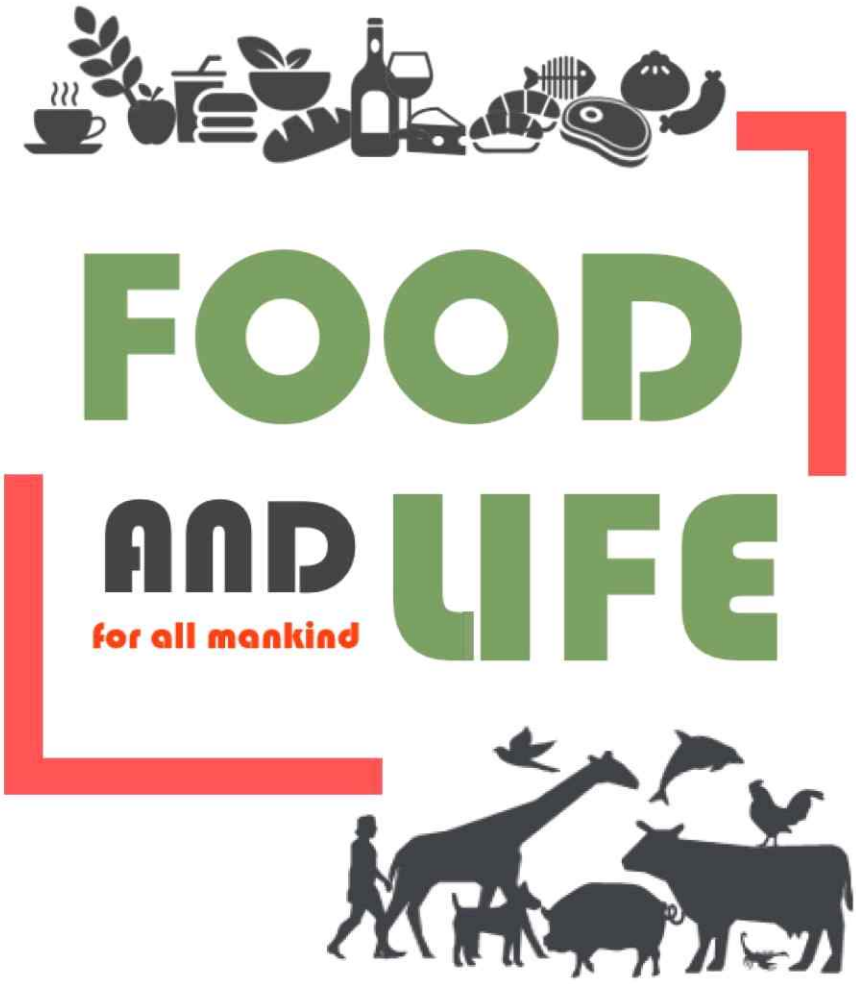

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Food and Life (2026) 2026(1):33-43
https://doi.org/10.5851/fl.2500024

Research Article Open Access

Improving food safety and nutrition knowledge, attitude, and practice in Ethiopian schoolchildren: A school-based intervention study

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Abstract

Inadequate food safety and nutrition knowledge among school-aged children hampers their developing immune systems, increasing their risk of foodborne illnesses and malnutrition. This longitudinal study examined the impact of a school-based intervention on the food safety and nutrition knowledge, attitudes, and practices (KAP) of 389 randomly selected students in Kuyu District, Northtown, Ethiopia. Data were collected using pre-tested, interviewer-administered questionnaires before and after the intervention. Paired-samples t-tests were performed with SPSS 26.0. Significant improvements were observed across all KAP domains following the intervention ($p<0.05$). Inadequate knowledge decreased from 73.3% to 17.2%. Negative attitudes declined from 86.1% to 26.7%. Additionally, the percentage of students demonstrating good practices increased from 23.1% to 68.6%. Mean scores for knowledge, attitudes, and practices also showed significant improvements with large effects: knowledge (pre: M=5.57, SD=1.68; post: M=8.32, SD=1.72; $t(388)=-22.71$, $p<0.0001$, effect size=1.6), attitudes (pre: M=4.25, SD=1.35; post: M=7.82, SD=2.00; $t(388)=-28.98$, $p<0.0001$, effect size=2.1), and practices (pre: M=5.54, SD=1.34; post: M=8.16, SD=1.49; $t(388)=-31.08$, $p<0.0001$, effect size=1.8). The school-based intervention significantly improved students' knowledge, attitudes, and practices (KAP) regarding food safety and nutrition. These findings underscore the importance of developing targeted initiatives that promote balanced diets and ongoing food safety education for school-aged children, which should be integrated into national food and nutrition policies.

Keywords: schoolchildren, food safety, nutrition security, knowledge, attitude, practice, intervention

Introduction

Food safety and balanced diets are critical for community health (Silva et al., 2023). The World Health Organization (WHO, 2021) emphasizes the importance of access to healthy food for overall well-being and highlights the necessity of protecting food from contaminants such as microbes, mycotoxins, and pesticides throughout the supply chain (Ellahi et al., 2024; Kovač et al., 2021). Foodborne hazards are a significant global public health concern (Alsubaie and Berekaa, 2020), with schools serving as crucial points of intervention. The WHO advocates for improved food safety education in schools to reduce the global burden of foodborne illnesses (WHO, 2021).

In traditional food preparation in the study area, the staple dish is "injera", a fermented, soft flatbread typically made from teff flour (*Eragrostis teff*). Injera is served with a hot stew made from legumes, vegetables, or meat, which is cooked just before mealtime. Leftovers, if any, are usually eaten as a snack or during the next meal. Nevertheless, the burden of foodborne diseases in Ethiopia is thought to be high (Mekonnen et al., 2021), and it possibly arises from cross-contamination during food handling.

Schools are vital in promoting lifelong healthy eating habits (O'Brien et al., 2021), and children, as knowledge brokers, can extend the impact of school programs to their homes. Despite this potential, malnutrition and unhealthy eating remain significant challenges, especially among school-aged children (Luo et al., 2021). A primary barrier is the lack of awareness

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among students, teachers, and caregivers (Kana'An et al., 2021; Mekonnen Kifle et al., 2024).

Challenges in nutrition and food safety include insufficient understanding, outdated techniques, and substandard procedures (Edin et al., 2024; Rokshana et al., 2022). While proper hygiene can prevent foodborne illnesses (Islam et al., 2023), poor personal hygiene and food handling persist (Deyasso and Ashenafi, 2021). Ready-to-eat foods are particularly vulnerable to contamination in the absence of strict safety regulations, posing significant health risks (Islam et al., 2023).

These issues disproportionately affect children, who are more susceptible to malnutrition and foodborne diseases due to immature immune systems and physiological sensitivities (Amoadu et al., 2024). Foodborne diseases result in millions of illnesses and thousands of deaths worldwide each year (Mekuanint, 2020). Notably, food handlers in homes and schools are responsible for up to 20% of outbreaks (Minda et al., 2024). For instance, contaminated food causes 70% of diarrheal illnesses in Ethiopia (Mekuanint, 2020).

Addressing these challenges requires a multifaceted approach, starting with improving schoolchildren's knowledge, attitudes, and practices related to food safety and nutrition (Habib et al., 2023). While extensive research exists in high-income countries (Carrillo-Alvarez et al., 2025), studies on children in low-resource settings are limited (Bello et al., 2024). Current interventions are often hindered by fragmented curricula and inadequate teacher training (Gebre et al., 2023). A systematic review of existing knowledge, attitudes, and practices could offer valuable insights for future efforts (Minda et al., 2024).

This paper underscores significant gaps and emphasizes the need for evidence-based strategies to enhance nutrition and food safety education in schools, particularly in underserved regions. This supports national efforts to reduce foodborne illnesses and foster healthier futures for children worldwide.

Materials and Methods

Study area and period

This longitudinal study was conducted in Kuyu District, North Shewa Zone, Oromia Regional State, Ethiopia, situated 156 km north of Addis Ababa. The district has a population of 187,146, with women making up 50.5% (ESS, 2023; Motuma et al., 2020). There are 41 primary schools (grades 1-8) in the district, serving 25,656 students, of whom 83.5% attend primary school (KDEO, 2022). Data collection took place from May 1 to July 30, 2023.

Study population and sampling

The study population included primary school children in grades 5 to 8 and their families. Students in lower grades were excluded because they might have trouble giving accurate responses.

Sample size determination: Sample size determination

The sample size was calculated using a single population proportion formula with a 95% confidence level and 5% margin of error (Daniel and Cross, 2018):

$$n = \frac{\left(\frac{Z\alpha}{2}\right)^2 x\ p(1-p)}{d^2}$$

where:

Zα/2 represents the standard normal deviation for a 95% confidence level (1.96); p indicates the estimated proportion of knowledge, attitudes, and practices (KAP; 61.3%), and d denotes the margin of error (0.05).

$$n = \frac{(1.96)^2 \times 0.613\ (1-0.613)}{(0.05)^2} = 365 + 36.5 = 402$$

By using the largest sample size of 365 and accounting for a 10% non-response rate, the final sample size is 402 participants.

Sampling procedure

A multistage sampling technique was used. Six primary schools were randomly chosen from Kuyu District. The calculated sample size was then proportionally distributed among grades 5-8 within these selected schools. Schoolchildren were randomly selected from each grade and sector. Additionally, the mothers or primary caregivers of the chosen schoolchildren were included in the study.

Intervention

From May 1 to July 30, 2023, a three-month program was implemented to improve the KAP of schoolchildren and their

families regarding food safety and nutrition. This initiative used a "school-home approach" where students served as "agents of change."

A total of 100 male and female school WASH club members, with 10 to 20 students from each school, participated in a one-week food and nutrition training during the semester break. The objective of the training was to increase the consumption of nutrient-dense foods by school children, increase food consumption frequency among school children, improve food safety and personal hygiene practices of mothers and children, enhance the level of KAP in children and mothers/guardians, and improve school attendance and academic performance of children. The training was based on "Five keys to safer food" (WHO, 2006) and on a balanced diet and healthy eating habits (UNICEF, 2019). Of these, 26 students were carefully chosen by school administrators to take part in the school-home training and monitoring activities. The selection focused on older age, strong academic performance, and excellent behavior. These students, selected from each participating school, were tasked with being change agents in their peers' homes.

Using a prepared manual and other training materials, the 26 selected students held weekly, house-to-house training sessions with mothers and caregivers to promote knowledge transfer and encourage behavior change at the household level. They visited each home once a week to discuss food safety and nutrition issues with the mothers and caregivers. Additionally, all participating schoolchildren were encouraged to share their experiences and information with their own families.

Data collection tools and procedure

A structured questionnaire, developed based on reliable and validated tools from previous studies (Deyasso and Ashenafi, 2021; Oliveira et al., 2023), was used to gather data. The questionnaire consisted of 49 items, divided into four sections: knowledge of food safety and healthy nutrition (12 items), attitude toward food safety and healthy nutrition (12 items), practices related to food safety and healthy nutrition (14 items), and sociodemographic characteristics (11 items). It contained both open and closed-ended questions.

Data were gathered through interviewer-administered questionnaires with 402 willing and anonymous participants from the selected schools. Schoolchildren filled out paper questionnaires under their teachers' supervision during class hours. Pre- and post-intervention data were collected from schoolchildren and their families using structured KAP questionnaires and observational checklists.

Data processing and analysis

Data were entered using EpiData software (version 3.5.3) and analyzed with SPSS (version 26.0, Chicago, IL, USA). Both descriptive and inferential statistics were used. Regression analysis was used to examine the relationship between various parameters and WASH conditions. Paired-samples *t*-tests were used to compare individual participants' KAP scores before and after the intervention, with a significance level of α=0.05. Bloom's cut-off point for KAP studies was used to classify results as 'good' (>80%), 'moderate' (60%–80%), or 'poor' (<60%), as in Destaw et al. (2021).

Ethical considerations

Ethical approval was received from the Ethical Review Board of the College of Development Studies at Addis Ababa University. Permission to carry out the study was obtained from the relevant education offices at the zone and district levels. Informed consent was obtained from household heads, school officials, and students over 18 years of age. Before the intervention, meetings were held with parents to describe the study's purpose and to get their consent for their children's participation.

Results

A total of 389 out of 402 schoolchildren participated in and completed food safety and healthy nutrition programs. Of these, 52.4% were female and 47.8% were male. Most participants (72.2%) were between 10 and 15 years old, while the remaining 27.8% were aged 16 to 20. Regarding residence, 50.6% of the participants lived in rural areas, and 49.4% lived in semi-urban settings. Concerning ethnicity, the Oromo group made up 90.2% of the participants (Table 1).

The intervention significantly improved student outcomes (Table 2), reducing the number of students with average semester scores below 75% (from 49.6% to 35.0%) and increasing the number of students scoring 75%–89% (from 40.9% to 53.5%). Overall disease prevalence decreased from 11.6% to 6.2%, accompanied by a slight decline in the proportion of diarrhea cases (from 68.9% to 66.7%). School attendance also markedly improved, with 91.5% of students

Table 1. Socio-demographic characteristics of primary schoolchildren in Kuyu district

Variables	Category	Number (%)
Sex	Male	186 (47.8)
	Female	203 (52.4)
Age	10-15	281 (72.2)
	16-20	108 (27.8)
Residence	Rural	197 (50.6)
	Urban	192 (49.4)
Ethnicity	Oromo	351 (90.2)
	Amhara	27 (6.9)
	Others (Gurage, Walaita)	11 (2.8)
Family religion	Orthodox	280 (72.0)
	Protestant	97 (24.9)
	Others (Muslim, Waqefata)	12 (3.1)
Distance from school	0-2 km	300 (77.1)
	〉2 km	89 (22.9)
Physical disability	No	374 (96.1)
	Yes	15 (3.9)

Table 2. Educational achievement and health-related issues among primary schoolchildren

Variables	Intervention		Increase in percentage points
	Pre- number (%)	Post- number (%)	
Average semester score			
〈75	193 (49.6)	136 (35.0)	-14.6
75-89	159 (40.9)	208 (53.5)	+12.6
≥90	37 (9.5)	45 (11.5)	+2.0
Experienced disease	45 (11.6)	24 (6.2)	-5.4
Types of disease			
Diarrhea	31 (8.0)	16 (4.1)	-3.9
Others (febrile illness, common cold)	14 (3.6)	8 (2.1)	-1.5
Number of days absent from school/month			
0-2 days	217 (55.8)	356 (91.5)	+35.7
〉2 days	172 (44.2)	33 (8.5)	-35.7

missing 0-2 days per month, a substantial increase from the prior 44.2% who missed over two days.

Improved knowledge towards food safety and nutrition

On average, post-intervention knowledge increased by 31 percentage points to 65% (moderate knowledge) across the 12 knowledge items (Table 3). A ‘good’ level of post-intervention knowledge (>80%) was observed in nutritional issues, such as discouraging sugar-rich foods and understanding the consequences of going to school without breakfast. ‘Good’ know-

Table 3. Knowledge of nutrition- and food safety-related issues among primary school children in Kuyu district

Knowledge variables	Intervention outcome		Increase in percentage points
	Pre- No. (%)	Post- No. (%)	
Consequences of a child going to school without breakfast	161 (41.4)	312 (80.2)	+38.8
Discourages sugar-rich foods	56 (14.4)	313 (80.5)	+66.1
Signs of undernutrition	96 (24.7)	176 (45.2)	+20.5
Causes of undernutrition	101 (26.0)	128 (32.9)	+6.9
Reason for separating raw and cooked foods	88 (22.6)	81 (20.8)	-1.8
Signs of well-cooked foods for safety	107 (27.5)	246 (63.2)	+35.7
Types of food to place in a cool place	217 (55.0)	361 (92.8)	+37.8
Reasons to avoid leftover foods	191 (49.1)	376 (96.6)	+47.5
Washing raw fruits and vegetables before eating	130 (33.4)	243 (62.5)	+29.1
How to prevent fecal contamination of food	265 (68.1)	378 (97.2)	+29.1
Key moment of hand washing	72 (14.5)	82 (21.1)	+6.6
How to treat water	104 (46.0)	368 (94.6)	+48.6
Average knowledge status	132 (33.9)	254 (65.3)	+31.4

ledge was also achieved in food safety topics, including storing food in a cool area, avoiding leftovers, preventing fecal contamination of food, and treating water. 'Moderate' post-intervention knowledge level (60%-80%) was observed in signs of well-cooked foods and washing raw fruits and vegetables before consumption.

Improved but still insufficient post-intervention knowledge (<60%) was observed in signs of undernutrition, causes of undernutrition, and key moments for handwashing. No improvement was seen in the reasons for separating raw and cooked foods. This is not practiced possibly because, as stew is prepared and consumed immediately, the need to separate cooked from raw foods is not a major concern. Overall, the educational intervention has increased the knowledge of our respondents, except for their understanding of how to separate raw and cooked foods to prevent kitchen contamination.

Improved attitudes towards food safety and nutrition

The intervention significantly improved students' attitudes towards health and food safety, which were initially "poor" (below 60%) across all 12 assessed items (Table 4). Post-intervention, attitudes showed an average increase of 42 percentage points (ranging from 20% to 55%), elevating the overall classification to a "moderate" level (60%-80%). This indicates that the training notably improved schoolchildren's previously poor attitudes regarding nutrition and food safety to an acceptable standard.

Notable improvements included a rise in the seriousness attributed to food poisoning (8 to 72%), an increase in eating breakfast before school (15% to 70%), a growth in the belief that iron-rich foods are healthy (15.7% to 66%), and greater awareness of the importance of handwashing (31% to 61%) and boiling water before drinking (12% to 59%).

Overall, this demonstrates the intervention's significant impact in transforming information into positive behavioral intentions, indicating a substantial shift toward science-based health practices across all evaluated areas.

Improved practices towards food safety and nutrition

Students' food safety and hygiene practices were initially very poor, with an average pre-intervention score of 17% (ranging from 6.4% to 26.5%). While the intervention led to a 13 percentage point increase, the improved practices still fell below 60%, indicating that a "moderate" level of practice was not achieved (Table 5). This suggests that sustained support and monitoring beyond the study's duration are crucial for further improvement.

Students' food safety and hygiene practices were initially

Table 4. Attitude of nutrition-related issues among primary school children in Kuyu district

Attitude variables	Intervention outcome		Increase in percentage points
	Pre- No. (%)	Post- No. (%)	
Good to eat before school	59 (15.2)	274 (70.4)	+55.2
Good to have three meals with a snack	131 (29.0)	236 (60.7)	+31.7
Good to have a meal rich in iron (beef, chicken, liver, …)	61 (15.7)	257 (66.1)	+50.4
Liking the taste of meat, eggs…	127 (32.6)	206 (53.0)	+20.4
Illness is likely from eating spoiled foods	53 (13.6)	206 (53.0)	+39.4
Food poisoning is serious	31 (8.0)	280 (72.0)	+64
Reheating leftover foods before eating is good	93 (23.9)	277 (71.2)	+47.3
Washing fruits with water is good	25 (6.4)	213 (54.8)	+48.4
Illness from not washing hands is likely	118 (30.8)	237 (60.9)	+30.1
Diarrhea is a serious health problem	86 (22.1)	239 (61.4)	+39.3
Handwashing is good before food preparation	75 (19.3)	195 (50.1)	+30.8
Boiling water before drinking	47 (12.1)	230 (59.1)	+47
Average attitude status	19.5%	61.1%	+42

Table 5. Practice of nutrition-related issues among primary school children in Kuyu district, North Shewa Zone, Oromia, Ethiopia 2023

Practice variables	Intervention outcome		Increase in percentage points
	Pre- No. (%)	Post- No. (%)	
Eat vitamin A and iron-rich food	59 (15.2)	217 (55.8)	+40.6
Eat animal-source food	66 (17.0)	122 (31.4)	+14.4
Eat vegetables	81 (20.8)	138 (35.5)	+14.7
Eat fruits	42 (10.8)	63 (16.2)	+5.4
Cleaning dirty utensils	76 (19.5)	129 (33.1)	+13.6
Store perishable foods	103 (26.5)	148 (38.1)	+11.6
Times of handwashing	97 (24.9)	97 (24.9)	+8.4
Treat the Water container for safety	64 (16.5)	87 (22.4)	+5.9
Treat water for drinking	49 (12.6)	108 (27.8)	+15.2
Ways of treating drinking water	25 (6.4)	54 (13.9)	+7.5
Average practice	17%	29.9%	+12.9

very low, averaging only 17% (with a range of 6.4% to 26.5%) across the ten assessed items before the intervention. While the intervention led to a 13-percentage-point increase, these improvements still fell short of the 60% threshold needed to reach a "moderate" level of practice. This suggests that ongoing support and monitoring beyond the study period are crucial for achieving more substantial and sustained improvements in these practices.

Impact of intervention on knowledge, attitudes, and practices in food safety and nutrition

A paired-samples *t*-test was performed to assess the

effectiveness of the food safety and health intervention by comparing the mean scores for schoolchildren's KAP before and after the intervention. The analysis showed statistically significant improvements in all three areas.

There was a notable increase in knowledge scores from pre-intervention (M=5.57, SD=1.68) to post-intervention (M=8.32, SD=1.72; t(388)=−22.71, p<0.0001). This shows a large effect size of 1.6, indicating a significant improvement in students' understanding.

A notable positive change was observed in attitudes, with mean scores increasing from pre-intervention (M=4.25, SD=1.35) to post-intervention (M=7.82, SD=2.00; t(388)=−28.98, p<0.0001). This shift resulted in an even larger effect size of 2.1, reflecting a significant positive change in students' attitudes toward food safety and health.

Students' practices also improved significantly, with mean scores increasing from pre-intervention (M=5.54, SD=1.34) to post-intervention (M=8.16, SD=1.49; t(388)=−31.08, p<0.0001). This change was accompanied by a large effect size of 1.8, indicating a substantial positive shift in health-related behaviors.

These results clearly show that the intervention had a highly significant and practically meaningful impact on schoolchildren's KAP regarding food safety and health.

Discussion

The KAP model is a fundamental part of public health research. It provides a systematic approach to understanding health behaviors, enabling researchers to develop effective interventions and evaluate their outcomes (Zarei et al., 2024). The most effective approach to understanding schoolchildren's food safety insights involves assessing their knowledge, attitudes, and practices (Wanniarachchi and Abeysundara, 2023). This framework indicates that improving KAP related to nutrition and food safety can significantly reduce foodborne illnesses, enhance overall health, and lower the risk of malnutrition. Ultimately, KAP greatly influences an individual's dietary choices and routines.

The findings of this study highlight the crucial role of school-based food safety and nutrition education programs in improving the KAP of schoolchildren in our study area. The observed improvements align with regional and international research, supporting the effectiveness of such interventions in similar settings (Bello et al., 2024; O'Brien et al., 2021). School-based nutrition initiatives, including education, better food environments, and comprehensive health-promoting strategies, can positively impact dietary outcomes.

Impact on knowledge

Our intervention significantly improved schoolchildren's knowledge, as evidenced by a large effect size (Cohen's d=1.6), indicating a substantial increase in nutritional literacy and underscoring the effectiveness of structured school-based programs. This aligns with findings from similar interventions that have enhanced the understanding of healthy eating and nutrition among schoolchildren (Chaudhary et al., 2020; El Mokadem and Shokr, 2021; Mogre et al., 2024). A consistent Ethiopian study also found that better diet-related behaviors were directly linked to knowledge gains (Lombamo et al., 2024).

Impact on attitudes

The fact that a sufficiently favorable attitude of students (p<0.05) was obtained in the assessed items aligns with other findings showing that nutrition education improves knowledge, attitudes, and practices related to health, nutrition, and hygiene among junior and senior high school students (Kim et al., 2023; Rimbawan et al., 2023). This demonstrates the success of the intervention in fostering positive health-related attitudes, with improved favorable attitudes toward food safety and nutrition (Wanniarachchi et al., 2023).

Impact on practices

Although none of the practice items reached satisfactory levels (all below 60%), we observed a statistically significant increase (p<0.05) in the number of schoolchildren demonstrating good food safety and healthy nutritional practices. This result, which is both statistically and practically significant, highlights the effectiveness of structured health education in schools (El Mokadem and Shokr, 2021; Mogre et al., 2024). It is often observed that a person's knowledge and positive attitude do not always translate into action. This gap between what people know and what they do is influenced by various factors, including environmental conditions, cultural practices, and socioeconomic status. These elements can act as significant barriers, hindering the adoption of desired behaviors even when an individual has favorable intentions.

These findings are supported by research from Islam et al.

(2023) and Ramu et al. (2023), who also discovered that school-based nutrition and hygiene programs, especially those utilizing hands-on, interactive methods, are highly effective in promoting safe food handling and consumption. These significant improvements emphasize the urgent need to fund similar school-based interventions as part of national health promotion strategies.

Overall impact and comparative strengths

The paired-samples *t*-test results consistently show significant improvements across all KAP domains. Knowledge scores increased notably (Mpre=5.57, Mpost=8.32; t(388)=−22.71, $p<0.0001$), with a very large effect size of 1.6. Attitudes also showed a highly significant positive change (Mpre=4.25, Mpost=7.82; t(388)=−28.98, $p<0.0001$), with an even larger effect size of 2.1. Likewise, practices significantly improved (Mpre=5.54, Mpost=8.16; t(388)=−31.08, $p<0.0001$), reflecting a very large effect size of 1.8.

These findings indicate that, while pre-intervention knowledge, attitudes, and practices were initially limited (averaging 34%, 20%, and 17%, respectively), the intervention significantly improved schoolchildren's knowledge and attitudes. These areas saw an average increase of 37 percentage points, reaching a sufficient level (over 60%). This aligns with other studies that also observed substantial improvements in schoolchildren's food safety attitudes relative to their knowledge scores (Buyco et al., 2022; Wanniarachchi et al., 2023). This suggests the intervention effectively translated knowledge into positive behavioral intentions and habits.

Conclusion

This study shows that a structured educational intervention significantly enhanced schoolchildren's KAP regarding food safety and nutrition. We observed substantial, statistically significant improvements across all KAP areas, with effect sizes demonstrating both practical and educational importance. Essentially, the intervention effectively changed participants' understanding and behaviors toward safer and healthier food choices.

Recommendations

Given these powerful results, we recommend permanently integrating food safety and nutrition education into school health curricula, ideally starting in primary school with involvement from parents, guardians, and local stakeholders to reinforce learning and promote lasting behavior change at home. We also suggest expanding this effective intervention strategy to more schools and regions, supported by government health and education policies, and conducting longitudinal mixed-method studies to assess the sustainability of these changes and identify areas for future improvement. To better assess the lasting impact of our work, we suggest a follow-up evaluation. This would help us see if the positive changes in KAP are maintained over time.

Limitations of the Study

The questionnaires used in this study might cause students to report what they believe is expected rather than their actual behavior. The study was conducted in only one district in Ethiopia; therefore, the findings may not be applicable to other diverse regions or populations. The study did not evaluate the KAP of students in lower primary grades, meaning the impact of the intervention on younger children, who are also vulnerable, was not assessed. The three-month intervention and monitoring period might not be sufficient to observe lasting behavioral changes, indicating the need for longer-term follow-up.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, we utilized the Gemini language model to enhance the readability and language of the manuscript. After using this service, we reviewed and edited the content as needed and take full responsibility for the content of the published article.

Conflicts of Interest

The authors declare no potential conflict of interest.

Acknowledgments

Not applicable.

Ethics Approval

The study was approved by the Institutional Review Board of the College of Development Studies at Addis Ababa University (CoDS/IRB/0003/2022) prior to its commencement.

Author Contributions

Data curation: Ketema K.

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References

Alsubaie ASR, Berekaa MM. 2020. Food safety in Saudi Arabia: A public health priority. Ann Med Health Sci Res 10:1142-1147.

Amoadu M, Abraham SA, Adams AK, Akoto-Buabeng W, Obeng P, Hagan JE Jr. 2024. Risk factors of malnutrition among in-school children and adolescents in developing countries: A scoping review. Children 11:476.

Bello F, Koukou E, Bodjrenou S, Termote C, Azokpota P, Hounkpatin WA. 2024. Food and nutrition knowledge, attitudes and practices among children in public primary school with canteens in southern Benin: A case study. BMC Nutr 10:40.

Buyco NG, Dorado JB, Azaña GP, Viajar RV, Aguila DV, Capanzana MV. 2022. Do school-based nutrition interventions improve the eating behavior of school-age children? Nutr Res Pract 16:217-232.

Carrillo-Alvarez E, Rifà-Ros R, Salinas-Roca B, Costa-Tutusaus L, Lamas M, Rodriguez-Monforte M. 2025. Diet-related health inequalities in high-income countries: A scoping review of observational studies. Adv Nutr 16:100439.

Chaudhary A, Sudzina F, Mikkelsen BE. 2020. Promoting healthy eating among young people: A review of the evidence of the impact of school-based interventions. Nutrients 12:2894.

Daniel WW, Cross CL. 2018. Biostatistics: A foundation for analysis in the health sciences. John Wiley & Sons, Hoboken, NJ, USA.

Destaw Z, Wencheko E, Zemenfeskidus S, Challa Y, Tiruneh M, Fite MT, Shaleka D, Ashenafi M. 2021. Use of modified composite index of anthropometric failure and MUAC-for-age to assess prevalence of malnutrition among school-age children and adolescents involved in the school feeding program in Addis Ababa, Ethiopia. BMC Nutr 7:81.

Deyasso M, Ashenafi M. 2021. A comparative analysis of water, sanitation, and hygiene (WASH) situation among public and private schools in Kirkos sub-city, Addis Ababa Ethiopia. Ethiop J Educ Sci 17:18-31.

Edin A, Jemal K, Ahmed IA, Gebremichael B, Bushra AA, Demena M, Abdirkadir M. 2024. Assessment of nutrition knowledge and associated factors among secondary school students in Haramaya district, Oromia region, eastern Ethiopia: implications for health education. Front Public Health 12:1398236.

Ellahi RM, Wood LC, Bekhit AEDA. 2024. Blockchain-driven food supply chains: A systematic review for unexplored opportunities. Appl Sci 14:8944.

El Mokadem NM, Shokr EA. 2021. School-based dietary intervention to promote healthy eating habits and physical activity among adolescence in rural area. Int J Adv Res Nurs 4:349-355.

ESS. 2023. Population size of towns by sex, region, zone, and weredas. Ethiopian Statistical Service. Available from: https://ess.gov.et/wp-content/uploads/2023/09/Population-Size-of-Towns-by-Sex-as-of-July-2023.pdf. Accessed at Jul 18, 2025.

Gebre GG, Legesse T, Fikadu AA. 2023. Food safety knowledge, attitude, and practice among male and female food handlers: Evidence from fruit and vegetable producers in Ethiopia. Heliyon 9:e17301.

Habib MA, Alam MR, Rahman T, Chowdhury AI, Shill LC. 2023. Knowledge, attitudes, and practices (KAP) of nutrition among school teachers in Bangladesh: A cross-sectional study. PLOS ONE 18:e0283530.

Islam MN, Roy N, Amin MB, Madilo FK, Karmakar K, Hossain E, Aktarujjaman M, Islam MS, Airin NJ. 2023. Food safety knowledge and handling practices among household food handlers in Bangladesh: A cross-sectional study. Food Control 147:109578.

Kana'An H, Saadeh R, Zruqait A, Alenezi M. 2021.

Knowledge, attitude, and practice of healthy eating among public school teachers in Kuwait. J Public Health Res 11:2223.

KDEO. 2022. Annual Report 2022. Kuyu District Education Office [KDEO].

Kim SS, Sununtnasuk C, Berhane HY, Walissa TT, Oumer AA, Asrat YT, Sanghvi T, Frongillo EA, Menon P. 2023. Feasibility and impact of school-based nutrition education interventions on the diets of adolescent girls in Ethiopia: A non-masked, cluster-randomised, controlled trial. Lancet Child Adolesc Health 7:686-696.

Kovač M, Bulaić M, Jakovljević J, Nevistić A, Rot T, Kovač T, Dodlek Šarkanj I, Šarkanj B. 2021. Mycotoxins, pesticide residues, and heavy metals analysis of Croatian cereals. Microorganisms 9:216.

Lombamo GE, Henry CJ, Zello GA. 2024. A nutrition education intervention positively affects the diet–health-related practices and nutritional status of mothers and children in a pulse-growing community in Halaba, South Ethiopia. Children 11:1400.

Luo Y, Chen L, Xu F, Gao X, Han D, Na L. 2021. Investigation on knowledge, attitudes and practices about food safety and nutrition in the China during the epidemic of corona virus disease 2019. Public Health Nutr 24: 267-274.

Mekonnen Kifle M, Terragni L, Morseth M. 2024. Teachers' perception of their students' dietary habits in Addis Ababa, Ethiopia: A qualitative study. BMC Nutr10:141.

Mekonnen SA, Gezehagn A, Berju A, Haile B, Dejene H, Nigatu S, Molla W, Jemberu WT. 2021. Health and economic burden of foodborne zoonotic diseases in Amhara region, Ethiopia. PLOS ONE 16:e0262032.

Mekuanint A. 2020. Food safety practices of mothers and its associated factors in Motta town, East Gojjam zone, Amhara region, Northwest Ethiopia. Ph.D. dissertation. Debre Markos Univ., Debre Markos, Ethiopia.

Minda GH, Tola HH, Amhare AF, Kebie A, Endale T. 2024. Personal hygiene practice and associated factors among elementary school students in Fiche town, Oromia, Ethiopia. BMC Infect Dis 24:781.

Mogre V, Sefogah PE, Adetunji AW, Olalekan OO, Gaa PK, Anie HNGA, Tayo B. 2024. A school-based food and nutrition education intervention increases nutrition-related knowledge and fruit consumption among primary school children in northern Ghana. BMC Public Health 24:1739.

Motuma FY, Rajan DS, Ameda TT. 2020. Determinants of rural multi-dimensional poverty: The case from Kuyu district, Central Ethiopia. IOSR J Humanit Soc Sci 25: 46-54.

O'Brien KM, Barnes C, Yoong S, Campbell E, Wyse R, Delaney T, Brown A, Stacey F, Davies L, Lorien S, Hodder RK. 2021. School-based nutrition interventions in children aged 6 to 18 years: An umbrella review of systematic reviews. Nutrients. 13:4113.

Oliveira GAL, Barrio DOL, Araújo GS, Saldanha MP, Schincaglia RM, Gubert MB, Toral N. 2023. Validation of the illustrated questionnaire on food consumption for Brazilian schoolchildren (QUACEB) for 6- to 10-year-old children. Front Public Health 11:1051499.

Ramu P, Osman M, Abdul Mutalib NA, Aljaberi MA, Lee KH, Lin CY, Hamat RA. 2023. Validity and reliability of a questionnaire on the knowledge, attitudes, perceptions and practices toward food poisoning among Malaysian secondary school students: A pilot study. Healthcare 11:853.

Rimbawan R, Nurdiani R, Rachman PH, Kawamata Y, Nozawa Y. 2023. School lunch programs and nutritional education improve knowledge, attitudes, and practices and reduce the prevalence of anemia: A pre-post intervention study in an Indonesian Islamic boarding school. Nutrients 15:1055.

Rokshana Rabeya M, Hasan Bin Zihad M, Anis Fakir M, Sabina Khatun M, Rakhi JJ, Islam A, Islam R, Saeed Khan MA, Hossain Hawlader MD. 2022. A community-based cross-sectional study about the knowledge, attitude, and practices of food safety measures among rural households in Bangladesh. J Nutr Metab 2022: 7814370.

Silva P, Araújo R, Lopes F, Ray S. 2023. Nutrition and food literacy: Framing the challenges to health communication. Nutrients 15:4708.

UNICEF. 2019. The state of the world's children 2019: Children, food and nutrition: Growing well in a changing world. UNICEF, New York, NY, USA.

Wanniarachchi PC, Abeysundara PDA. 2023. A systematic review on knowledge, attitude and practices (KAP) of food safety among school children: A global perspective. Suan Sunandha Sci Technol J 10:34-45.

Wanniarachchi PC, Abeysundara PDA, Peiris HS. 2023. Food safety knowledge, attitude, and practices among school

children: A cross-sectional study based in the Colombo educational zone, Sri Lanka. Sri Lanka J Soc Sci 45: 241-253.

WHO. 2006. Five keys to safer food manual. World Health Organization. Available from: https://iris.who.int/handle/10665/43546 Accessed at Feb 26, 2026.

WHO. 2021. Making every school a health-promoting school: Global standards and indicators. World Health Organization [WHO], Geneva, Switzerland.

WHO. 2022. WHO global strategy for food safety 2022-2030: Towards stronger food safety systems and global cooperation. World Health Organization [WHO], Geneva, Switzerland.

Zarei F, Dehghani A, Ratansiri A, Ghaffari M, Raina SK, Halimi A, Rakhshanderou S, Ismael SA, Amiri P, Aminafshar A, Mosavi Jarrahi A. 2024. ChecKAP: A checklist for reporting a knowledge, attitude, and practice (KAP) study. Asian Pac J Cancer Prev 25:2573-2577.

Date Received Jul. 27, 2025
Date Revised Sep. 23, 2025
Date Accepted Nov. 3, 2025