



Teacher Training on Healthy Canteen Improves Knowledge and Attitude of Primary School Student

Ana Yuliah Rahmawati^{1✉}, Kun Aristiati Susiloretni¹, Fitriani¹, Arina Nurul Ihsani²

¹Poltekkes Kemenkes Semarang, Indonesia

²Poltekkes Kemenkes Jakarta 2, Indonesia

Article Info

Article History:
Submitted 12 Augustus 2025
Accepted 16 July 2026
Published 30 July 2026

Keywords:
school-aged children; canteen;
NCDs; nutrition education

DOI
<https://doi.org/10.15294/jhe.v11i1.38211>

Abstract

Background: School age is one of the periods that experience rapid growth and development and are highly vulnerable to nutritional problems due to poor eating habits influenced by their school environment. Nutrition education interventions in schools are essential to improve knowledge, attitudes, and behaviors related to healthy eating among students and teachers. This study aimed to evaluate the effectiveness of nutrition education interventions using videos and leaflets in improving the knowledge, attitudes, and practices of students and teachers, regarding healthy snack selection in elementary schools.

Methods: This quasi-experimental study with a non-randomized one group pre-post test design was conducted in two elementary schools in Semarang, involving students and teachers. Data were collected through nutrition education interventions using videos and leaflets, with knowledge, attitudes, and practices measured before and after the intervention.

Results: There is an effect of nutrition education on students' knowledge and attitude in choosing healthy snacks ($p < 0.001$), the effect of nutrition education on teachers' attitude choosing healthy snacks in both groups ($p = 0.027$).

Conclusion: The results showed that nutrition education interventions using videos and leaflets effectively improved students' knowledge and attitudes toward healthy snack choices, and also enhanced attitudes among teachers. However, the intervention had limited effect on improving teachers' knowledge, highlighting the need for more targeted and interactive approaches, especially for adults.

✉ Correspondence Address:
Email : anayuliah@poltekkes-smg.ac.id

INTRODUCTION

School-aged children (SAC) (age 6 to 12 years), is one of the periods that experience rapid growth and development. At this stage of development, engagement in physical activities progressively increases, including activities such as play, exercise, and assisting parents with daily tasks. Good nutritional intake in terms of quantity and quality is needed to optimized children's growth and development. Nutrition intake at this age usually not optimal, as eating behaviors are significantly influenced by various environmental factors (Mahan LK, 2008; MatthewJukes, 2021; Patel et al., 2021).

Poor eating habits among SAC contribute to serious nutritional problems, such as obesity, thinnes or stunting. The prevalence of stunting and undernutrition among school children is still high internationally. It was reported in trends from 1975 to 2016, that the prevalence of stunted school children is around 48-56%, In 2016, South Asia accounted for 63% of the world's moderately and severely underweight children, with population growth also increasing the underweight burden in Southeast Asia and central, east, and west Africa. In Indonesian SAC, there is an increase rate of severely thinnes and thinnes in 5 years from 2018 to 2023 by 9,2% to 11% and a decrease of obese rate from 9,2% to 7,8% (Badan Penelitian dan Pengembangan Kesehatan, 2019; Kementerian Kesehatan RI, 2023).

Nutritional problems in SAC are often associated with consumption patterns of eating habits and behavior both at home and at school. Eating behaviors such as, snacks consumption, junk food or street food which are typically high in fat, particularly those that are fried. These types of foods generally have low satiety value and do not provide lasting fullness. This pattern of consumption may contribute to the prevalence of malnutrition among school-aged children (Judarwanto, 2006; MatthewJukes, 2021).

One of the key factors influencing an individual's nutritional status is limited knowledge about nutrition. Inadequate nutritional knowledge may hinder an individual's ability to apply appropriate dietary practices in daily life. Providing nutrition education from an early age is an effective

strategy to enhance nutritional knowledge. This education can be delivered through various methods, such as counseling, as well as the use of educational media including posters, leaflets, booklets, videos, and other relevant materials targeted at school-aged children (Machfoedz I dan Suryani S, 2007; Suhardjo, 2003).

Education can increase a person's knowledge, with increased knowledge is generally associated with improved behaviors towards nutrition and health (Li & Powdthavee, 2015). Health and nutrition education programs in school children are one way to implement global health interventions in a simple and effective way to obtain wider education (MatthewJukes, 2021).

Children spend a significant portion of their day at school, consuming 1-2 meals there (Esposito et al., 2022). The role of teachers is very important in helping children choose healthy snacks. Schools play a crucial role in regulating and ensuring the safety and quality of food sold within the school canteen environment. Thus the school food environment significantly influences children's dietary habits and malnutrition risk (Kelly et al., 2019).

The food environment around schools often features unhealthy options, despite existing guidelines. Numerous vendors remain inadequately informed about food safety and the quality of food and beverages offered. Their primary focus tends to be on maximizing profit, often at the expense of considering the potential health risks associated with selling unhygienic food and drinks to school children. The impact of a low level of food safety can lead to a variety of foodborne diseases caused by improper food processing (Hadi et al., 2021).

Research indicates that school food environments significantly influence students' dietary choices, but often promoting energy-dense, nutrient-poor options (O'Halloran et al., 2020). Conversely, availability and accessibility of healthy foods in schools are associated with increased fruit and vegetable consumption among students (Terry-McElrath et al., 2014).

Healthy canteens are not just about offering healthy foods; they act as a practical, real-life nutrition education tool. Embedding nutrition education within the school canteen bridges the gap between knowledge and practice

(Khaerunisa et al., 2025a). Thus enhances nutrition literacy and decision-making skills in children.

A study in 40 secondary schools in India introduced an intervention that included school policies, classroom activities, and family programs using Information, Education, and Communication (IEC) materials. The study showed that more intervention schools implemented healthy food policies compared to control schools, and students in the intervention group demonstrated greater improvements in knowledge and behavior related to healthy eating (Trial et al., 2014).

Despite existing evidence highlighting the significant influence of school food environments and nutrition education on children's eating behaviors, there remain several research gaps and opportunities. Furthermore, there is lack of studies that involve active collaboration between schools, families, and local food vendors to create a supportive and consistent healthy eating environment. This experimental research observe the relationship between education intervention to teachers and students.

METHODS

This was quasi experimental research with a non-randomized one group pre-post test design. The type of data collected in this study was primary quantitative data, which included nutrition education on healthy snack selection as independent variable, knowledge, attitudes, and practices in selecting healthy snacks among school children as dependent variables.

The study was conducted in 2 elementary schools in Semarang City. The selection was based on recommendations from the Semarang City Education Office focusing on schools with an organized canteen and a minimum canteen area of more than 5m². The selected schools were SDN Kalibanteng 1 West Semarang, representing a rural area, and SDN Sendangmulyo 4 Tembalang, representing an urban area.

The study population consisted of all elementary school students, and teachers from the two selected elementary schools. The sample inclusion criteria were: fourth-

and fifth-grade students, teachers teaching at the selected schools. Student participants were selected through random sampling by randomly choosing one class from both grade IV or V at each school. All teachers from the selected schools were included as study participants. SDN Sendangmulyo 04 was designated as the intervention group, while SDN Kalibanteng Kidul 01 served as the control group. The research instruments included informed consent forms, educational materials (in the form of videos and leaflets) on healthy snack selection for school children, and structured questionnaires to assess knowledge and attitudes among students and teachers.

Prior to data collection, the research instrument, which consisted of a questionnaire assessing knowledge and attitudes regarding healthy snacks and nutrition, was subjected to validity and reliability testing. Validity was evaluated among 30 respondents with characteristics comparable to those of the study population using the Pearson Product-Moment correlation test. All questionnaire items demonstrated statistical significance ($p < 0.05$) and were therefore considered valid. Reliability analysis was performed using Cronbach's Alpha, yielding coefficients of 0.721 for the knowledge scale and 0.773 for the attitude scale, indicating acceptable internal consistency. These findings suggest that the questionnaire is a valid and reliable instrument for measuring respondents' knowledge and attitudes toward healthy snacks and nutrition.

Univariate analysis was conducted to describe the frequency distribution of each variable examined in the study. Normality testing was performed using the Kolmogorov-Smirnov test. Subsequently, paired t-tests were applied to assess changes within the intervention group, while independent t-tests were used to compare outcomes between the intervention and control groups. Analysis was performed using SPSS software version 21

This study was approved by the Health Research Ethics Committee of Poltekkes Kemenkes Semarang No. 1082/EA/KEPK/2024. For both groups, written informed consent were obtained from parents of all children (participants).

RESULT AND DISCUSSIONS

We found that at SDN Sendangmulyo 04 a team of food safety supervisors for children's snacks at school has been formed and the food sellers are clean (clothes, hands) and there are no open wounds and does not wear excessive jewelry. However, there is no written commitment from the school to maintain the safety of snacks at school, sellers/handlers do not use Personal Protective Equipment (PPE) such as aprons and headgear, and they have received training on food sanitation hygiene or food safety (Table 1). While at SDN Kalibanteng Kidul 01, we observed that a supervisory team for the safety of children's snacks at school had been formed with no written commitment from the school to maintain the safety of snacks at school. We also found that sellers/handlers

have not received training on food sanitation hygiene or food safety.

Based on the observation, there were no food suspected of containing hazardous chemicals such as formalin, borax and textile dyes. However, qualitative/quantitative checks are also needed to confirm this. Food provided and/or sold in the canteen is healthy food and drinks, which means it must be safe (from biological/germ hazards, chemical hazards and physical hazards) and contain the nutrients needed especially for consumers, especially students.

Based on (Table 1) The snacks sold at Canteen 2 are varied enough to meet the nutritional needs of students while at school, especially students who do not bring lunch at school.

Table.1 Snacks sold in the canteens

Types of Snacks	Canteen at Intervention Primary School	Canteen at Control Primary School
Full meal	Geprek Chicken Rice Salt Chili Chicken Rice Fried rice Honey chicken rice Rendang rice Chicken katsu rice Chicken rice Egg noodle bite rice Spicy chicken rice bites Onigiri Sushi	Geprek Chicken Rice Fried rice Rice wrap
Dry snacks	Nting - nting Rambak Banana jam Chips Macaroni Chiki (taro, potato) Oreo Packaged snacks	Spicy crackers Chiki (chitato, chiki balls) Pop corn Marshmallow Intestines Makroni
Wet snacks	Pudding ceplok Mochi Nagasari Fried foods Meatball skewers Sausage skewers Satay dumplings Pizza Steamed donuts Waffle Leker Fried noodles Spaghetti	Donuts Dumplings Kebabs Jasuke Moci Dumplings Chocolate Cheese crispy banana Takoyaki Corndog Pizza Grilled meatballs Sausage bread

Types of Snacks	Canteen at Intervention Primary School	Canteen at Control Primary School
	Egg roll	Risol mayo
	Jasuke	Tofu meatballs
	Crispy banana	Sausage solo
	Baked brownies	Kubami
	Sausage packaging	Maklor
		Chocolate banana
		Ice cream
Fruit	Guava juice	Melon fruit juice
Drinks	Suction pudding	Bottled drinks (the box, fruit tea, s-tee)
	Chocolate ice	Ice the cup
	Boba drink	Flavored drinks (pop ice)
	Packaged beverages (boxed tea)	
	Packaged milk	
	Mineral water	

The complete meals sold by the school, especially at the intervention primary school, are quite varied, but most of the contents are only staple foods and protein, both at the intervention and control primary schools. For example, the katsu rice contains only rice and chicken. Rice dominates consumption among Indonesia population, despite the availability of diverse local staples (Rusdi, 2023).

Dry snacks sold are mostly high in sodium because they are topped with seasonings and monosodium glutamate that add savory snacks, such as spicy crackers, macroni, packaged snacks. The wet snacks sold are also quite varied, there are traditional and contemporary snacks, but most are high in carbs and high in fat such as: fried foods, donuts, brownis and others. There are only a few traditional snacks such as nagasari, buns, steamed donuts, most of the contemporary foods. Children's preference for salty snacks is influenced by both innate taste preferences and environmental factors (West et al., 2019).

The complete meals sold by the school, especially at the intervention primary school, are quite varied, but most of the contents are only staple foods and protein, both at the intervention and control primary schools. For example, the katsu rice contains only rice and chicken. Rice dominates consumption among Indonesia population, despite the availability of diverse local staples (Rusdi, 2023).

Dry snacks sold are mostly high in sodium because they are topped with seasonings and monosodium glutamate that add savory snacks, such as spicy crackers, macroni, packaged

snacks. The wet snacks sold are also quite varied, there are traditional and contemporary snacks, but most are high in carbs and high in fat such as: fried foods, donuts, brownis and others. There are only a few traditional snacks such as nagasari, buns, steamed donuts, most of the contemporary foods. Children's preference for salty snacks is influenced by both innate taste preferences and environmental factors (West et al., 2019).

Based on the result of knowledge and attitudes improve with nutrition education, particularly among students, we see behavioral nudging approach as a potential for further intervention simple changes to choice architecture, such as improving the visibility and accessibility of healthy options, can lead to increased selection and consumption of fruits, vegetables, and other nutritious food (Marcano-Olivier et al., 2019; Winkler et al., 2018). Effective strategies include altering food placement, enhancing presentation, and using attractive labeling (Ozturk et al., 2020).

However, our observation showed an absense of written commitment or formal policies regarding healthy canteen management. Research indicates that implementing healthy school canteens is crucial for improving students' nutrition and overall health. Written policies and commitments are important for effective implementation as proper management, including staff training, use of protective equipment, and supervision, are essential (Fudla et al., 2022) to impact students' academic achievement and eating habits (Agustin et al., 2022; Khaerunisa et al., 2025b).

Teacher and Student Characteristics

Based on (Table 2) The respondent teachers were all classroom teachers. The average age of teachers in control primary schools was 41.8 ± 12.3 years while in intervention primary schools it was 41.2 ± 10.6 years. The gender of teachers in control and intervention primary schools was mostly female, 66.7% and 84.2%

respectively. The mean length of teaching experience in control primary schools was 12.1 ± 11.9 years, while in intervention primary schools it was 15.5 ± 10.4 years. Students who were respondents were grade 4 and 5 students, so their mean age was almost the same, 10.4 (0.5) years in control primary schools and 10.5 (0.6) years in intervention primary schools.

Table.2 Characteristics of teachers and students

Parameters	Control	Intervention	Total
Teacher			
Age	41.8± 12.3	40.7± 9.4	41.2± 10.6
Gender			
Male	5 (33.3%)	3 (15.8%)	8 (23.5%)
Female	10 (66.7%)	16 (84.2%)	26 (76.5%)
Years of teaching (yrs)	12.1± 11.9	15.5± 10.4	14.0± 11.1
Students			
Participants	46 (46.5%)	53 (53.5%)	99 (100.0%)
age	10.4 (0.5)	10.5 (0.6)	10.4 (0.6)
Gender			
Male.	29 (63.0%)	24 (45.3%)	53 (53.5%)
Female	17 (37.0%)	29 (54.7%)	46 (46.5%)

Table.3 Teacher's knowledge and attitude

Parameters	Control	Intervention	Total
Knowledge pretest	64.7± 14.6	66.3± 8.8	65.6± 11.5
Knowledge posttest	65.7± 10.0	72.1± 11.1	69.3± 10.9
Attitude pretest	3.8± 0.7	4.1± 0.3	3.9± 0.5
Attitude posttest	3.7± 0.7	4.3± 0.3	4.0± 0.6
Category Pretest knowledge			
<=60 (less)	7 (46.7%)	7 (36.8%)	14 (41.2%)
61-80 (sufficient)	7 (46.7%)	11 (57.9%)	18 (52.9%)
>=80 (good)	1 (6.7%)	1 (5.3%)	2 (5.9%)
Category Posttest knowledge			
<=60 (less)	8 (53.3%)	2 (10.5%)	10 (29.4%)
61-80 (sufficient)	7 (46.7%)	14 (73.7%)	21 (61.8%)
>=80 (good)	0 (0.0%)	3 (15.8%)	3 (8.8%)

Effect of nutrition education on teachers' knowledge and attitudes about food selection

Teachers in the intervention group were given education using videos and leaflets once, after which grades 4 and 5 were sampled so that teachers in those grades were assigned to teach their classes. Table 3 below shows the knowledge and attitudes of teachers before and after the intervention in the 2 groups. (Table 3)

The findings of this study indicate that the nutrition education intervention using videos and leaflets did not significantly affect teachers'

knowledge regarding healthy snack choices. This suggests that informational materials such as videos and leaflets may have limited impact on improving teachers' knowledge, particularly in populations where baseline knowledge is already moderately high or where prior exposure to similar content exists. The education impact may vary depending on the target audience and subject matter.

No significant change in teachers' knowledge, but their attitudes improved indicates that knowledge alone may not be the primary barrier. Teachers report limited

time, inadequate resources, and competing curriculum demands as major barriers to delivering nutrition education in primary schools (de Vlieger et al., 2019; Metos et al., 2019). Barriers to effective implementation include insufficient resources, inadequate training, and low prioritization compared to academic subjects (Aydin et al., 2022).

In contrast, the intervention was effective in improving teachers' attitudes toward healthy snack selection. This finding highlights that even when changes in knowledge are minimal, targeted educational interventions can positively influence attitudes. While some studies found sustained improvements in attitudes after receiving nutrition education (Vasquez-Mamani et al., 2025) others noted that attitude changes were not fully retained long-term (Zakiah et al., 2023). Research suggests that investing in nutrition education for teachers can have beneficial effects on both teachers and students, though more comprehensive support and resources are needed (Gurning & Nasution, 2023; Liu et al.,

2018). This highlights the importance of regular exposure to nutrition education that can lead to sustained positive attitudes in teachers.

This points to the need for future interventions to integrate interactive elements—such as discussions, role plays, or participatory learning activities—to strengthen both cognitive and emotional engagement. Research suggests that interactive learning methods are generally more effective than passive approaches for improving knowledge and attitudes related to health topics. Role-playing and participatory discussions have shown particular promise in enhancing understanding and changing behaviors (Nurdin et al., 2018).

Effect of nutrition education on students' knowledge and practice in choosing snacks

Students in the intervention group were given education twice by their class teachers using videos and leaflets afterwards. The education was also interspersed with quizzes to attract students' interest. (Table.4)

Table.4 Students' knowledge and attitude

Parameters	Control	Intervention	Total
Knowledge pretest	55.2± 14.6	61.0± 15.2	58.3± 15.1
Knowledge posttest	60.2± 15.4	72.4± 14.5	66.8± 16.1
Attitude pretest	0.8± 0.2	0.7± 0.3	0.7± 0.2
Attitude posttest	0.7± 0.2	0.9± 0.1	0.8± 0.1
Category Pretest knowledge			
<60	30 (65.2%)	22 (41.5%)	52 (52.5%)
60-79	13 (28.3%)	23 (43.4%)	36 (36.4%)
>80	3 (6.5%)	8 (15.1%)	11 (11.1%)
Category Posttest knowledge			
<60	24 (52.2%)	11 (20.8%)	35 (35.4%)
60-79	15 (32.6%)	18 (34.0%)	33 (33.3%)
>80	7 (15.2%)	24 (45.3%)	31 (31.3%)

Nutrition education on teachers' knowledge and attitude about the selection of snack

Based on our analysis in (Table 5), nutrition education did not affect teacher knowledge between the intervention and control groups after controlling for age, gender, years of teaching, pre-test scores ($p=0.258$),

although the intervention group scored higher with a mean of 72.1 +11.1.

Nutrition education affected the attitude of teachers between the intervention and control groups after controlling for age, gender, length of teaching, pre-test scores ($p=0.027$), in the intervention group the score was higher with a mean of 4.3 +0.3.

Table.5 Effect of nutrition education on teachers' knowledge and attitude about food selection in both groups

Outcomes	Control	Intervention	Adjusted p
	mean $\pm$ SD	mean $\pm$ SD	
Knowledge	65.7 $\pm$ 10.0	72.1 $\pm$ 11.1	0.258
Attitude	3.7 $\pm$ 0.7	4.3 $\pm$ 0.3	0.027

Nutrition education on students' knowledge and practice in choosing snacks

Based on (Table 6) Nutrition education was found to significantly influence students' knowledge between the intervention and control groups after controlling for age, gender, teaching experience, and pre-test scores ($p < 0.001$). The intervention group showed a higher

mean post-test knowledge score (72.4 ± 14.5).

Similarly, nutrition education was also effective in improving students' attitudes toward healthy snacking between the two groups after adjusting for age, gender, teaching experience, and pre-test scores ($p < 0.001$), with the intervention group demonstrating a higher mean attitude score (0.9 ± 0.1)

Table.6 Effect of nutrition education on students' knowledge and practice of food selection in both groups

Outcomes	Control	Intervention	Adjusted
	mean $\pm$ SD	mean $\pm$ SD	p
Knowledge	60.2 $\pm$ 15.4	72.4 $\pm$ 14.5	<0.001
Practice	0.7 $\pm$ 0.2	0.9 $\pm$ 0.1	<0.001

The results of this study demonstrate that the nutrition education intervention, delivered through videos and leaflets, significantly improved both students' knowledge and attitudes regarding healthy snack selection. Highlights the effectiveness of visual and printed educational media in enhancing students' understanding of healthy eating practices. In addition to improving knowledge, the intervention also had a significant impact on students' attitudes toward healthy snack choices.

Research indicates that educational media such as videos and leaflets are effective in increasing knowledge among school children on various health topics. Previous study found both video and leaflets interventions significantly improved nutrition knowledge in elementary school children (Khaerunisa et al., 2025b). Both video and poster interventions positively influenced knowledge, attitudes, and actions regarding healthy snack choices among elementary students (Mayasari et al., 2020). Overall, these studies demonstrate that visually appealing media are valuable tools for health education among school-aged children.

Nutrition education must be culturally sensitive and address taste preferences to

effectively promote healthy eating behaviors. Culturally adapted nutrition education in a food pantry setting can help different ethnic groups improve health literacy and nutrition behaviors (Guerra et al., 2020). However, changing snacking behavior remains challenging and may require additional strategies. Efforts has been made to address this issues, researchers have developed nutritious alternatives like corn and tempeh jelly gum (Guerra et al., 2020) and seaweed snack bars to address childhood obesity (Farida et al., 2022).

As in our findings showed that nutrition education through leaflets and video has significantly impact on children knowledge and attitudes, we see that digital technology offers promising opportunities for scaling nutrition education interventions among teachers and students. Studies have shown that interactive multimedia platforms, mobile applications, and social media can effectively increase nutrition knowledge and promote healthier dietary habits in children and adolescents (Dallagiacoma et al., 2023; Tallon et al., 2020). These digital tools allow for tailored messaging, increased engagement, and wider reach compared to traditional methods (Nogueira-Rio et al., 2024; Uribe et al., 2023). Overall, digital tools show

significant potential for enhancing nutrition education especially with growing access to mobile devices among teachers and students

CONCLUSION

This study demonstrated that nutrition education interventions using videos and leaflets effectively improved students' knowledge and attitudes toward healthy snack choices, while also enhancing attitudes among teachers. However, the intervention had limited impact on improving teachers' knowledge, likely due to existing time constraints, limited resources, and high baseline knowledge. These findings emphasize the importance of targeted, engaging, and age-appropriate educational methods, particularly for students who are more responsive to visual and printed materials

For future interventions, it is recommended to integrate interactive, participatory learning approaches—such as role-playing or discussions—to better engage teachers and support long-term retention of knowledge and attitudes. Additionally, schools should consider adopting written policies and formal commitments to healthy canteen management to create a supportive environment for sustaining behavior change. Leveraging digital platforms such as mobile apps and interactive media can also be a promising strategy to broaden the reach and effectiveness of nutrition education programs for both students and teachers.

REFERENCES

- Agustin, S., Pertiwi, P. I., & Windayana, H. (2022). The Management of Healthy Cafeteria on Students' Academic Achievement. *Indonesian Journal of Multidisciplinary Science*, 1(6), 603–608.
- Aydin, G., Margerison, C., Worsley, A., & Booth, A. (2022). Australian teachers' perceptions and experiences of food and nutrition education in primary schools: A qualitative study. *Australian Journal of Teacher Education* (Online), 47(2), 61–75.
- Badan Penelitian dan Pengembangan Kesehatan. (2019). *Laporan Nasional Riskesdas 2018*. In Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan (LPBP).
- Dallagiocoma, G., Alberti, F., & Odone, A. (2023). The efficacy of digital media tools to promote a healthy diet in children: A systematic review of intervention studies. *Acta Bio-Medica: Atenei Parmensis*, 94(S3), e2023157–e2023157.
- Dan, L., Dikomsumsi, A., & Penjual, K. (2014). *Pendidikan Pengolahan Makanan Murah, Sehat*, 15–23.
- de Vlieger, N., Riley, N., Miller, A., Collins, C. E., & Bucher, T. (2019). Nutrition education in the Australian New South Wales primary school curriculum: An exploration of time allocation, translation and attitudes in a sample of teachers. *Health Promotion Journal of Australia*, 30(1), 94–101.
- Esposito, F., Sanmarchi, F., Marini, S., Masini, A., Scrimaglia, S., Adorno, E., Soldà, G., Arrichiello, F., Ferretti, F., Rangone, M., Celenza, F., Guberti, E., Tiso, D., Toselli, S., Lorenzini, A., Dallolio, L., & Sacchetti, R. (2022). Weekday and Weekend Differences in Eating Habits, Physical Activity and Screen Time Behavior among a Sample of Primary School Children: The “Seven Days for My Health” Project. *International Journal of Environmental Research and Public Health*, 19(7), 4215. <https://doi.org/10.3390/ijerph19074215>
- Farida, F., Santoso, A. H., & Rahman, N. (2022). Modification of snack bar cheubit with addition of seaweed (*Eucheuma Cottonii*) and beet (*Beta vulgaris* L.) as a snack alternative for elementary school children obesity. *Journal of Local Therapy*, 1(1), 24–29.
- Fudla, H., Pratiwi, A. A., Tarmizi, N. A. A., Meiyetrian, E., Pramesti, I. L., Ananda, A. J. N., Anggraini, R., Iswarawanti, D. N., & Ermayani, E. (2022). A Mixed-Methods Exploration of Implementation of a Healthy School Canteen Program after a Year Intervention. *Open Access Macedonian Journal of Medical Sciences*, 10(T8), 58–68.
- Green, L. W. (1980). *No Title Health Education Planning: A Diagnostic Approach*. Mayfield Publishing Company.
- Guerra, L. A., Roberts, K. J., Soyeju, S., Beairisto, S., Yang, C., Wiegandt-Rohde, A., & Li, X. (2020). P39 culturally adapting nutrition education in a food pantry setting. *Journal of Nutrition Education and Behavior*, 52(7), S33–S34.
- Gurning, F. P., & Nasution, F. (2023). Implementasi kebijakan program gizi anak sekolah melalui pendampingan guru sekolah dasar. *Journal of Telenursing (JOTING)*, 5(2), 3963–3973.
- Hadi, B. R. I., Asih, A. Y. P., & Syafuddin, A. (2021). Penerapan Hygiene Sanitasi Makanan pada

- Pedagang Kaki Lima. *Media Kesehatan Masyarakat Indonesia*, 20(6), 451–462. <https://doi.org/10.14710/mkmi.20.6.451-462>
- Judarwanto, W. (2006). *Antisipasi Perilaku Makan Anak Sekolah*.
- Kelly, C., Callaghan, M., Molcho, M., Nic Gabhainn, S., & Alforque Thomas, A. (2019). Food environments in and around post-primary schools in Ireland: Associations with youth dietary habits. *Appetite*, 132, 182–189. <https://doi.org/10.1016/j.appet.2018.08.021>
- Kementerian Kesehatan RI. (2023). *Survei Kesehatan Indonesia (SKI) - Indonesian Health Survey*. Jakarta, 965.
- Khaerunisa, I., Nisa, K. K., Handayani, N. A., Liandi, N. A., Rahayu, R., & Prihantini, P. (2025a). Kantin Sehat dalam Meningkatkan Kebiasaan Makan Sehat pada Siswa Sekolah Dasar. *Indo-MathEdu Intellectuals Journal*, 6(1), 540–546. <https://doi.org/10.54373/imeij.v6i1.2507>
- Khaerunisa, I., Nisa, K. K., Handayani, N. A., Liandi, N. A., Rahayu, R., & Prihantini, P. (2025b). Kantin Sehat dalam Meningkatkan Kebiasaan Makan Sehat pada Siswa Sekolah Dasar. *Indo-MathEdu Intellectuals Journal*, 6(1), 540–546.
- Li, J., & Powdthavee, N. (2015). Does more education lead to better health habits? Evidence from the school reforms in Australia. *Social Science & Medicine*, 127, 83–91. <https://doi.org/10.1016/j.socscimed.2014.07.021>
- Liu, H., Xu, X., Liu, D., Rao, Y., Reis, C., Sharma, M., Yuan, J., Chen, Y., & Zhao, Y. (2018). Nutrition-related knowledge, attitudes, and practices (KAP) among kindergarten teachers in Chongqing, China: A cross-sectional survey. *International Journal of Environmental Research and Public Health*, 15(4), 615.
- Machfoedz I dan Suryani S. (2007). *Pendidikan Kesehatan bagian dari Promosi Kesehatan*. Fitramaya.
- Mahan LK, E.-S. S. (2008). *Krause's Food & Nutrition Therapy (12th ed.)*. Saunders Elsevier.
- Marcano-Olivier, M., Pearson, R., Ruparell, A., Horne, P. J., Viktor, S., & Erjavec, M. (2019). A low-cost Behavioural Nudge and choice architecture intervention targeting school lunches increases children's consumption of fruit: a cluster randomised trial. *International Journal of Behavioral Nutrition and Physical Activity*, 16, 1–9.
- MatthewJukes. (2021). Better education through improved health and nutrition: implications for early childhood development programs in developing countries. In *Angewandte Chemie International Edition*, 6(11), 951–952. CABI International.
- Mayasari, E., Hayu, R. E., & Permanasari, I. (2020). Education Media Videos and Posters on Healthy Snacks Behavior In Elementary Schools Students. *STRADA Jurnal Ilmiah Kesehatan*, 9(2), 543–550.
- Metos, J. M., Sarnoff, K., & Jordan, K. C. (2019). Teachers' perceived and desired roles in nutrition education. *Journal of School Health*, 89(1), 68–76.
- Nogueira-Rio, N., Varela Vazquez, L., Lopez-Santamarina, A., Mondragon-Portocarrero, A., Karav, S., & Miranda, J. M. (2024). Mobile Applications and Artificial Intelligence for Nutrition Education: A Narrative Review. *Dietetics*, 3(4), 483–503.
- Nurdin, T. A., Japar, M., Bachtar, I. G., & Adiansha, A. A. (2018). Improving social attitudes and knowledge through role playing method. *Am Educ Res J*, 6(7), 1040–1045.
- O'Halloran, S., Eksteen, G., Gebremariam, M., & Alston, L. (2020). Measurement Methods Used to Assess the School Food Environment: A Systematic Review. *International Journal of Environmental Research and Public Health*, 17(5), 1623. <https://doi.org/10.3390/ijerph17051623>
- Ozturk, O. D., Frongillo, E. A., Blake, C. E., McInnes, M. M., & Turner-McGrievy, G. (2020). Before the lunch line: Effectiveness of behavioral economic interventions for pre-commitment on elementary school children's food choices. *Journal of Economic Behavior & Organization*, 176, 597–618.
- Patel, C., Coulibaly, J. T., Hofmann, D., N'Gbeso, Y., Hattendorf, J., & Keiser, J. (2021). Efficacy and Safety of Albendazole in Hookworm-infected Preschool-aged Children, School-aged Children, and Adults in Côte d'Ivoire: A Phase 2 Randomized, Controlled Dose-finding Trial. *Clinical Infectious Diseases*, 73(2), e494–e502. <https://doi.org/10.1093/CID/CIAA989>
- Rusdi, M. (2023). VARIETY OF STAPLE FOODS: Perceptions of Indonesian Society on Other Staple Foods of Rice. *AKADEMIK: Jurnal Mahasiswa Humanis*, 3(1), 41–48. <https://doi.org/10.37481/jmh.v3i1.580>
- Suhardjo. (2003). *Berbagai Cara Pendidikan Gizi*. Bumi Aksara.
- Tallon, J. M., Dias, R. S., Costa, A. M., Narciso, J., Barros, A., & Silva, A. J. (2020). Pilot evaluation of an interactive multimedia platform to provide nutrition education to

- Portuguese adolescents. *European Journal of Public Health*, 30(2), 353–357.
- Terry-McElrath, Y. M., O'Malley, P. M., & Johnston, L. D. (2014). Accessibility over availability: associations between the school food environment and student fruit and green vegetable consumption. *Childhood Obesity*, 10(3), 241–250.
- Trial, R. C., Saraf, D. S., Gupta, S. K., & Pandav, C. S. (2014). *Effectiveness of a School Based Intervention for Prevention of Non-communicable Diseases in Middle School Children of Rural North India : A Effectiveness of a School Based Intervention for Prevention of Non-communicable Diseases in Middle School Children*. September 2018. <https://doi.org/10.1007/s12098-014-1562-9>
- Uribe, A. L. M., Duffy, E. W., Enahora, B., Githinji, P., McGuirt, J., & Tripicchio, G. L. (2023). Digital technology in nutrition education and behavior change: opportunities and challenges. *Journal of Nutrition Education and Behavior*, 55(6), 391.
- Vasquez-Mamani, L. N., Cueva-Calizaya, L. A., Gálvez-Díaz, N. D. C., Saintila, J., & Calizaya-Milla, Y. E. (2025). Effect of a Nutrition Education Program on Knowledge, Attitudes, and Dietary Practices, Anthropometry, and Hemoglobin in Peruvian Adolescents. *Journal of Multidisciplinary Healthcare*, 1679–1693.
- West, M., Liem, D. G., Booth, A., Nowson, C., & Grimes, C. (2019). Salt preference and ability to discriminate between salt content of two commercially available products of Australian primary schoolchildren. *Nutrients*, 11(2), 388.
- Winkler, G., Berger, B., Filipiak-Pittroff, B., Hartmann, A., & Streber, A. (2018). Small changes in choice architecture in self-service cafeterias. Do they nudge consumers towards healthier food choices. *Ernährungs Umschau*, 65(10), M546–M554.
- Zakiah, S., Toaha, A., Abri, N., & Wahyutri, E. (2023). The Effect of Nutrition Education on Knowledge, Attitudes, and Iron Intake in Adolescent Girls. *Journal of Health and Nutrition Research*, 2(3), 131–139.