekutif Teknologi; 2022. 1–180 p.
16. Bawono Y. Perkembangan anak & remaja. 4th ed. Reski MY, editor. Solok: Cendekia Muslim Press; 2023.
17. TP2S. Strategi Nasional Percepatan Pencegahan Anak Kerdil (Stunting). 2nd ed. Jakarta: Sekretariat Percepatan Pencegahan Stunting; 2019. 1–110 p.
18. Ragelien T, Grønhøj A. The influence of peers′ and siblings′ on children's and adolescents′ healthy eating behavior. A systematic literature review. Appetite. 2020;148(2020):1–19.
19. Chung A, Vieira D, Donley T, Tan N, Jean-Louis G, Gouley KK, et al. Adolescent Peer Influence on Eating Behaviors via Social Media: Scoping Review. J Med Internet Res. 2021;23(6):1–12.
20. Liu KSN, Chen JY, Ng MYC, Yeung MHY, Bedford LE, Lam CLK. How Does the Family Influence Adolescent Eating Habits in Terms of Knowledge, Attitudes and Practices? A Global Systematic Review of Qualitative Studies. Nutrients. 2021;13(3717):1–29.
21. Hanum FN, Maulida F. Pengaruh Media Sosial, Body Image dan Pola Makan pada Remaja Penari Bukittinggi. Amerta Nutr. 2023;7(4):546–54.
22. Palupi UR, Rahmawaty S. Relationship between Pocket Money for Food Purchases and Fast Food Consumption Frequency among Nutrition Students. Indones J Hum Nutr. 2025;11(2):133–41.
23. Golden SD, Earp JAL. Social Ecological Approaches to Individuals and Their Contexts : Twenty Years of Health Education & Behavior Health Promotion Interventions. SAGE. 2012;39(3):364–72.
24. Ghai S, Fassi L, Awadh F, Orben A. Lack of Sample Diversity in Research on Adolescent Depression and Social Media Use : A Scoping Review and Meta-Analysis. SAGE. 2023;11(5):759 –772.
25. Ziegler J, Fiedler K. Small Sample Size and Group Homogeneity : A Crucial Ingredient to Inter-Group Bias. SAGE. 2025;51(9):1631 –1647.
26. Asari AA, Birhanu Z, Godesso A. Adolescents ' health literacy perspectives and implications. BMC Public Health [Internet]. 2025;25(1233):1–16. Available from: https://doi.org/10.1186/s12889-025-22341-y
27. Ozturk FO, Ayaz-alkaya S. Health literacy and health promotion behaviors of adolescents in Turkey. J Pediatr Nurs [Internet]. 2020; Available from: https://doi.org/10.1016/j.pedn.2020.04.019
28. Azzahra KR, Sefrina LR, Elvandari M. Relationship Between Pocket Money and Student Nutritional Status. J Kesehat Pasak Bumi Kalimantan. 2025;8(1):12–20.
29. Rosioară AI, Năsui BA, Ciuciuc N, Sîrbu DM, Curseu D, Vesa SC, et al. Beyond BMI : Exploring Adolescent Lifestyle and Health Behaviours in Transylvania, Romania. Nutrients. 2025;17(268):1–20.
30. Dewa NS, Kaunang WPJ, Sekeon SAS. Hubungan Antara Umur, Jenis Kelamin, Tingkat Pendidikan dengan Perilaku Pencegahan Covid-19 pada Masyarakat Kelurahan Wulauan Kecamatan Tondano Utara. J Kesehat Masy. 2022;6(3):2058–65.
31. Shirzadi S, Borzu ZA, Jahanfar S, Alvani S, Balouchi M, Gerow HJ, et al. A comparative study of healthy lifestyle behaviors and related factors among Iranian male and female

adolescents : a cross- sectional study. BMC Public Health. 2025;25(558):1–11.
32. Drywie M, Górnicka M, Kulik S, Górnicki K. Patterns of Avoiding Nutrition Mistakes in Metropolitan Adolescents Are Associated with Sex, Nutrition Knowledge, Physical Activity, and Family Environment. Nutrients. 2021;13(433):1–13.
33. Delaney CL, Byrd-bredbenner C. Family Social Support and Weight-Related Behaviors of School-Age Children: An Exploratory Analysis. Int J Environ Res Public Heal. 2022;19(8501):1–13.
34. Bocci BM, Lipari D, Pammolli A, Simi R, Frongillo E, Miserendino A, et al. How Family Structure Can Influence Adolescents' Eating Habits: An Italian Health Behaviour in School-Aged Children (HBSC) 2022 Sample. Children. 2024;11(1368):1–9.
35. Freemana MC, Garn J V., Sclara GD, Boissonb S, Medlicottb K, Alexandera KT, et al. The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis. Int J Hyg Environ Health [Internet]. 2017;220(6):928–49. Available from: http://dx.doi.org/10.1016/j.ijheh.2017.05.007
36. Gao Y, Sheng J, Mi X, Zhou M, Zou S, Zhou H. Household Water Access, Dietary Diversity and Nutritional Status among Preschoolers in Poor, Rural Areas of Central and Western China. Nutrients. 2022;14(458):1–15.
37. Bekele T, Rahman B, Rawstorne P. The effect of access to water, sanitation and handwashing facilities on child growth indicators: Evidence from the Ethiopia Demographic and Health Survey 2016. PLoS One [Internet]. 2020;15(9):1–21. Available from: http://dx.doi.org/10.1371/journal.pone.0239313
38. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. Source Code Biol Med. 2008;3(17):1–8.
39. Newcombe PJ, Connolly S, Seaman S, Richardson S, SJ Sharp. A two-step method for variable selection in the analysis of a case-cohort study. Int J ofEpidemiology. 2018;47(2):597–604.
40. Sauerbrei W, Perperoglou A, Schmid M, Abrahamowicz M, Becher H, Binder H, et al. State of the art in selection of variables and functional forms in multivariable analysis — outstanding issues. Diagnostic Progn Res. 2020;4(3):1–18.
41. Talbot D, Massamba VK. A descriptive review of variable selection methods in four epidemiologic journals: there is still room for improvement. Eur J Epidemiol [Internet]. 2019;34:725–30. Available from: https://doi.org/10.1007/s10654-019-00529-y
42. Walter S, Tiemeier H. Variable selection: current practice in epidemiological studies. Eur J Epidemiol. 2009;24:733–6.
43. Nojima M, Tokunaga M, Nagamura F. Quantitative investigation of inappropriate regression model construction and the importance of medical statistics experts in observational medical research: a cross- sectional study. BMJ Open. 2018;8:1–10.