Media Kesehatan Masyarakat Indonesia
Volume 21 Issue 2 2025
DOI : 10.30597/mkmi.v21i2.42133
Website : http://journal.unhas.ac.id/index.php/mkmi

Urban School Nutrition: Student and Teacher Perspectives on Creating a Healthier Food Environment

Rahayu Indriasari[1*], Yessy Kurniati[2], Safrullah Amir[1], Indra Fajarwati Ibnu[3], Balqis[4]
[1]Department of Nutrition Science, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia
[2]Faculty of Medicine and Health Science, Alauddin Islamic State University, Makassar, Indonesia
[3]Department of Health Promotion and Behavioral Science, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia
[4]Department of Health Administration and Policy, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia
[*]Authors Correspondence: rahayu.indriasari@unhas.ac.id/082187642776

ARTICLE INFO

Article History:
Received Nov, 20th, 2024
Accepted Jun, 2nd, 2025
Published online Jun, 30th, 2025

Keywords:
Urban;
School Food Environment;
Adolescents;
Healthy Eating;
Health Promotion School;

ABSTRACT
Changes in lifestyle and eating habits can affect food choices for adolescents, impacting their nutritional intake. Schools are pivotal in shaping healthy eating behaviors. This qualitative study explores the perspectives of secondary school students and teachers on strategies to improve the healthy food environment in an urban school. Two focus group discussions with students and one with teachers, along with one in-depth interview with the school principal, were conducted at a junior high school in Makassar city. The audio recordings were transcribed and analyzed thematically to identify key themes. Students appeared to be aware of the importance of healthy eating habits; however, they lacked a full understanding of which healthier choices to make. Focus group discussions and interviews revealed that all groups recognize the importance of promoting healthier choices through regulation, education, and accessible nutritious foods. The study highlights actionable strategies for implementing school-based interventions to foster sustainable healthy eating behaviors.

INTRODUCTION

Adolescence is a critical period of growth and development, characterized by heightened nutritional needs and increased independence in food choices. However, this stage is often marked by unhealthy dietary patterns, including excessive consumption of ultra-processed foods, which contribute to a global rise in overweight and obesity rates among adolescents. These dietary behaviors pose long-term health risks, such as diabetes, cardiovascular diseases, and obesity-related complications, emphasizing the urgency of interventions targeting adolescent nutrition.[1,2]

Adolescents worldwide are increasingly affected by overnutrition, a significant contributor to the global burden of diet-related Non-Communicable Diseases (NCDs). The prevalence of overweight and obesity among individuals aged 5–19 years has risen dramatically from 8% in 1990 to 20% in 2022, with over 390 million adolescents globally now classified as overweight. Among them, approximately 160 million are living with obesity, a condition closely linked to excessive consumption of ultra-processed foods, sedentary lifestyles, and limited access to nutritious diets.[3,4]

In Indonesia, the issue mirrors global trends. According to national data, overnutrition among adolescents has become a pressing public health challenge, exacerbated by the rapid urbanization and dietary transitions toward energy-dense, nutrient-poor foods. A 2022 survey highlighted that adolescents in urban areas are at higher risk due to increased consumption of processed snacks and sugary beverages, which contribute to obesity and related metabolic disorders.[3,5]

Schools serve as a vital setting for shaping adolescent eating behaviors, given the substantial time students spend on school premises and the significant proportion of daily caloric intake that occurs there. Evidence shows that school-based interventions, such as modifying food environments and incorporating nutrition education into curricula, can positively influence dietary behaviors. These interventions not only promote healthier food choices but also contribute to broader educational and social outcomes, such as improved academic performance and reduced health disparities.[1,6]

Globally, there is growing recognition of the importance of leveraging schools to promote healthy eating habits. Programs that integrate nutrition education, enforce canteen policies, and involve parents and communities have demonstrated promising results. However, many existing initiatives lack scalability or fail to address systemic challenges, such as the accessibility and affordability of healthy food options. A comprehensive, multi-component approach that aligns with global standards for health-promoting schools is critical for maximizing the impact of these interventions.[6,7]

Despite these advancements, gaps remain in the implementation and evaluation of school-based nutrition strategies, particularly in middle and low-income countries. Addressing these gaps through robust research and inclusive policymaking can enhance the role of schools in fostering sustainable dietary habits among adolescents, ultimately contributing to their long-term health and well-being.[2,6]

Schools play a crucial role in addressing this growing epidemic. As adolescents spend a substantial portion of their time at school, these settings offer a unique opportunity to intervene. By improving school food environments, enforcing nutrition policies, and integrating education on healthy eating habits into the curriculum, schools can help mitigate the rising rates of overnutrition and establish healthier behaviors that persist into adulthood.[2,6] This study aimed to explore students' and teachers' perspectives on strategies to create a healthier food environment in an urban school setting. The findings contribute to designing effective interventions for promoting nutrition education and sustainable health behaviors.

MATERIAL AND METHOD

This study employed a qualitative design to gather in-depth insights into the perspectives of secondary school students and teachers on promoting healthy eating in schools. The setting for the research was a purposively selected urban school in Makassar, the capital city of South Sulawesi Province, located in the eastern part of Indonesia. This junior high school was chosen based on previous data highlighting significant issues with overnutrition and the high consumption of ultra-processed foods among adoles-

cents.[8]

Participant Selection

Participants were selected to ensure diverse representation within the school environment. Eleven students from grades 7 and 8 were recruited by the school staff to participate in two focus group discussions. These students were chosen to capture varying levels of awareness and attitudes toward healthy eating. Six teachers were also recruited voluntarily to participate in one focus group discussion. The school principal was chosen as the representative of the school authorities to be interviewed.

Data Collection

Focus Group Discussions (FGDs) with the students included one group of the 7th grade students and one group of the 8th grade students. The first group consisted of six students, and the second group consisted of five students, as one invited participant was unable to attend the FGDs on the scheduled day. Both FGDs were held in a meeting room at the school, with no other attendees except the research team. The discussions led by the principal author using a guide and note taking was managed by the research assistant. Interactive methods, such as prompting participants to categorize foods or discuss hypothetical scenarios, were used to stimulate engagement and richer responses. Open-ended questions encouraged participants to share their views on definitions of healthy and unhealthy foods, perceived barriers to adopting healthier diets, strategies for improving the school food environment, and potential media and channel to use for nutrition education intervention targeting students, teachers, and parents.

A separate FGD was conducted by the second author and the research assistant with six teachers in a meeting room at the school. The discussion elaborated teachers' perspectives on the effective strategies to promote healthier food consumption at school and to strengthening regulations regarding school canteen as well as potential channels for delivering nutrition education at school. The FGD was attended by the participants and the research team, with no other attendees present.

An in-depth interview was conducted by the third author with the school principal, privately at the principal's office, to understand administrative viewpoints and the feasibility of proposed strategies to promote healthier food environment at school, as well as challenges and opportunities in improving the availability of implementing policies or regulations regarding a healthy school canteen.

All FGDs and interviews were recorded using digital recorders with the permission of the participants, to ensure comprehensive data capture. Note taking was managed by the research assistant for all FGD activities, and by the interviewer himself during the in-depth interview session.

Analytical Approach

The collected data were transcribed verbatim and analyzed thematically using a coding framework. Codes were generated inductively to reflect recurring themes and insights from participants. A rigorous iterative process ensured that coding captured nuanced views while reducing researcher bias. Themes were synthesized into actionable strategies for promoting healthy eating, namely: strategies to strengthening regulations to support healthy eating at school and strategies to support healthy food environment at school. Comparisons between FGDs and interview results were taken into consideration.

Ethical Considerations

Ethical approval was obtained from the review boards, of the Ethic Committee of Faculty of Public Health Hasanuddin University (No. 482/UN4.14.1/TP.01.02/2024) and informed consent was acquired from all participants, including parental consent for minors. Participant confidentiality was maintained throughout the research process.

RESULTS

Students' Awareness and Perspectives

Categorization of Foods

Students from both groups showed an understanding of healthy versus unhealthy foods. Healthy foods were described using terms such as "fresh," "natural," "vitamin-rich," and "clean," while unhealthy foods were associated with descriptors like "oily," "fried," "sugary," "preserved," and "dirty." Despite this general awareness, an agreement show from the students in both groups that expressed uncertainty in making consistent healthy food choices due to limited knowledge about their nutritional bene-

fits and the appeal of unhealthy options available at the school canteen. There are some misclassification made by the students from both groups when showing a set of pictures of food and drink choices. For instance, deep fried chicken was considered as heathy choice by majority of students, while wholemeal bread categorized as an unhealthy choice.

Perceived Benefits of Healthy Eating

Both group of students either recognized multiple benefits of healthy eating, including; improved concentration and academic performance, enhanced immunity and overall fitness. The 8th grade group, however mentioned specific health advantages of healthy eating, such as reduced menstrual pain and better eye health.

Risks of Unhealthy Eating

Commonly mentioned risks of consuming unhealthy foods, by both groups of students, included immediate health impacts, such as acne and stomach-ache. Long-term risks, including obesity and diabetes, were noted by some but not all participants in each group, suggesting gaps in nutritional education.

School Support for A Healthier Food Environment

All groups of FGDs and interview's participants agreed on the necessity of schools playing a pivotal role in shaping a healthier food environment (Table 1). They recognized the importance of regulatory measures but offered complementary viewpoints based on their roles, such as students focused on restricting unhealthy food availability, teachers emphasized education and quality assurance, and the principal prioritized systematic monitoring and enforcement.

During the focus group discussions, students from both groups consistently highlighted the need for implementing regulations aimed at preventing the sale of unhealthy foods within school premises. This focus reflects their awareness of how the availability of food influences dietary choices. They perceived that restricting the sale of sugary drinks, fried snacks, and highly processed foods in school canteens would reduce the temptation and ease the shift toward healthier eating habits. Students proposed actionable steps, such as disallowing vendors from selling items categorized as unhealthy, including snacks high in sugar, salt, and fats. Another measure suggested was introducing healthy alternatives by encouraging canteen operators to offer appealing and nutritious options, such as less sugary drinks, low-fat snacks, and freshly prepared meals.

Unlike students, who primarily focused on limiting access to unhealthy snacks, teachers approached the problem from a broader, systematic viewpoint. Teachers believed that achieving a healthier school food environment required sustained efforts that combine policy enforcement, education, and continuous quality checks. Teachers emphasized the importance of promoting homemade meals as a healthier and safer alternative to store-bought or canteen food. Teachers expressed concern over the widespread availability of processed foods in school canteens and recommended policy enforcement to limit the sale of such items, replacing them with healthier options. Teachers also emphasized the importance of maintaining high standards for food preparation and handling in school canteens. Issues such as improper food storage, inadequate hygiene among food handlers, and unclean preparation areas were noted as risks to students' health. To address these concerns, teachers suggested introducing regular inspections to evaluate and enforce cleanliness standards.

The school principal identified food safety and nutritional quality as fundamental priorities for a healthier school food environment. This emphasis included ensuring that foods provided at school, particularly those sold in the canteen, meet minimum nutritional and safety standards. To achieve these goals, the principal proposed stricter oversight and collaboration with stakeholders, including food vendors and local health authorities. The school principal placed a strong emphasis on establishing systems to monitor and control the sale and quality of food in school canteens. Key aspects included introducing structured tools like checklists or digital reporting systems to track food quality and vendor compliance with school policies, setting clear guidelines for food suppliers, detailing acceptable food types, portion sizes, and preparation standards, and training canteen staff and vendors in food safety practices, hygiene, and nutritional education to align their practices with school policies. These measures were seen as

essential for sustaining a consistent standard of food quality and reducing dependence on ad hoc inspections. The school principal also recognized the need for accountability in enforcing food safety and nutritional standards. Proposed penalties for violations included, issuing initial warnings for minor infractions and imposing financial penalties on repeat offenders to deter noncompliance.

As shown in Table 2, each group provided unique recommendations on strategies to promote healthy food consumption at school, reflecting their distinct roles and perspectives. While students primarily focused on replacing unhealthy foods with healthier options in school canteens, teachers promoted actions such as regular verification of food and drink safety and nutritional value by regulatory bodies like BPOM (Indonesian Food and Drug Authority), encouraging students to bring homemade meals (e.g., breakfast, lunch, or snacks), and integration of nutrition-related topics into the curriculum to install long-term behavioural changes. Moreover, the school principal proposed primary actions such as formation of "healthy-school communities" (campaign groups) to foster a collective movement for health and embedding healthy food practices into the school curriculum.

In terms of effective channels that can be used, each group identified specific communication and engagement strategies to encourage healthier food habits. The students proposed the use of creative and visually engaging tools, such as educational videos and infographics videos and infographics shared via social media platforms, hosting healthy food bazaars to increase awareness and availability of nutritious options, and displaying infogaphics at canteen points of sale to directly influence purchasing decisions. Teachers' methods lean towards structured educational practices, integrating health promotion within the academic context. They advocated for more formalized channels, including delivering educational messages as part of classroom lessons and utilizing school assemblies as a direct method of communication to reinforce key messages. Additionally, the school principal emphasized collaboration as a key channel such as partnering with Student Council *(OSIS)* and involving parents in healthy food promotion efforts.

Table 1. Views Across Groups on The Role of School to Support a Healthier Food Environment

Theme	In what ways school can support a healthier school-food environment?		
	FGD Students	**FGD Teachers**	**In-Depth Interview**
Strengthening Regulations	Regulation for not selling unhealthy foods at school	1. Encourage homemade foods and limit high/ultra-processed foods sold at canteen 2. Guarantee food safety, cleanliness, and personal hygiene 3. Regular monitoring and evaluation	1. Ensure foods eaten are safe and healthy 2. Provision of instrument for monitoring and control foods/drinks sold at canteen 3. Provide warning and penalties for violations

Source: Primary Data, 2024

Table 2. Views Across Groups on Strategies to Promote Healthy Food Consumption at School

Theme	What are strategies to promote healthy foods consumption at school?		
	FGD Students	**FGD Teachers**	**In-Depth Interview**
Promotion Strategies	Replacing unhealthy foods with healthy foods sold at canteen	1. Food/drinks sold at canteen are regularly verified by BPOM 2. Bring breakfast/lunch/snack box from home 3. Integrate into curriculum	1. Create healthy-school communities (campaign groups) 2. Integrate into curriculum
	What channels that effective to promote healthy foods at school?		
	1. Educational videos, infographics posted in social media 2. Healthy food bazaar 3. Infographics at canteen	1. Educational messages integrated in classroom teaching 2. Direct messages during school assembly	Collaborate with Student Council *(OSIS)* programs and parents

Source: Primary Data, 2024

DISCUSSION

The findings of this qualitative study generate important evidence for understanding students' awareness and perspectives regarding healthy and unhealthy foods and their consequences on many aspects in adolescents' life as well as their recommendations regarding school roles to support for healthier food environment, teachers' perceptions on systematic approach that could be implemented in promoting and supporting a healthier food environment at school communities, and views from the school's highest authority person on the managerial and operational strategies to create a healthier school-food environment.

Students from both groups demonstrated an understanding of the distinctions between healthy and unhealthy foods. Their descriptors for healthy foods such as "fresh," "natural," "vitamin-rich," and "clean" indicate a general awareness of healthy foods, consistent with findings from previous research. A study by Keane et al. highlighted that adolescents often identify healthy foods based on their perceived freshness and absence of artificial additives. Similarly, descriptors like "oily," "fried," "sugary," and "preserved" reflect negative associations with unhealthy foods, echoing findings from Lachat et al. that adolescents are increasingly aware of the negative effects of processed foods.[9,10]

However, despite this awareness, students admitted to challenges in making consistent healthy food choices. This inconsistency may stem from a lack of nutritional knowledge, as described by Worsley, who observed that adolescents often struggle to translate theoretical awareness into practical dietary habits.[11] The study by Iyassu et al. revealed that although adolescents are aware of the health risks associated with unhealthy food consumption, they are more concerned about social consequences, such as peer mistreatment due to being underweight or overweight.[12] Furthermore, the appeal of unhealthy options readily available at school canteens exacerbates this issue, as suggested by Van Ansem et al., who linked the prevalence of unhealthy food environments to poor dietary decisions among teenagers.[13] The study by Chaby et al. found that poor food choices among adolescents are largely due to the lack of healthy food options available in the school environment.[14]

Both groups recognized the benefits of healthy eating, with mentions of enhanced academic performance, better concentration, and improved immunity. These findings align with research by Florence et al., which connected nutrient-rich diets to better cognitive function and school performance.[15] Interestingly, the 8th-grade group offered more nuanced benefits, such as reduced menstrual pain and improved eye health, suggesting that older students may have slightly more detailed health knowledge, a trend supported by Rasmussen et al., who reported that nutritional knowledge often increases with age.[16] The study by Kundu et al. found that educational programs promoting nutrition knowledge can help students make healthier food choices.[17] Similarly, Egg et al. reported that good nutritional knowledge encourages students to consume healthy foods more frequently.[18]

Students commonly associated unhealthy eating with immediate physical consequences, such as acne and stomachaches. However, awareness of long-term risks like obesity and diabetes was less consistent, indicating gaps in their understanding of chronic health outcomes. These findings are consistent with the work of Story et al., who observed that while adolescents understand some short-term impacts of poor nutrition, they often lack awareness of long-term risks due to limited educational interventions in schools.[19]

The results emphasize the importance of targeted nutrition education for adolescents. Programs that bridge the gap between theoretical awareness and practical decision-making, such as those discussed by Contento, are critical.[20] Additionally, improving the school food environment to reduce the availability of unhealthy options, as recommended by the World Health Organization (WHO), could support adolescents in making healthier food choices consistently. Integrating real-life examples and age-specific concerns, such as those highlighted by the 8th-grade group, could further enhance the effectiveness of these interventions.[21,22]

The data presented in the Table 1 highlights a shared concern among students, teachers, and key informant regarding the need for stronger

school-level regulations to foster a healthier food environment. From the student Focus Group Discussions (FGDs), there was a clear call for the establishment of regulations that prohibit the sale of unhealthy foods within school premises. This view is echoed and expanded upon by teachers, who emphasized the importance of promoting homemade meals and restricting the availability of high or ultra-processed foods in school canteens. Teachers also stressed the necessity of ensuring food safety and hygiene, as well as the importance of regular monitoring and evaluation of food practices at school.

Insights from in-depth interviews further reinforced these perspectives by advocating for stronger mechanisms to ensure that foods consumed by students are both safe and nutritious. Respondents recommended the provision of monitoring tools and systems to better control the types of foods and drinks sold in school canteens. Additionally, there was a strong sentiment that schools should implement a system of warnings and penalties for violations of food-related regulations to ensure compliance and accountability.

Together, these findings demonstrate a strong consensus across all groups on the crucial role of schools in shaping the food environment, not only through direct food provision but also by enforcing clear, structured, and actionable policies to support student health and well-being. Strong school policy is crucial to support environment as one important domain in Health Promoting School Framework,[23] and Barnes, et al, 2021 suggest that policy implementation has played a key role in increasing the presence of healthy foods in schools, likely supporting improvements in population-level nutrition.[24]

Table 2 presents findings on strategies and communication channels perceived as effective in promoting healthy food consumption in schools. Across the groups, several key strategies emerged, including provision of healthy food options, food safety regulations, integration of nutrition topics into curriculum, and healthy-school community formation. The strategies identified is align closely with the Health Promoting School (HPS) framework developed by the WHO, which emphasizes a comprehensive approach involving school policies, curriculum, the school environment, and community partnerships to improve student health and well-being.[25]

Students emphasized simplicity, advocating for direct changes in food availability. Their recommendations suggest an acute awareness of the need for healthier food choices and their dependency on the canteen for meals during school hours. Students emphasized the need for straightforward changes, such as ensuring that only healthy foods are available at school canteens. Their perspective reflects a practical understanding of how food environments directly influence their choices, as they rely heavily on canteens for meals during school hours. Research on food environments underscores the significant role of food availability in shaping dietary habits. A study by Swinburn et al., highlights that the presence of unhealthy food options in school environments contributes to increased consumption of ultra-processed foods among adolescents.[26] Similarly, research by Nørnberg et al., points to the importance of accessible healthy options in promoting better eating behaviors in children and adolescents.[27] This approach aligns with global strategies for obesity prevention, including creating "obesogenic" environments that are conducive to healthier eating behaviors. The simplicity of the students' recommendation shows their recognition of the power of environmental cues in shaping their dietary decisions.[28] In the context of Indonesia, a study by Octawijaya et al. proposed that school canteens that incorporate local food culture can support the development of healthier eating habits among students.[29]

A study conducted by Coady found that the availability of healthy food in school canteens influences students' consumption of healthy food.[30] This finding contrasts with the research by da Silva, which found no significant relationship between the school environment and healthy food consumption.[31] These differing results highlight the importance of collaboration between the school environment and the home environment in promoting healthy eating habits among students.

Teachers approached the issue systematically, suggesting both institutional interventions and student-centric strategies that combine education with practical applications.

Teachers proposed a combination of institutional and student-focused strategies, such as regular food quality verification, promoting homemade meals, and incorporating nutrition education into the school curriculum. This reflects a holistic approach to tackling unhealthy food consumption. Teachers' recommendations align with findings by Wang and Lobstein, which argue that school-based interventions are most effective when they integrate educational components with supportive policy measures.[32] Kifle et al. also found similar results, noting that teachers perceive the integration of nutrition education into the school curriculum as important.[33] Moreover, Micha et al., emphasize that multi-component interventions in schools, combining education with structural changes, lead to significant improvements in dietary behaviors among adolescents.[31] This finding is consistent with the results reported by Almughamisi et al. The integration of nutrition education into curricula is particularly significant.[34] Studies like Pérez-Rodrigo and Aranceta, demonstrate that school-based health education programs not only improve knowledge but also foster long-term behavioral changes.[35] Teachers' focus on both practical and educational dimensions reflects a forward-thinking approach.[23]

The principal's recommendations highlight managerial strategies and the establishment of a supportive community framework to sustain long-term changes. The principal's approach highlights the importance of involving multiple stakeholders in creating a unified and consistent message around healthy eating. The principal focused on managerial strategies, such as monitoring food safety, enforcing penalties for violations, and fostering collaboration among stakeholders, including students, parents, and student councils. This indicates a governance-oriented approach to sustaining health-promoting environments. The principal's approach mirrors best practices identified in public health frameworks. For instance, a study by Story et al., highlights the critical role of school leadership in implementing and maintaining health-promotion policies.[36] Furthermore, Langford et al., found that interventions involving multiple stakeholders, including families and community members, are more sustainable and impactful.[25]By emphasizing stakeholder collaboration, the principal addresses the need for a shared responsibility in creating a healthier food environment. This approach resonates with WHO's Global School Health Initiative, which advocates for whole-school strategies to improve nutrition and health.[37]

In terms of communication channels, students identified social media as a powerful medium, suggesting the use of educational videos and infographics, in addition to onsite approaches like healthy food bazaars and visual materials at canteens. Teachers suggested embedding educational content within classroom instruction and delivering targeted messages during school assemblies. Informants from in-depth interviews advocated for collaborative efforts involving student councils *(OSIS)* and parental engagement as effective avenues to sustain healthy eating behaviors. Together, these channels reflect a comprehensive communication strategy consistent with the WHO and UNICEF school nutrition promotion frameworks.[38]

CONCLUSION AND RECOMMENDATION

Overall, the findings underscore a multisectoral and multimedia approach that includes policy, education, environmental restructuring, and community engagement to support healthy food consumption among school-aged children. The diverse perspectives of students advocating for direct changes, teachers suggesting systemic approaches, and the principal emphasizing managerial strategies create a comprehensive framework for promoting healthy food consumption at school. These findings suggesting the need for a multi-stakeholder and multi-prolonged approach to tackle dietary challenges in schools. Such collaboration can foster environments conducive to sustained behavioral changes, ultimately reducing the prevalence of diet-related health issues among adolescents.

ACKNOWLEDGMENTS

The research received funding support from the University of Hasanuddin through LPPM UNHAS (grant number 2215/UN4.1/KEP/2021).

The authors would like to acknowledge all participants in the FGDs and interviews, the research assistants who helped the data collection, and the authorities and teachers at the schools to fully support this research.

AUTHOR CONTRIBUTIONS

Conceived and designed the research by RI, IFI, YK, SA, and B; RI, YK, and SA perfomed data collection; RI and YK performed data analysis and wrote the manuscript. All authors read and apporoved the final manuscript. RI = Rahayu Indriasari; IFI = Indra Fajarwati Ibnu; YK = Yessy Kurniati; SA = Safrullah Amir; B = Baqis.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Devine L. D., Hill A. J., Gallagher A. M. Improving Adolescents' Dietary Behaviours in The School-Setting: Challenges and Opportunities. *Proceedings of the Nutrition Society*. 2023;82(2):172–185. https://doi.org/10.1017/S0029665123002197
2. Chaudhary A., Sudzina F., Mikkelsen B. E. Promoting Healthy Eating Among Young People A Review of the Evidence of The Impact of School-Based Interventions. *Nutrients*. 2020;12(9):1–34. https://doi.org/10.3390/nu12092894
3. WHO. Obesity and Overweight. World Health Organization; 2025. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
4. UNICEF. Undernourished and Overlooked: A Global Nutrition Crisis in Adolescent Girls and Women. United Nations Children's Fund; 2023. https://www.unicef.org/reports/undernourished-overlooked-nutrition-crisis
5. Muonde M., Olorunsogo T. O., Ogugua J. O., Maduka C. P., Omotayo O. Global Nutrition Challenges: A Public Health Review of Dietary Risks and Interventions. *World Journal of Advanced Research and Reviews*. 2024;21(1):1467–1478. https://doi.org/10.30574/wjarr.2024.21.1.0177
6. Baltag V., Sidaner E., Bundy D., Guthold R., Nwachukwu C., Engesveen K., et al. Realising the Potential of Schools to Improve Adolescent Nutrition. *BMJ*. 2022; 379:e067678. https://doi.org/10.1136/bmj-2021-067678
7. Daly A. N., O'Sullivan E. J., Kearney J. M. Considerations for Health and Food Choice in Adolescents. *Proceedings of the Nutrition Society*. 2022;81(1):75–86. https://doi.org/10.1017/S0029665121003827
8. Fadila J. Hubungan Konsumsi Ultra Processed Food Terhadap Kejadian Berat Badan Lebih pada Remaja di SMPN 3 Makassar. (Thesis). Makassar; Fakultas Kesehatan Masyarakat Universitas Hasanuddin; 2022. https://repository.unhas.ac.id/id/eprint/18087/
9. Keane A, Willetts A, Godin L. Adolescents' Perceptions of Healthy and Unhealthy Food: The Role of Food Additives and Naturalness. *Journal of Public Health (Bangkok)*. 2015; 37(2):213–219.
10. Lachat C., Nago E., Verstraeten R., Roberfroid D., Van Camp J., Kolsteren P. Eating Out of Home and Its Association with Dietary Intake: A Systematic Review of The Evidence. *Obesity Reviews*. 2012;13(4):329–46. https://doi.org/10.1111/j.1467-789X.2011.00953.x
11. Worsley A. Nutrition Knowledge and Food Consumption: Can Nutrition Knowledge Change Food Behaviour? *Asia Pacific Journal of Clinical Nutrition*. 2002;11(S3):S579–S585. https://doi.org/10.1046/j.1440-6047.11.supp3.7.x
12. Iyassu A., Laillou A., Tilahun K., Workneh F., Mogues S., Chitekwe S., Baye K. The Influence of Adolescents' Nutrition Knowledge and School Food Environment on Adolescents' Dietary Behaviors in Urban Ethiopia: A Qualitative Study. *Maternal & Child Nutrition*. 2024;20(S5):e13527. https://doi.org/10.1111/mcn.13527
13. Van Ansem W. J., Schrijvers C. T., Rodenburg G., Van de Mheen D., Van de Goor I. A. School Food Environments and The Dietary Choices of Adolescents: The Role of Food

Availability. *J Sch Health*. 2013;83(7):521–9.

14. Mama Chabi S., Fanou-Fogny N., Nago Koukoubou E., Deforche B., Van Lippevelde W. Factors Explaining Adolescent Girls' Eating Habits in Urban Benin: A Qualitative Study. *Adolescents*. 2022;2(2):205–219. https://doi.org/10.3390/adolescents2020017
15. Florence M. D., Asbridge M., Veugelers P. J. Diet Quality and Academic Performance. *Journal of School Health*. 2008;78(4):209–215. https://doi.org/10.1111/j.1746-1561.2008.00288.x
16. Rasmussen M., Krølner R., Klepp K. I., Lytle L., Brug J., Bere E., Due P. Determinants of Fruit and Vegetable Consumption Among Children and Adolescents: A Review of The Literature. Part I: Quantitative Studies. *International Journal of Behavioral Nutrition and Physical Activity*. 2006;3(22):1–19. https://doi.org/10.1186/1479-5868-3-22
17. Kundu S., Khan M. S. I, Bakchi J., Sayeed A., Al Banna M. H., Begum M. R., Hassan M. N. Sources of Nutrition Information and Nutritional Knowledge Among School-Going Adolescents in Bangladesh. *Public Health in Practice*. 2020;1(March):1–5. https://doi.org/10.1016/j.puhip.2020.100030
18. Egg S., Wakolbinger M., Reisser A., Schätzer M., Wild B., Rust P. Relationship Between Nutrition Knowledge, Education and Other Determinants of Food Intake and Lifestyle Habits Among Adolescents from Urban and Rural Secondary Schools in Tyrol, Western Austria. *Public Health Nutrition*. 2020;23(17):3136–3147. https://doi.org/10.1017/S1368980020000488
19. Story M, Neumark-Sztainer D, French S. Individual and Environmental Influences on Adolescent Eating Behavior. *Journal of the American Dietetic Association*. 2002;102(3):S40–S51. https://doi.org/10.1016/S0002-8223(02)90421-9
20. Contento I. R. Nutrition Education: Linking Research, Theory, and Practice. 2008;17(1):176–179. https://pubmed.ncbi.nlm.nih.gov/18296331/
21. WHO. Report of The Commission on Ending Childhood Obesity: Implementation Plan: Executive Summary. World Health Organization; 2017. https://iris.who.int/handle/10665/259349
22. Rocha L. L, Cordeiro N. G., Jardim M. Z., Kurihayashi A. Y, Gentil P. C, Russo G. C, et al. Do Brazilian Regulatory Measures Promote Sustainable and Healthy Eating in The School Food Environment? *BMC Public Health*. 2023;23(2166):1–9. https://doi.org/10.1186/s12889-023-17111-7
23. O'Brien K. M., Barnes C., Yoong S., Campbell E., Wyse R., Delaney T., et al. School-Based Nutrition Interventions in Children Aged 6 to 18 Years: An Umbrella Review of Systematic Reviews. *Nutrients*. 2021;13(11):1–31. https://doi.org/10.3390/nu13114113
24. Barnes C., Mccrabb S., Stacey F., Nathan N., Yoong S. L., Grady A., et al. Improving Implementation of School-Based Healthy Eating and Physical Activity Policies, Practices, and Programs: A Systematic Review. *Translational Behavioral Medicine*. 2021;11(7):1365–1410. https://doi.org/10.1093/tbm/ibab037
25. Langford R., Bonell C. P., Jones H. E, Pouliou T., Murphy S. M., Waters E., et al. The WHO Health Promoting School Framework for Improving The Health and Well-Being of Students and Their Academic Achievement. *Cochrane Database of Systematic Reviews*. 2014;4(CD008958). https://doi.org/10.1002/14651858.CD008958.pub2
26. Swinburn B. A., Sacks G., Hall K. D., McPherson K., Finegood D. T., Moodie M. L., et al. The global obesity pandemic: Shaped by Global Drivers and Local Environments. *Lancet*. 2011;378(9793):804–814. http://dx.doi.org/10.1016/S0140-6736(11)60813-1
27. Nørnberg T., Houlby L., Jørgensen L., et al.

Do We Know How to Nudge? A Review of The Use of Behavioral Nudges in The School Food Environment. *Int J Behav Nutr Phys Act*. 2016;13(1):77.

28. Ronto R., Carins J., Ball L., Pendergast D, Harris N. Adolescents' Views on High School Food Environments. *Health Promotion Journal of Australia*. 2021;32(3):458–466. https://doi.org/10.1002/hpja.384
29. Octawijaya I. H., Wariki W. M. V, Hori A., Ichikawa M. Food Environment of Junior High Schools in Tomohon City, Indonesia. *Indonesian Journal of Public Health*. 2022;17 (3):377–384. https://doi.org/10.20473/ijph.v17i3.2022.377-384
30. Coady O. R., Styles S. E., Smith C. Barriers and Enablers to Providing Healthy Food and Beverages in New Zealand Secondary School Canteens. *Health Promotion International*. 2025;40(1):daaf011. https://doi.org/10.1093/heapro/daaf011
31. da Silva M. B., Pinheiro K. C., Rockenbach G., Hinnig P. D., de Pinho M. G., de Souza L. D., et al. Association Between the Food Environment Around Schools and Food Consumption of Adolescents in Large and Small Municipalities in Southern Brazil. *International Journal of Environmental Research and Public Health*. 2024;21(11): 1524. https://doi.org/10.3390/ijerph21111524
32. Wang Y., Lobstein T. Worldwide Trends in Childhood Overweight and Obesity. *International Journal of Pediatric Obesity*. 2006;1(1):11–25. https://doi.org/10.1080/17477160600586747
33. Mekonnen Kifle M, Terragni L., Morseth M. Teachers' Perception of Their Students' Dietary Habits in Addis Ababa, Ethiopia: A Qualitative Study. *BMC Nutrition*. 2024; 10(141). https://doi.org/10.1186/s40795-024-00946-7
34. Almughamisi M, O'Keeffe M, Harding S. Adolescent Obesity Prevention in Saudi Arabia: Co-identifying Actionable Priorities for Interventions. *Frontiers Public Health*. 2022;10:1–11. https://doi.org/10.3389/fpubh.2022.863765
35. Pérez-Rodrigo C., Aranceta J. School-based Nutrition Education: Lessons Learned and New Perspectives. *Public Health Nutrition*. 2001;4(1a):131–139. https://doi.org/10.1079/PHN2000108
36. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annual Review of Public Health*. 2008;29:253–272. https://doi.org/10.1146/annurev.publhealth.29.020907.090926
37. WHO. 1998. Global School Health Initiative: Health-Promoting Schools. World Health Organization; 1998. https://www.who.int/health-topics/health-promoting-schools#tab=tab_1
38. FAO. School-based Food and Nutrition Education. Rome: Food and Agriculture Organization of The United Nations; 2020. https://openknowledge.fao.org/server/api/core/bitstreams/be2fc797-d10d-44fc-9e62-618190756f26/content