International Journal of Adolescence and Youth

ISSN: 0267-3843 (Print) 2164-4527 (Online) Journal homepage: www.tandfonline.com/journals/rady20

Nutritional knowledge and attitudes of adolescents in public secondary schools in Uganda: a case study of Nansana Municipality, Uganda

Joshua Ssemakula, Edward Kansiime & Kenneth Ssekatawa

To cite this article: Joshua Ssemakula, Edward Kansiime & Kenneth Ssekatawa (2026) Nutritional knowledge and attitudes of adolescents in public secondary schools in Uganda: a case study of Nansana Municipality, Uganda, International Journal of Adolescence and Youth, 31:1, 2607245, DOI: 10.1080/02673843.2025.2607245

To link to this article: https://doi.org/10.1080/02673843.2025.2607245

Published online: 26 Dec 2025.

INTERNATIONAL JOURNAL OF ADOLESCENCE AND YOUTH
2026, VOL. 31, NO. 1, 2607245
https://doi.org/10.1080/02673843.2025.2607245

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS Check for updates

Nutritional knowledge and attitudes of adolescents in public secondary schools in Uganda: a case study of Nansana Municipality, Uganda

Joshua Ssemakula[a,b], Edward Kansiime[a] and Kenneth Ssekatawa[a]

[a]Department of Science, Technical and Vocational Education, Makerere University, Kampala, Uganda; [b]Department of Nutrition, Food Science and Technology, Bugema University, Kampala, Uganda

ABSTRACT

This study investigated sources of nutrition information, attitudes, and nutrition knowledge towards the consumption of healthy foods among adolescents. A mixed cross-sectional study involving 1174 adolescents randomly chosen from all five public schools in Nansana Municipality was carried out. Information was gathered using a questionnaire and focus group discussions. From the findings, 'television' and 'lessons taught in class' were the most preferred sources of nutrition information, with percentage scores of 27.6% and 23.2%, respectively. Statistical analysis showed that adolescents with greater nutrition knowledge in themes: 'nutrition and health outcomes' and 'nutrition function and sources' significantly outperformed their peers on several items, for example, understanding the function of proteins ($t = 4.67$, $p < .001$, $d = 0.26$, 95% CI [0.14, 0.38]) and recognizing the cause of scurvy ($t = 15.50$, $p < .001$, $d = 0.86$, [0.74, 0.98]). A larger portion of participants exhibited negative attitudes towards healthy eating. These findings underscore the need for targeted interventions.

ARTICLE HISTORY
Received 12 July 2025
Accepted 16 December 2025

KEYWORDS
School-going adolescents; nutrition; health; knowledge; attitudes

Background

Optimal nutrition is crucial for reaching full potential during all phases of growth and development, yet many studies on vulnerable populations have focused primarily on infants, young children, and women (Hashad, 2023). Nevertheless, malnutrition affects adolescents, leading to stunted growth, delayed puberty, weakened immunity, and a greater risk of infections (Rukmana et al., 2023). Malnutrition also impairs cognitive development, resulting in poor memory, low concentration, and reduced academic performance (Zakiah et al., 2023). Psychosocial issues such as fatigue, low self-esteem, and poor classroom engagement are common (Arias et al., 2025). In the long term, for example, overnourished adolescents face increased risks of chronic diseases such as diabetes and cardiovascular conditions, limiting their ability to grow into healthy, productive adults (Kusemererwa, 2023). This period is recognized as a period of growth with heightened nutritional requirements, warranting specific attention as well (Gadanya et al., 2022). Therefore, good nutrition knowledge and positive attitudes towards the consumption of healthy food are vital for the proper nutrition practices among young individuals. This establishment of healthy eating habits during adolescence not only promote optimal growth but also foster the development of good dietary practices into adulthood (Gudelia et al., 2023; Patimah et al., 2023).

In Uganda, recent research shows that nutritional knowledge among adolescents in public secondary schools is generally low, especially in rural areas, and this is strongly linked to poor dietary habits and suboptimal nutrition status (Angella et al., 2024; Buyinza et al., 2025; Isabirye et al., 2020). Many students are unfamiliar with balanced diets, have difficulty understanding nutritional information, and often ignore dietary advice. However, a majority express willingness to promote healthy eating if the right information is given (Buyinza et al., 2025). Several interventions have been implemented regarding the knowledge and attitudes of learners in the scope of Sub-Saharan Africa, without the exception of Uganda. For instance, Kyere et al. (2020) emphasized that school-based nutrition interventions lead to reduced micronutrient

CONTACT Kenneth Ssekatawa kssekatee@gmail.com

deficiencies and enhance nutrition status. However, he pointed out pitfalls in its impact on anthropometry and nutrition behaviour. Similarly, another study by Kansiime et al. (2024) was opposed to the idea of school-based nutrition interventions and rather magnified the use of project-based learning models to improve knowledge among secondary school students in Uganda. Despite its relevance, it overlooks the most vulnerable students, such as teenagers and adolescents. Contrary, Wang et al. (2022) strongly supported school-based nutrition intervention packages, including school meals, nutrition education, and school gardens, which can improve diet quality for adolescents and their household members, thus reducing adolescent malnutrition. Gadanya et al. (2022) introduced a structured nutrition education program as one of the most effective ways of enhancing knowledge, attitudes, and practices. Their work provides a one-sided response focusing only on female adolescents, which introduces information bias in the study. Other studies have popularized interventions that are frequent, regular, and timely. For instance, Quaidoo et al. (2022) investigated the impact of nutrition education on the knowledge, attitudes, and practices of school children in Ghana. His findings revealed that a six-week program improved only knowledge and attitudes, eliminating dietary diversity. Similarly, Buyinza et al. (2025) evaluated a six-month education program in China and showed that it had a great impact on knowledge, attitudes, and behaviour. This implies that the duration of the educational program matters. Other scholars in Uganda point out background characteristics as being associated with nutrition status (Angella et al., 2024). Similarly, Vasquez-Mamani et al. (2025) noted that nutrition education programs significantly contribute to knowledge, attitudes, and dietary practices in Peruvian adolescents. Nevertheless, most scholars emphasize that schools in sub-Saharan Africa need to improve their health and nutrition environments to improve adolescent health and nutrition, with limited coverage of health policies, suboptimal facilities, and unregulated food environments (Noor et al., 2025). This is also supported by Raut et al. (2024), who maintained that nutrition education interventions effectively increase nutritional knowledge and attitudes among school-going adolescents, building positive knowledge, attitudes, and healthy eating habits. In Ugandan schools, most canteens are not within the standards of properly governed schools. Despite the nutrition knowledge they acquire from these schools, the school canteens focus on fast foods, and highly lucrative foods that worsen nutrition practices and dietary diversity of the adolescents in school canteens, ranging from deep-fried foods, sugary drinks, chips, and pastries, worsening the nutritional behaviour and practice of the learners. Some authors have attributed this pattern to low nutritional literacy among adolescents (Buyinza et al., 2025). Another study in Uganda linked this undesirable situation to low socioeconomic status, single parenthood, and home meal dependency (Isabirye et al., 2020). As part of the motivation for this study, the exact contextual aspects of knowledge and attitudes that exist across various adolescents remain unclear. Therefore, this study investigated nutrition knowledge and attitudes among adolescents in public secondary schools in Nansana Municipality.

Methodology

Study design and selection of locales

This study employed a mixed methods cross-sectional design. The motivation behind this design was to allow both qualitative and quantitative analyses. The qualitative study involved purposively selecting participants using the Focused Group Discussions with a focus on key informants. In parallel, the quantitative approach utilized a deductive method of empirically testing hypotheses by randomly selecting a representative sample, collecting data, and performing analysis.

Sampling techniques

All five public secondary schools in Nansana Municipality were included in the study, resulting in a census of all eligible schools. A proportionate simple random sampling technique was employed to select 10–19-year-old school-going adolescents in the sample. This technique was possible due to the larger number of adolescents available within the secondary schools that we visited. Additionally, this technique was deemed suitable for selecting many adolescents in our study without any form of selection bias. From the total population of 4900 adolescents in Nansana Municipality, only 1174 school-going adolescents were

selected using simple random sampling. The sample size, however, was computed by the Taro Yamane sample size formula, as shown below:

$$n = \frac{N}{1 + N \times e^2}$$

where by N = finite population, n = desired sample, and e is the margin of error. The study utilized a margin of error of 2.5% and acquired the required sample size, as shown below:

$$n = \frac{4900}{1 + 4900 \times 0.02549009^2} = 1174$$

The present cross-sectional study was conducted among adolescents aged 10–19 years from all five public schools in Nansana Municipality. A total of 1174 adolescents were selected.

Data collection procedure

Data on adolescents' socio-demographic and socio-economic characteristics, nutritional knowledge, and attitudes were collected. Data collection from adolescents was done using self-administered, English-language questionnaires. The knowledge and attitude questions in the self-administered questionnaire were adapted from the Macias & Glasauer (2014) and then slightly modified, pretested and validated to suit the study context. The knowledge section consisted of 14 questions, each with a 'correct/incorrect' response. A correct response was scored 1, and an incorrect response was scored 0. The maximum possible knowledge score was therefore 14. The knowledge columns obtained were aggregated/summed row-wise to form a knowledge score. The total knowledge score was used to estimate the average knowledge score of 7, which was later used to determine scores above and below average. Those who scored above the average knowledge score were coded 1 and labelled 'more knowledge', else, 'less knowledge'. The selection was based on the average value in order to strike a balance in the centering and categorization to avoid self-reported bias in an approach called matching. On the other hand, attitude was based on 10 strict questions that formed a positive attitude. Different from knowledge, attitude was collected as a 5-point Likert scale with 5 = strongly agree and 1 = strongly disagree. The responses from the adolescents, who were falling 4 and above, indicated a higher score. This implies that those who rated positive attitudes 4 and above simulated a higher score for a good attitude, else a bad attitude. This enabled the researchers to clearly identify good from bad attitudes by recategorizing those above average as the former and otherwise as the latter.

Inclusion

Inclusion into the study was based on two conditions: one must be an adolescent (10–19 years), and secondly, one must be a student in a public secondary school within Nansana Municipality.

Exclusion

Non-schooling adolescents attending secondary schools outside Nansana Municipality were excluded from participation.

Additionally, focus group discussions were employed, comprising groups of 8–12 individuals each. The participants were purposefully selected to provide insights. These included adolescent leaders, and they were not part of the respondents of the self-administered questionnaires. The focus group discussion guides were instrumental in gathering supplementary information regarding nutritional knowledge and attitudes. Focus group discussions were organized separately for various classes across different schools, thereby generating qualitative data. The researcher facilitated all the focus group discussions, with one of the research assistants documenting the proceedings while another observed the interactions. The discussions proved to be invaluable in extracting comprehensive information concerning nutritional knowledge and attitudes within the educational institutions. In each school, a total of three focus group

discussions were conducted in each school, with one session designated for each class from S1 to S3. This approach was adopted to ensure equitable representation from all classes, thereby yielding a comprehensive perspective from all adolescents. The focus group discussions were conducted in settings such as libraries or classrooms at times and locations that were convenient for the participants. Considerable efforts were made to ensure that the selected venues were comfortable and devoid of disruptions. The findings derived from the focus group discussions served to triangulate the quantitative data collected within this study.

The focus group discussion was conducted in a methodical and standardized fashion. The facilitator initiated the proceedings by introducing the research team and extending a warm welcome to the participants, who were subsequently invited to present their own introductions. The facilitator articulated the objective of the meeting and established the parameters for discussion. The session commenced with the facilitator presenting the initial inquiry from the focus group discussion guide. While adherence to the guide was maintained, efforts were made to sustain a natural conversational flow without deviating from the objectives of the discussion. The facilitator actively encouraged contributions from more reticent participants and took measures to discourage any individual from monopolizing the discussion, thereby ensuring a balanced discourse. At the conclusion of the session, the facilitator addressed any inquiries or pertinent issues that emerged during the discussion and expressed appreciation to the participants for their engagement.

Data analysis

Data analysis was performed in various suitable applications. Descriptive analysis was performed with the aid of summary statistics, including mean, minimum values, and maximum values, using SPSS version 27.0 and Stata version 18.0. Additionally, frequency tables were also run to provide the proportions of the demographic profile of the study adolescents. The sources of nutrition information, preferences, nutritional knowledge, and nutrition-related attitudes were evaluated with the aid of frequency tables. To confirm these findings, visualizations for knowledge scores by adolescent schooling status, class were plotted with the aid of bar charts and box plots. Similarly, nutritional attitude by gender was analyzed using a box plot, while schooling status was analyzed by a bar chart. To reinforce the empirical intuition behind the knowledge and nutrition attitudes of adolescents in secondary school learners in Uganda, a scatterplot was estimated with a line of best fit to reveal if promotion of nutrition knowledge fosters a continued path of attitude.

At the inferential analysis level, t-tests were estimated by RStudio version 4.5.1 to perform comparison of both nutrition knowledge and attitude scores by a grouped binary variable acquired from the knowledge and nutrition scores using the rempsyc package, 'nice_t_test', for creating nice APA tables exportable to words (via 'flextable'), easily run statistical tests or check assumptions, and automatize various other tasks. This approach enabled us to estimate differences in scores between more knowledgeable and less knowledgeable, good versus poor attitude. Additionally, this approach allowed the estimation of t-values, degrees of freedom, significant *p*-values, and Cohen's *d* for effect size to determine item contribution and the confidence intervals.

Following verbatim transcription of the focus group discussions, thematic content analysis was performed on the qualitative data. After carefully reading the transcripts multiple times to become comfortable with them, codes were created by assigning variable categories labels. Two separate researchers created and used an original codebook to increase the coding process's legitimacy. By comparing their coding results, inter-coder reliability checks were performed; disagreements were discussed and settled by consensus, ensuring consistency and reducing interpretation bias. The variables were then made clearer by grouping the improved codes into more general categories and identifying, clustering, and arranging common themes in a certain sequence. Under each theme, specific data were used to draw inferences, which were then combined to create conclusions.

Pilot study

A pilot study to test the research instruments was conducted with a total of 20 adolescents from a public secondary school outside Nansana Municipality. It was done to test and refine research methods, tools, and procedures before the main study. Data collected during the pilot study were not included in the final data analysis.

Validity and reliability of instruments

Validity

A pilot survey was conducted on a small sample (2 schools) of adolescent students in the same municipality. This enabled us to ensure that the questionnaires collected findings in relation to the stated objectives. In addition, the study instruments were shared with experts for review, and their preapprovals were provided before the main fieldwork.

Reliability

A Cronbach alpha test was conducted on most of the constructs of the study to determine if they fall within the specified range of 0.7 and above. Particularly, the reliability statistics in Table 1 demonstrate exceptionally high internal consistency across all the constructs, knowledge, and attitudes, with Cronbach's alpha values ranging from 0.9 and above. These values far exceed the commonly accepted threshold of 0.70, indicating that the items within each scale are highly correlated and measure their respective constructs consistently. This strong reliability supports the validity of further analysis and interpretation, boosting confidence in the relationships among these variables in the school-based nutrition context.

Trustworthiness for the qualitative component

Credibility was enhanced through triangulation and peer debriefing; dependability through maintaining an audit trail; and confirmability through reflexive notes and transferability through providing thick descriptions of the study context.

Ethical approval

This study was first cleared for fieldwork by the university supervisors after thorough doctoral committee presentations and defense at the School of Education and External Studies at Makerere University. Furthermore, the study acquired an expedited review of the protocol and obtained approval from the Mildmay Uganda Research Ethics Committee (Ref: MUREC-2025-1761). Informed consent was also obtained from the parents/guardians of the adolescent respondents before engaging their adolescents. Before actual data collection, informed assent was obtained from adolescents below the age of 18 while informed consent was obtained from those with 18 or 19 years.

Results

Missing data test

The study evaluated the presence of missing data using the codebook function from Stata version 18 and then later employed the compact to join all the variables together, as shown in Table 2 below.

Most of the main study variables, including nutrition knowledge and attitude scores, had complete responses from all 1,174 participants. A few demographic questions had small gaps: class (3 missing),

Table 1. Reliability statistics for nutrition knowledge and attitudes.

Construct	Average interitem covariance	Number of items	Scale reliability coefficient (Cronbach's alpha)
Knowledge	0.3174	10	0.9363
Attitudes	0.2931	10	0.9321

Source: Primary Data Collection, 2025.

Table 2. Descriptive statistics for testing missing data.

Variable	Obs	Unique	Mean	Min	Max	Label
KNOW	1174	15	9.833049	0	14	Total Knowledge Score
ATT	1174	26	18.74276	3	29	Nutrition Attitude Score
Class	1171	3	2.010248	1	3	Class
Residence status of adolescents	1155	2	1.780087	1	2	Status of the adolescent
Religion	1156	5	2.602941	1	5	Religious affiliation

Source: Primary Data Collection, 2025.

residence status (19 missing), and religion (18 missing). These missing responses are well below the 5% threshold of minimal concern and are unlikely to affect the findings of the study.

Socio-demographic characteristics of adolescents in secondary schools in Nansana Municipality

The majority of the adolescents (35%) were between the ages of 17 and 19; furthermore, the majority of adolescents (78.7%) were in the day section (Table 3).

Adolescents' source of nutrition information

The primary sources of nutrition knowledge cited by adolescents were textbooks 18.7%, family members 13.7%, in-class sessions 23.2%, and non-disaggregated television sources 27.6% (Table 4). Additional information sources included newspapers and pamphlets, family members, and friends. Only a small percentage of adolescents (0.5%) had access to publications and the internet. The results from focus groups revealed that adolescents learned about nutrition from newspapers and pamphlets, friends, and class teachings.

Preference of the sources of nutrition information

Nutritional information sources were arranged according to preference. The participants were also asked why they liked the information source (Table 5). More than one-fourth (27.6%) of the participants enjoyed watching television, with 41.2% saying that it was engaging and packed with information. Approximately 20% stated that it offered a wide range of information that was clear and easy to understand. Additional justifications for enjoying television included the fact that its messages served as a helpful reminder of crucial nutrition-related behaviours, such as cleaning hands after using the restroom and before eating.

Table 3. Respondents' background information on healthy eating.

Demographic characteristics	Frequency	Percentage (%)
Gender		
Male	480	40.9
Female	694	59.1
Age		
10–13	402	34.2
14–16	361	30.7
17–19	411	35
Class		
S1	404	34.4
S2	361	30.7
S3	409	34.8
Status of the students		
Boarding	250	21.2
Day	924	78.7

Table 4. Sources of nutrition information (SONI).

SONI	Frequency	Percentage (%)	Cumulative percent (%)
I do not receive any nutrition information	19	1.6	1.6
Text books	219	18.7	20.3
Newspapers/pamphlets	43	3.7	23.9
Family members	161	13.7	37.6
Friends	44	3.7	41.4
Television	324	27.6	69.0
Radio	62	5.3	74.3
From lessons taught in class	272	23.2	97.4
Healthy learning programme activities	17	1.4	98.9
Internet	6	0.5	99.4
Any other (specify)	7	0.6	100.0
Total	1174	100.0	

Table 5. Preference of the sources of nutrition information sources of nutrition information.

Sources of nutrition information	Percentage %	Reasons for liking the source of information
Television	27.6	Information is very Interesting to watch and has more information (41.2%) Information is clear (20%)
Lessons taught in class	23.2	Teachers explain much more for me us to understand (60.0%)
Textbooks	18.7	Information seems more correct (23.1%) Some teachers refer us to textbooks (32.3%)

Table 6. Nutritional knowledge on healthy eating of adolescents in public secondary schools in Nansana Municipality.

Statement	Response	Frequency	Percentage (%)
THEME 1: Nutrition and health outcomes			
Adequate consumption of beans can prevent iron deficiency.	Wrong	485	41.4%
	Correct	689	58.6%
A high fiber diet is essential for good bowel function	Wrong	880	75%
	Correct	294	25%
Scurvy is caused by a deficiency of vitamin C	Wrong	477	40.6%
	Correct	697	59.4%
Skipping meals is good for quick weight loss	No	501	42.7%
	Yes	673	57.3%
Maize supplies fiber that prevents constipation	No	599	51
	Yes	575	49%
High/more frequent consumption of deep fried and processed foods can lead to malnutrition.	Wrong	681	58%
	Correct	493	42%
THEME 2: Nutrition function and sources			
Much salt is needed to supply mineral salts to the body, much as it's not tasty.	No	200	17%
	Yes	974	83%
Proteins (meats, poultry, dairy products, peas, beans) are a main source of energy for the body	No	575	48.9%
	Yes	599	51.1%

Nutritional knowledge

Many myths concerning diet and health were exposed by the examination of participants' replies. In important areas, a sizable percentage of respondents showed a lack of precise understanding (Table 6). Interestingly, 41.4% of the participants were unable to accurately identify an iron deficiency-related illness. Similarly, 75% of the respondents held the false belief that a high-fibre diet is not necessary for healthy bowel function, which is a serious misconception that might put people at risk for digestive problems. Furthermore, 57.3% of the respondents mistakenly thought that skipping meals would help them lose weight quickly, which is a bad habit that might lead to metabolic imbalance. Even more alarming is the fact that 83% of respondents agreed with the false claim that a high-salt diet is required for mineral supply, even though it is known to be linked to cardiovascular disease and hypertension.

Another worrying finding is that 58% of respondents were unable to name any behaviours that can result in malnutrition, indicating a serious lack of knowledge about the dangers and causes of unhealthy eating habits. Furthermore, 51.1% of respondents incorrectly identified meals high in protein as their primary source of energy, demonstrating a mix-up between nutrients that provide energy and those that aid in body construction. Together, these results highlight important areas where nutrition education is desperately required to dispel myths that might have a detrimental impact on health outcomes.

According to Table 7, more knowledgeable adolescents in Wakiso District significantly outperformed their less knowledgeable peers across most nutritional knowledge items. For example, they scored higher on understanding the function of proteins in the body ($t = 4.67$, $p < .001$, $d = 0.26$, 95% CI [0.14, 0.38]) and the importance of calcium-rich foods for strong bones and teeth ($t = 7.12$, $p < .001$, $d = 0.42$, [0.30, 0.53]). They were also more aware of iron deficiency consequences ($t = 4.96$, $p < .001$, $d = 0.27$, [0.16, 0.39]) and unhealthy snack choices ($t = 9.35$, $p < .001$, $d = 0.50$, [0.38, 0.62]). Notably, they demonstrated superior knowledge of modern food preservation methods ($t = 10.96$, $p < .001$, $d = 0.59$, [0.47, 0.70]) and the cause of scurvy ($t = 15.50$, $p < .001$, $d = 0.86$, [0.74, 0.98]). However, less knowledgeable adolescents performed better on identifying body-building-only food groups ($t = -12.79$, $p < .001$, $d = -0.75$, [−0.87, −0.63]) and recognizing unsafe water practices ($t = -8.35$, $p < .001$, $d = -0.46$, [−0.58, −0.35]). Small but significant differences also appeared in knowledge about vitamin A deficiency ($t = 5.07$, $p < .001$, $d = 0.28$, [0.16,

Table 7. The nutritional knowledge status of adolescents in public secondary schools.

Knowledge status	*t*	*df*	*p*	*d*	95% CI
Theme 1: Nutrition and health outcomes					
For bones and teeth to be strong, we should eat foods rich in	7.12	1,127.63	<.001***	0.42	[0.30, 0.53]
Which one of the following conditions results from iron deficiency?	4.96	1,077.17	<.001***	0.27	[0.16, 0.39]
Which of the following snacks is unhealthy to eat regularly?	9.35	877.26	<.001***	0.50	[0.38, 0.62]
Which one of the following is a modern method of preserving food?	10.96	870.39	<.001***	0.59	[0.47, 0.70]
Scurvy is caused by a deficiency of	15.50	1,115.42	<.001***	0.86	[0.74, 0.98]
What deficiency disease is caused by a lack of vitamin A in the body?	5.07	1,015.52	<.001***	0.28	[0.16, 0.39]
Which of the following practices can lead to sickness?	−5.15	822.84	<.001***	-0.27	[−0.39, −0.16]
Which of the following foods is NOT preserved by salting?	−3.63	967.54	.004**	-0.20	[−0.31, −0.08]
Which one of the following practices should be done to preserve vitamin C	4.00	1,152.16	.001***	0.23	[0.12, 0.35]
Which one of the following practices will make drinking water unsafe?	−8.35	1,111.04	<.001***	-0.46	[−0.58, −0.35]
Theme 2: Nutrient function and sources					
Fruits and vegetables provide which one of the following nutrients?	−3.04	909.97	.034*	-0.16	[−0.28, −0.05]
Which of these groups of food contains nutrients used for body building ONLY?	−12.79	1,130.89	<.001***	-0.75	[−0.87, −0.63]
What is the function of proteins in the body?	4.67	1,103.65	<.001***	0.26	[0.14, 0.38]
James' mother cooked a mixture of beans and maize	2.46	891.78	.199	0.13	[0.02, 0.25]

Table 8. Knowledge on functions of food nutrients concept.

Concept on food nutrients	All public schools in Nansana Municipality $N = 1174$ (*n* %)
Proteins restore damaged bodily tissues.	627 (53.4%)
Vitamin C is important for boosting immune system	729 (62%)
Fruits and vegetables provide vitamins and minerals in the body	963 (82%)
Rice is energy giving foods	848 (72.2%)
Meat, milk and beans are body building foods	599 (51.1%)

0.39]) and vitamin C preservation ($t = 4.00$, $p = .001$, $d = 0.23$, [0.12, 0.35]). One item concerning food spoilage after 3 days – showed no significant difference ($t = 2.46$, $p = .199$, $d = 0.13$, [0.02, 0.25]). Additionally, the results in Table 7 revealed that the statement 'scurvy is caused by a deficiency of' reported the single highest effect size ($d = 0.86$), indicating a very large difference in knowledge scores between more knowledgeable and less knowledgeable adolescents. In contrast, the item with the lowest effect size is 'Jame's mother cooked a mixture of beans and maize.' with a Cohen's *d* of 0.13, and a non-significant *p*-value (.199), implying minimal difference in knowledge between the groups on this item.

Knowledge of the functions of food nutrients

Understanding the roles of dietary nutrients may be crucial in influencing a person's choices regarding their eating habits as an adolescent. In general, the adolescents had inadequate knowledge about the functions of nutrients, as shown in Table 8. For example, some respondents had inadequate knowledge of the roles that proteins play in the body, since 46.6% of them claimed that the primary job of proteins does not involve the repair of damaged bodily tissues.

Nutrition knowledge from the focus group discussion

Although FGDs, adolescents showed varied levels of knowledge of different nutrition-related issues, it was generally remarkable that they displayed poor knowledge of some nutrition-related issues, including balanced diet and barriers to good nutrition (Table 9). Furthermore, adolescents in senior one and two were able to name the various food categories; however, they were unable to group them according to their bodily functions since the lower courses do not address this subject. This may suggest that classroom instruction contributes to the dissemination of nutrition. According to the results of the focus group discussion, the majority of adolescents were also aware of the roles that various nutrients play in the body and could name them without hesitation.

The relationship between nutrition knowledge and the source of nutrition information

Overall, the findings indicated that adolescents who received their nutrition information from teachers in school/classroom interactions had significantly greater nutrition knowledge, suggesting that school/

Table 9. Adolescents' specific knowledge revealed by focus group discussion.

Nutrition-related aspects	Adolescents' specific knowledge
Barriers to good Nutrition	"It might be challenging to eat healthily when all of your pals are consuming soda and fast foods in the school canteen and outside school. You do not wish to feel excluded." "There isn't enough time. You don't want to cook when you come home from prep and school; you simply want something quick." "Because I'm rushing to school/class or I'm not hungry in the morning, I frequently skip breakfast."
Balanced diet	"I'm not really sure what constitutes 'good' or 'poor' food. I simply eat what I enjoy." "Veggies and fruits are pricey. Purchasing chapati or mandazi is more affordable." "Aware of the causes of malnutrition in the community arising from not consuming adequate foods."

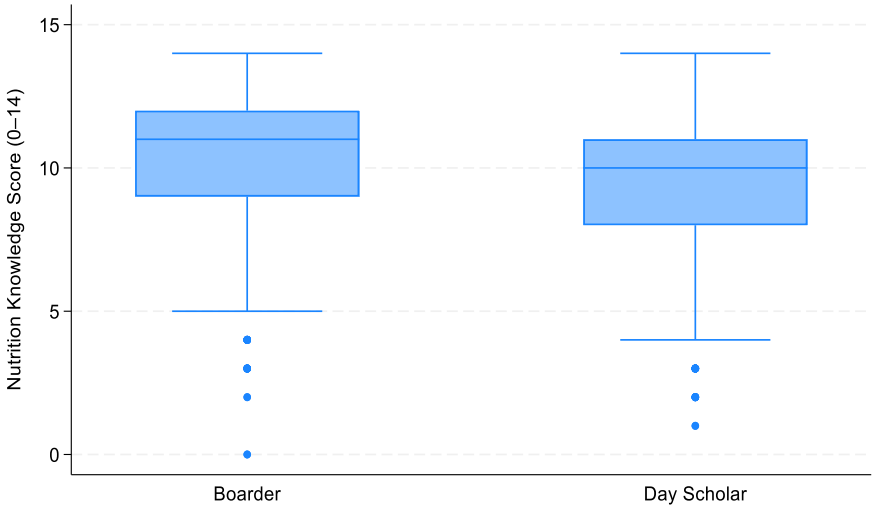

Figure 1. Nutrition knowledge score by adolescent status.

classroom environments contribute to better nutrition knowledge. When nutrition-related factors were broken out, it was shown that the adolescents who received their nutrition information from the teachers during the lessons learned much more about how to choose foods.

This reaffirms that school children's understanding of nutrition is enhanced by taking part in the classroom activities. implying that the school had to make the most of the various nutrition-related activities and encourage adolescents to participate in them, as this could improve their overall knowledge of nutrition.

Nutrition knowledge score by adolescent status

Based on the boxplots presented in Figure 1, adolescents in the boarding section obtained a significantly higher median score than day scholars. The greater nutritional knowledge among the boarders could be attributed to the nature of the enclosed environment that allows them to concentrate on their studies with limited home interruptions. One plausible explanation is that the boarding school setting facilitates more consistent exposure to both formal instruction and informal reinforcement of nutrition-related practices. For example, shared meals, health routines, and peer influence may play a role in reinforcing what is taught in class. This finding was also echoed by the learners themselves.

A boarding adolescent said:

> *"Here at school, we eat the food prepared in the dining hall and drink water from the tanks. It is controlled, so we are sure it is safe."* A2 FGD 3

By contrast, a day scholar shared:

"At home, I sometimes eat chapati, mandazi, or buy soda on the way to school. It depends on what is available that day." A1 FGD 5

Nutrition knowledge by class

According to the horizontal bar chart in Figure 2, adolescents in senior three had greater nutrition knowledge, followed by senior two and then senior one. This showed that the higher the adolescent class, the higher the nutrition score. This pattern aligns with the curriculum structure, where more advanced topics in nutrition are typically introduced in the upper classes, and earlier lessons are revisited and expanded upon.

Nutrition attitude

Attitude of adolescents towards healthy eating

Table 10 shows that 51% of respondents had a negative attitude toward the lunch provided by the school is sufficient for me, whereas 49% had a positive attitude. The results showed that respondents (23.7%) who agreed that all nutritious foods are expensive were less likely to eat healthily than those (76.2%) who disagreed.

Regarding whether 'Sodas and fried eggs are the best foods to eat when am sick', respondents who agreed (71.3%) had a positive attitude and were more likely to eat unhealthily than those who disagreed (28.7%). According to the poll, 45% of the respondents agreed with the statement that vegetables are much better than meat and meat products, while 55% disagreed with the statement.

According to the data, respondents (76.2%) who agreed that all tasty foods are good for their health were more likely to eat unhealthy food than those who disagreed. Those who agreed with the statement were 23.8% less likely to be positive about eating healthily.

According to Table 11, adolescents with a good nutritional attitude scored significantly higher across all attitude items compared to those with a poor attitude. They were more likely to agree that eating a variety of foods is important ($t = -11.62$, $p < .001$, $d = -0.69$, 95% CI [−0.81, −0.58]) and that handwashing prevents illness ($t = -14.79$, $p < .001$, $d = -0.89$, [−1.01, −0.77]). They also found learning about enjoyable nutrition ($t = -14.19$, $p < .001$, $d = -0.87$, [−0.99, −0.75]) and expressed strong enjoyment in cooking ($t = -15.96$, $p < .001$, $d = -0.96$, [−1.08, −0.84]). Positive feelings toward drinking boiled water were evident ($t = -10.25$, $p < .001$, $d = -0.63$, [−0.74, −0.51]), and they recognized fruits as healthy snacks ($t = -12.61$, $p < .001$, $d = -0.76$, [−0.88, −0.64]). Adolescents with good attitudes also valued reading food labels ($t = -14.05$, $p < .001$, $d = -0.86$, [−0.98, −0.74]) and appreciated the healthy learning program ($t = -13.63$, $p < .001$, $d = -0.83$, [−0.95, −0.71]). They placed importance on breakfast ($t = -13.19$, $p < .001$, $d = -0.80$, [−0.92,

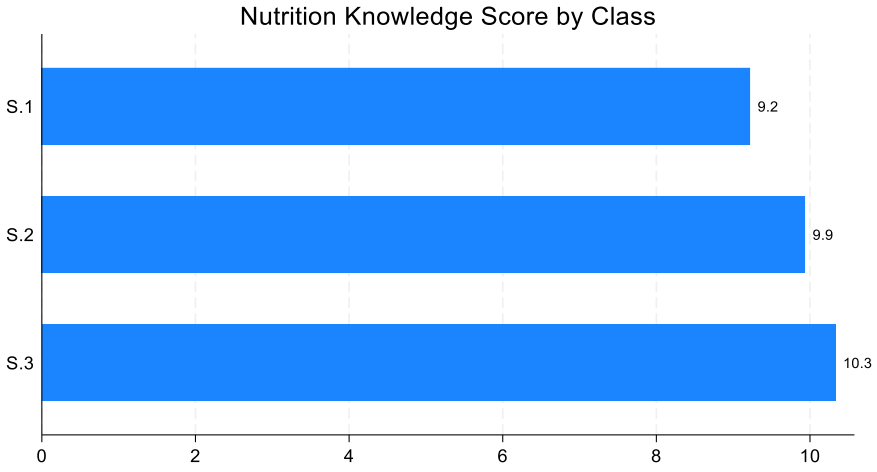

Figure 2. Nutrition knowledge by class.

Table 10. Adolescents' nutrition related attitudes in secondary schools in Nansana Municipality.

Statement	Response	Frequency	Percentage (%)
Theme 1: Attitude towards choices			
Soda and fried eggs are the best foods to take when I am sick	No	337	28.7
	Yes	837	71.3
Vegetables are much better than meat and meat products	No	778	66.3
	Yes	396	33.7
All nutritious foods are expensive	No	528	45
	Yes	646	55
THEME 2: Attitude towards healthy eating and habits			
When the canteens are congested, I just skip that meal	No	370	31.5
	Yes	804	68.5
The lunch provided by the school is sufficient for me	No	575	49
	Yes	599	51
All tasty foods are good for my health	No	279	23.8
	Yes	895	76.2
It's okay to dispose off rubbish anywhere in the compound as long as the teachers are not seeing us	No	435	36.8
	Yes	739	63.2
It is okay to skip some meals within the day	No	965	82.2
	Yes	209	17.8

Table 11. Nutritional attitude of adolescents in public secondary schools.

Attitude status	*t*	*df*	*P*	*d*	95% CI
Theme 1: Attitudes towards food choices					
We should eat many kinds of foods	−11.62	957.72	<.001***	−0.69	[−0.81, −0.58]
Reading food labels is good	−14.05	647.86	<.001***	−0.86	[−0.98, −0.74]
Cooking is enjoyable, only for foods I like	−15.96	838.51	<.001***	−0.96	[−1.08, −0.84]
Theme 2: Attitudes towards health eating & habits					
Fruits are a healthy snack	−12.61	824.03	<.001***	−0.76	[−0.88, −0.64]
I like the healthy learning program	−13.63	669.29	<.001***	−0.83	[−0.95, −0.71]
Breakfast is important to me	−13.19	702.64	<.001***	−0.80	[−0.92, −0.68]
Handwashing prevents illness	−14.79	792.50	<.001***	−0.89	[−1.01, −0.77]
I feel good when I drink boiled water	−10.25	668.03	<.001***	−0.63	[−0.74, −0.51]
Learning nutrition is enjoyable	−14.19	647.26	<.001***	−0.87	[−0.99, −0.75]
I like posho and beans if well prepared	−15.20	836.01	<.001***	−0.92	[−1.04, −0.80]

−0.68]) and showed strong preference for well-prepared posho and beans ($t = -15.20$, $p < .001$, $d = -0.92$, [−1.04, −0.80]). Moreover, the items 'Cooking is enjoyable,' 'I like posho and beans if well prepared,' and 'Handwashing prevents illness' recorded the highest Cohen's *d* values, indicating the largest differences in attitudes between adolescents with good and poor nutritional attitudes. These findings suggest that adolescents with a positive attitude toward nutrition expressed significantly greater enthusiasm and appreciation for cooking, traditional staple foods such as posho and beans, which are widely consumed in Uganda, and hygiene practices such as handwashing, which has been a vital preventive measure against the spread of viruses in schools and communities.

Nutrition attitude score by gender

Figure 3 shows that attitudes towards nutrition were almost the same across all genders with both groups having comparable medians and interquartile ranges. However, female adolescents displayed a few lower outlier scores compared to males which gave the impression of slightly lower values among some individuals. In this context, this trend may reflect underlying social or psychological factors, such as varying levels of interest, confidence, or relevance adolescents associate with nutrition.

Adolescents in the FGDs also highlighted this contrast. A boy highlighted the sports link:

"Boys tend to show more interest when nutrition is linked to energy or fitness; we want to see how it helps in football." A6 FGD 1

Whereas a girl explained her cautiousness:

"Sometimes we girls worry about our body size. I listen to what teachers say about food, but I also fear eating too much because I don't want to get fat." A4 FGD 4

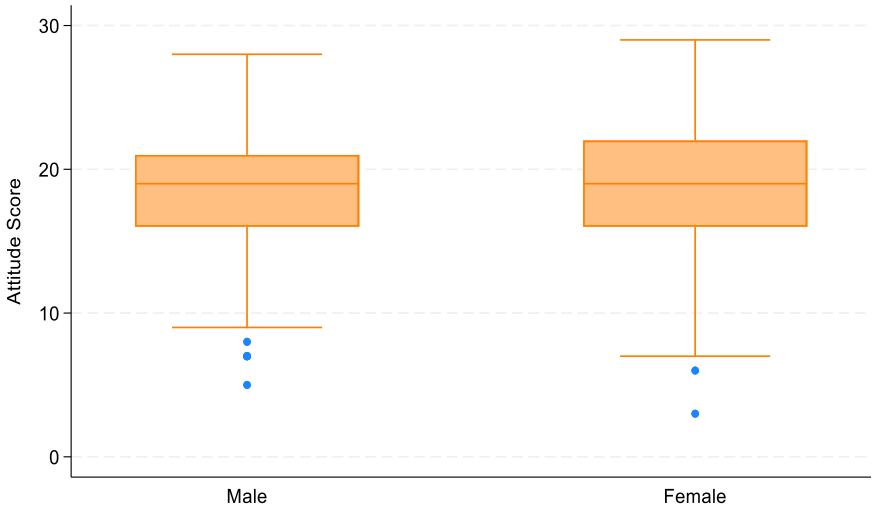

Figure 3. Nutrition attitude score by gender.

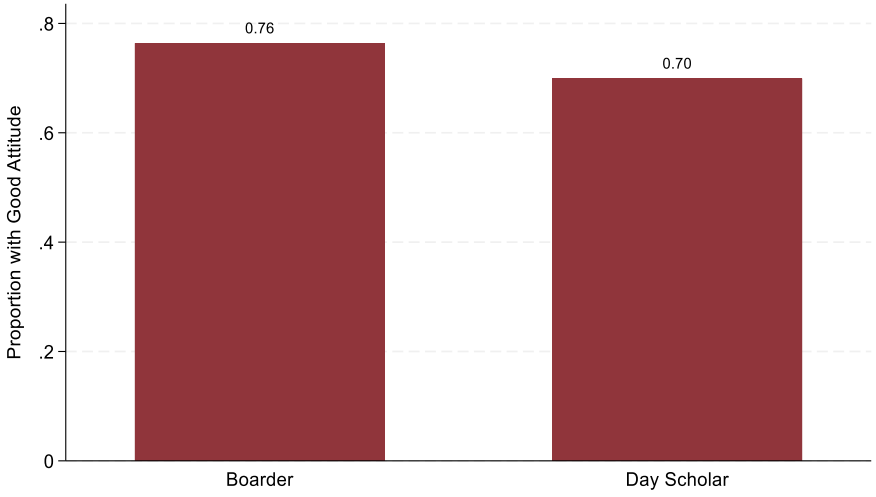

Figure 4. Proportion with good nutrition attitude by schooling status.

Proportion with a good nutrition attitude by schooling status

Results from Figure 4 show that a good nutrition attitude was prevalent among adolescents in the boarding section as compared to those in the day scholar section. Similar to nutrition knowledge, individuals residing within school premises tend to have a more positive attitude towards nutrition compared to those at home. This is because they obtain first-hand information about nutrition care more frequently and thus develop a better attitude towards it over time.

Boarding adolescents likely benefits from more consistent exposure to structured routines, communal meals, and health-related guidance from staff, which together reinforce positive attitudes toward nutrition.

Adolescents in the FGDs also highlighted this contrast. A boarding girl shared:

> *"In boarding, we are always reminded to eat what is served and to take water. Even during health talks, they check if we follow."* A1 FGD 4

By contrast, a day scholar reflected:

> *"At home, my parents are busy, so sometimes I just eat what I find. It is not always healthy."* A3 FGD 7

Relationship between nutrition knowledge and attitude scores

The scatterplot in Figure 5 shows that there is a strongly positive correlation between knowledge and attitude about nutrition among adolescents. This implies that the higher the nutrition knowledge acquired, the better the attitude exhibited by them.

This correlation suggests that knowledge serves as a foundation for shaping positive attitudes. When adolescents are well informed, they are more likely to perceive nutrition as relevant to their daily lives. Adolescents themselves reinforced this.

One boy stated:

> *"Once I understood why soda is bad, I reduced taking it. Now I carry water from home."* A5 FGD 3

Another girl added:

> *"When we learned about vegetables in class, I started telling my friends that eating them helps us avoid sickness. I like sharing that knowledge."* A6 FGD 6

Discussion

This study assessed nutrition knowledge and attitudes among adolescents in public secondary schools in Nansana Municipality. In summary, adolescents in Nansana Municipality secondary schools had low nutrition knowledge and mixed attitudes, influenced mainly by television, classroom lessons, and peers. Misconceptions about food and nutrients were common, though classroom teaching, boarding environments, and higher classes improved knowledge. Attitudes were inconsistent, but a strong positive link was found between higher knowledge and healthier attitudes, with focus groups highlighting barriers such as cost and peer influence.

The study findings revealed that adolescents who received nutritional information from lessons/school environment were 4 times more likely to have good nutritional knowledge compared to those who received information from television and radio. This finding is in agreement with a study performed by (Edin et al., 2024) among adolescents in Ethiopia, who reported that 'sources of information about nutrition, diet or foods were: books, health care providers, family members and media channels' and he added that 'their dietary habits are easily influenced by other individuals and the media' (Zakiah et al., 2023). Not all nutrition information in the media is false, according to a study by Gadanya et al. (2022), underscoring the media's potential as a medium for health communication when used effectively. The majority of teenagers in this survey, however, stated that they learned about nutrition from commercials, which frequently contained false information and pushed meals high in calories. Teenagers could become confused and adopt unhealthy eating habits as a result of such marketing or insufficient messaging. To combat this,

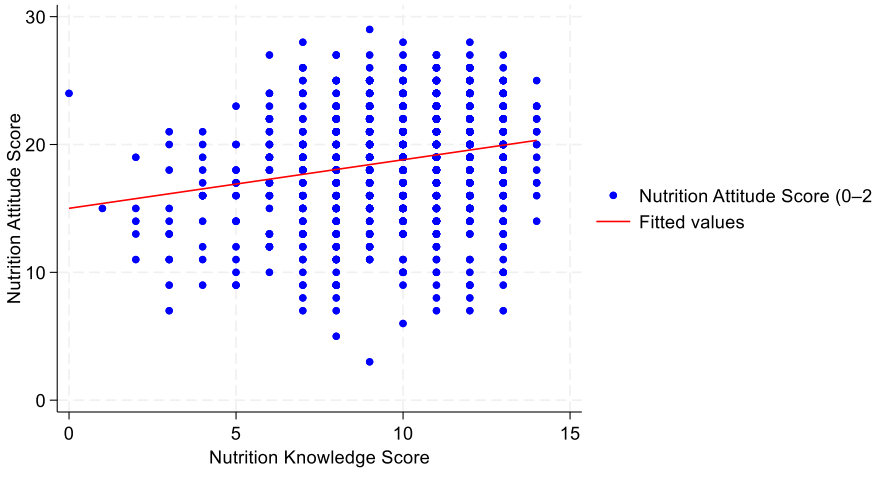

Figure 5. Relationship between nutrition knowledge and attitude scores.

media messaging must be strengthened by promoting collaborations between schools, health authorities, and media outlets to spread information about science-based nutrition. Regulations could also be implemented to guarantee that accurate health information is included with food marketing aimed at teenagers. Furthermore, including nutrition education initiatives into social media and other media platforms may help turn the media from a confusing source to a tool for encouraging better eating habits.

Furthermore, the results suggest that the best setting for disseminating accurate nutrition information is still the classroom. Therefore, adolescents' exposure to science-based knowledge would be maximized by including systematic nutrition instruction into the school curriculum, which is backed by qualified teachers and recurring seminars. Enhancing this educational setting could help combat false information from outside sources such as media advertisements.

The relatively poor nutritional knowledge on healthy eating revealed by this study is in agreement with the study by (Peace et al., 2022), which revealed that about three-quarters of adolescents have less knowledge about the right eating behaviours (Nurbaya et al., 2023). The findings of this study are also supported by those of a study in Ethiopia, which revealed that approximately three-quarters of adolescents had poor nutritional knowledge (Edin et al., 2024).

With respect to specific responses to nutritional knowledge questions concerning maize being sources of fibers or roughage are in line with the findings of a study conducted by Elhassan in India, which revealed that more than half of the respondents did not know which foods contain fibers (Sigdel, 2024). This is true, as adolescents do not have adequate knowledge of healthy foods since most adolescents report that they do not have regular information on nutrition.

These gender-based disparities imply that customized interventions might be necessary. For example, school-based nutrition initiatives should focus more on involving male pupils, who seem to know less about nutrition. Boys may be more receptive to interactive and hands-on methods such as cooking demonstrations, sports club nutrition seminars, or peer-led initiatives. Simultaneously, current approaches that are already effective with female teenagers should be reinforced, such as the connection between nutrition education and wellbeing, body image, and reproductive health. Therefore, gender-sensitive strategies would guarantee that nutrition education is focused on and successful for both boys and girls.

As far as the attitude of adolescents towards healthy eating are concerned, the study revealed that the majority of adolescents believed that all tasty foods are good for healthy living. The findings are in line with the study done in Ecuador that found that 'most of the schools in the study had respondents having a positive bias towards tasty foods regardless of their nutritional benefits and therefore such were taken to be more palatable and accepted' (Arias et al., 2025).

The results about adolescents' attitudes on healthy eating showed a poor attitude in that most of the respondents indicated that nutritious foods do not taste well. These results are in line with those of a previous study (Moriyani & Meena, 2022), which revealed that close to a quarter of the adolescents indicated that healthy foods were not tasty and nice (Zakiah et al., 2023). Therefore, many adolescents prefer tasty foods, which in most cases contain many calories when not used, which can lead to non-communicable diseases, so information for change in attitude is needed.

When relating these results to intervention, it is evident that nutrition education must address attitudes and taste preferences in addition to knowledge. Cooking clubs, food sampling events, and innovative marketing strategies that present healthy meals as appealing, delectable, and reasonably priced might all be incorporated into school programming. This would guarantee that teenagers form long-lasting, healthy eating habits and help dispel the myth that nutrient-dense meals are unappealing.

The study revealed that more than half of the respondents believed that skipping meals is a good strategy for weight loss. This study is in line with one that was carried out in Saudi Arabia that involved adolescents aged 11–19 years, which found that 'close to two-thirds of the adolescents skip at least one meal a day.' Aldubayan (2020) and a study conducted in Palestine found that more than half of the adolescents skip breakfast (Badrasawi et al., 2022). Therefore, time should be allocated before morning lessons for morning breakfast so that day adolescents can take it to avoid snacking on fast foods.

Some of the respondents showed that they are confused with the nutrient contents of some foods. This reveals that adolescents do not have sufficient knowledge of healthy foods. This study differs from the findings obtained in Darab city, Iran, in secondary schools, which reported that most participants had sufficient knowledge and attitude related to the consumption of snacks (Isabirye et al., 2020; Moaadeli et al.,

2015). Therefore, adolescents should be provided with proper nutritional information to change their attitude towards nutritious and healthy foods.

The current study revealed significant differences in nutritional knowledge among adolescents in public secondary schools in Nansana Municipality. Adolescents with above-average knowledge scores demonstrated a stronger understanding of nutrient functions, deficiency diseases, and food safety practices. These findings are consistent with previous research in Uganda, which reported generally low nutritional knowledge among adolescents, particularly in rural areas, and linked this to poor dietary habits and suboptimal nutrition status (Angella et al., 2024; Buyinza et al., 2025; Isabirye et al., 2020). While many students struggle with interpreting nutritional information and often disregard dietary advice, Buyinza et al. (2025) noted a promising willingness among adolescents to adopt healthier eating habits if properly informed. This finding supports the idea that knowledge gaps can be addressed through targeted interventions. Studies such as Kyere et al. (2020) and Wang et al. (2022) have shown that school-based nutrition programs, especially those that combine education with practical components such as school gardens and meals, can improve knowledge and reduce micronutrient deficiencies. However, contrasting views from Kansiime et al. (2024) suggest that project-based learning may be more effective, though it risks excluding vulnerable groups. The current findings reinforce the need for inclusive, context-sensitive educational strategies that prioritize both content and delivery.

Furthermore, the findings highlighted a similarly strong divide in nutritional attitudes, with adolescents who scored above average expressing greater enthusiasm for cooking, traditional meals, and hygiene practices. These results echo those of Abu-Baker et al. (2021) and Raut et al. (2024), who emphasized that structured nutrition education programs significantly enhance attitudes and practices. The positive attitude toward culturally familiar foods such as posho and beans and the recognition of handwashing as a health measure, reflect the influence of both cultural relevance and public health messaging. However, despite these gains, the broader school environment remains a challenge. Noor et al. (2025) and Buyinza et al. (2025) criticized the poor regulation of school canteens, which often promote fast foods and sugary snacks, undermining the nutritional behaviours being taught. This disconnect between knowledge, attitude, and actual practice highlights the importance of aligning school policies, food environments, and educational efforts. Moreover, background factors such as socioeconomic status and family structure (Isabirye et al., 2020) continue to shape adolescents' nutritional outlooks, suggesting that interventions must be multifaceted and responsive to the lived realities of learners.

Translation to health education practice

This study underscores the critical need for targeted nutrition education interventions among adolescents in Ugandan public secondary schools, particularly in urbanizing areas such as the Nansana Municipality. With significant gaps in knowledge, 83% of adolescents believe that high salt intake is necessary for mineral supply, and the widespread endorsement of unhealthy dietary attitudes, there is a clear need to strengthen school-based nutrition education.

Findings revealed that adolescents who received nutrition information from classroom lessons demonstrated significantly higher nutrition knowledge, emphasizing the school environment as a powerful setting for health education.

In alignment with National Commission for Health Education Credentialing (NCHEC) competencies particularly those under 1.3 (determine factors that influence health), 2.1 (engage priority populations and partners in planning), and 3.2 (deliver health education) this study highlights the importance of enhancing classroom instruction on nutrition through curriculum integration, teacher training, and use of interactive, culturally relevant approaches.

Health educators can address these knowledge gaps by:

- Partnering with curriculum developers and the Ministry of Education to embed theory-based nutrition content into lower secondary syllabi, especially in Senior One and Two, where knowledge was weakest.
- Training teachers in participatory delivery methods (e.g. discussions, real-life examples, media analysis) to counter prevalent myths about healthy eating.

- Working with school administrators and canteen operators to create healthy food environments, informed by the identified barriers like peer influence and affordability of nutritious food.
- Leveraging adolescents' preferred sources of information (television and classroom) by integrating educational broadcasts with class-based follow-up activities, thereby reinforcing health messages in multiple contexts.

Additionally, classroom-based interventions should address prevalent attitudinal barriers such as the belief that all tasty foods are healthy (76.2%) and skipping meals aids weight loss (57.3%), which can undermine even correct knowledge. Behaviour-focused strategies, such as role-playing, peer-led sessions, and school health clubs, may promote better attitude formation.

The findings inform educators, curriculum planners, and public health practitioners working with adolescents on how to design evidence-based nutrition education programs that are responsive to learners' knowledge gaps, preferences, and environmental constraints. This work also supports competency 2.3.2 (plan for delivery of health education using best practices) and 3.2.1 (create a conducive learning environment) by offering practical insights into how adolescents learn and apply nutrition knowledge.

Incorporating these strategies can enhance adolescents' nutritional literacy, challenge harmful misconceptions, and promote lifelong healthy eating habits, thereby contributing to the reduction of malnutrition and its long-term health consequences.

Conclusion

According to this study, there are clear differences in the attitudes and understanding of adolescents regarding nutrition in public secondary schools. Even though children who learned about nutrition in formal educational settings showed greater comprehension, false information from the media and commercials still has a detrimental impact on their eating habits. Although overall attitudes toward healthy eating remained poor, with misunderstandings including skipping meals to lose weight and associating nutritious foods with bad taste, female teenagers were often more informed than male adolescents.

These results highlight the critical need for thorough, evidence-based nutrition education programs that are implemented in schools. Legislators and policymakers should consider banning deceptive food ads directed at teenagers and incorporating formal nutrition instruction into school curricula. In order to provide interesting nutrition lectures that dispel myths and promote healthy eating habits, educators should also be given the tools and training they need. When combined, these initiatives can close the knowledge gaps, combat negative influences, and encourage teens to adopt healthy eating habits.

The findings revealed that more knowledgeable adolescents consistently demonstrated stronger understanding across a wide range of nutritional topics compared to their less knowledgeable peers. They showed clearer awareness of nutrient functions, deficiency diseases, and healthy food choices. The understanding of modern food preservation methods and the importance of vitamins stood out as particularly strong. Meanwhile, less knowledgeable adolescents struggled with several key concepts, although they occasionally performed better on specific items. Overall, the results highlighted a substantial gap in nutritional knowledge, suggesting that targeted education efforts could help bridge this divide and support healthier decision-making among all adolescents.

Adolescents with a good nutritional attitude consistently expressed more positive views toward healthy eating and hygiene practices compared to those with poor attitudes. Those with good attitudes were significantly more likely to agree that eating a variety of foods is important, that handwashing prevents illness, and that learning about nutrition and cooking is enjoyable. They also showed stronger appreciation for healthy habits such as drinking boiled water, eating fruits as snacks, reading food labels, and valuing breakfast. Furthermore, they expressed greater enjoyment of school-based health programs and traditional meals such as well-prepared posho and beans. The large and consistent effect sizes across all the items indicate a clear and meaningful distinction in attitudes between the two groups, suggesting that adolescents with good attitudes not only understand but also embrace healthy nutritional behaviours and practices. In conclusion, the strongest attitude differences between adolescents with good and poor nutritional outlooks were linked to enjoyment of cooking, appreciation for traditional meals such as posho and beans, and recognition of handwashing as a key health practice. These findings reflect how

positive attitudes are shaped not only by knowledge but also by cultural relevance and personal engagement with everyday nutrition and hygiene behaviours.

Recommendations

To dispel myths and establish fundamental knowledge, interactive teaching and hands-on demonstrations should be incorporated into school-based nutrition instruction, particularly for junior adolescents. Through clubs, promotions, and supervised meals, boarding school practices that promote healthy eating should be modified for day scholars. Using parents, teachers, and classmates as role models can help to reinforce positive attitudes.

The limited use of digital and internet sources for nutritional information leaves adolescents less informed about healthy eating, widening knowledge gaps and increasing the risk of malnutrition. With global trends emphasizing online learning and information access, enhancing digital literacy and equitable access to online nutrition resources is crucial for improving adolescents' dietary choices and health outcomes.

Based on these findings, it is recommended that public secondary schools in Wakiso District strengthen their nutrition education programs by prioritizing topics where knowledge gaps are most evident. Educators should focus on practical, relatable teaching methods that engage less knowledgeable adolescents and reinforce critical concepts such as nutrient functions, food safety, and deficiency diseases.

Integrate hands-on cooking and nutrition activities into the school curriculum. The strong positive attitude toward cooking and enjoyment of nutrition learning among adolescents with good attitudes suggests that experiential learning can be a powerful tool. Schools should incorporate practical cooking sessions, food preparation demonstrations, and interactive nutrition lessons to foster engagement and deepen appreciation for healthy eating. These activities can help students connect nutritional concepts to real-life practices, making learning both enjoyable and impactful.

Promote culturally relevant and appealing school meals. The high attitude scores related to liking well-prepared posho and beans highlight the importance of culturally familiar foods in shaping positive nutritional attitudes. Schools should ensure that the meals served are not only nutritious but also prepared in ways that students find appealing. Engaging students in meal planning or feedback sessions can increase their sense of ownership and satisfaction, reinforcing positive attitudes toward traditional healthy foods.

Strengthening hygiene education through school-wide campaigns. The strong endorsement of handwashing as a preventive health measure underscores the value adolescents place on hygiene. Schools should build on this by implementing regular hygiene awareness campaigns, providing adequate handwashing facilities, and integrating health education into daily routines. Reinforcing these practices can sustain and expand positive attitudes, contributing to both nutritional well-being and overall public health.

Strengths and limitations of the study

Strengths: This study compared groups (boarding vs. day, different classes), collected a wide range of knowledge and attitude data, employed a large sample size, and employed a combination of approaches (questionnaires and focus groups) for triangulation. These findings provide useful information for school-based nutrition programs.

Limitations: This study is not without limitations. First, the use of self-reported data may have introduced recall and social desirability biases, as participants might have over- or under-reported certain behaviours or attitudes. Second, the sampling approach was limited to selected public secondary schools within Nansana Municipality, which may restrict the diversity of participants and limit the generalizability of the findings to other settings or populations. Lastly, its cross-sectional design precludes causal inference.

Acknowledgements

The authors are grateful to all participants in this study for their valuable cooperation.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The authors reported there is no funding associated with the work featured in this article.

ORCID

Kenneth Ssekatawa 0000-0003-4061-9345

Ethics approval statement

The ethical approval (Ref: MUREC-2025-1761) was granted by the Mildmay Uganda Research Ethics Committee.

References

Abu-Baker, N., Eyadat, A., & Khamaiseh, A. (2021). The impact of nutrition education on knowledge, attitude, and practice regarding iron deficiency anemia among female adolescent students in Jordan. *Heliyon*, *7*, e06348. https://doi.org/10.1016/j.heliyon.2021.e06348

Aldubayan, K. (2020). Teachers' perspectives on nutrition education in boys' public high schools in Riyadh, Saudi Arabia. *Eastern Mediterranean Health Journal*, *26*(2), 170–175. https://doi.org/10.26719/2020.26.2.170

Angella, N., Kariuki, J., & Nyamai, J. J. (2024). Determinants of nutrition status among adolescents in selected secondary schools in rural Kanungu district Uganda. *International Journal of Community Medicine and Health*, *11*(11), 4191–4197.

Arias, J. V., Guerrero, C. C., Espinoza, L. G., Ángel, M., & Jácome, E. (2025). Healthy eating and nutrition, a review of the theoretical aspects of a healthy diet Alimentación y nutrición saludables, una revisión de los aspectos teóricos. *de una dieta sana*, 3(112), https://doi.org/10.62486/agsalud2025112

Badrasawi, M., Anabatawi, O., & Qaissieh, M. (2022). Nutrition knowledge and dietary practices among secondary school students in Hebron-Palestine: a cross-sectional study. *Palestinian Medical and Pharmaceutical Journal*, *6*(1), 41–52. https://doi.org/10.59049/2790-0231.1034

Buyinza, T., Buzigi, E., Bukenya, J., Mbuliro, M., Kiwanuka, J., Ndejjo, R., & Guwatudde, D. (2025). Association between nutrition literacy and diet quality among adolescents and young adults in the rural district of Mayuge, Eastern Uganda. *BMC Public Health*, *25*(1), 2335. https://doi.org/10.1186/s12889-025-23498-2

Edin, A., Jemal, K., Ahmed, I. A., Gebremichael, B., Bushra, A. A., 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. *Frontiers in Public Health*, *12*(June), 1–8. https://doi.org/10.3389/fpubh.2024.1398236

Gadanya, A. M., Hamza, B., & Abubakar, S. M. (2022). Assessment of nutritional status, knowledge, attitude and practices of secondary school students in Kano, Nigeria. *Bayero Journal of Pure and Applied Sciences*, *14*(2), 214–217. https://doi.org/10.4314/bajopas.v14i2.26

Gudelia, N. -G., Claudia, M. -R. M., Brenda, R. -M., & Teresa, T. - H. R. M. (2023). Knowledge and practices of school adolescents in situation of obesity, *Connecting Expertise Multidisciplinary Development for the Future*. https://doi.org/10.56238/connexpemultidisdevolpfut-085

Hashad, M. E. (2023). Students' self-efficacy and the moderating role of nutrition education Student nutritional knowledge and dietary behavior: The mediating role of students' self-efficacy and the moderating role of nutrition education. October.

Isabirye, N., Bukenya, J. N., Nakafeero, M., Ssekamatte, T., Guwatudde, D., & Fawzi, W. (2020). Dietary diversity and associated factors among adolescents in eastern Uganda: A cross-sectional study. *BMC Public Health*, *20*(1), 4–11. https://doi.org/10.1186/s12889-020-08669-7

Kansiime, E., Josephine, E., & Gaston, A. (2024). Effect of project-based learning on learners' nutrition knowledge in secondary schools in central Uganda. *International Journal For Multidisciplinary Research*, *6*(6), 1–15. https://doi.org/10.36948/ijfmr.2024.v06i06.30862

Kusemererwa, D. O. (June 2021). Nutrition nutritional awareness among the secondary schools students in Maganjo. *Unpublished Project Report, Department of Food Science and Technology, Makerere University Library*, *1*.

Kyere, P., Veerman, J. L., Lee, P., & Stewart, D. E. (2020). Effectiveness of school-based nutrition interventions in sub-Saharan Africa: A systematic review. *Public Health Nutrition*, *23*(14), 2626–2636. https://doi.org/10.1017/S1368980020000506

Moaadeli, Z., Hossainnejad Neyrizi, A., Sharifikia, I., & Abbasi Marandi, K. (2015). The study of knowledge, attitude and nutritional practice of secondary school students in Darab City, Fars Province, Iran in 2011–2012. *International Journal of School Health*, *2*(2), 1–7. https://doi.org/10.17795/intjsh-25702

Moriyani, V., & Meena, D. S. (2022). Assessment knowledge regarding healthy food and actual eating habits of adolescent students (13–16 years). *The Pharma Innovation*, *11*(10), 1294–1298. https://doi.org/10.22271/tpi.2022.v11.i10o.16240

Noor, A. R., Paulo, H. A., Shinde, S., Tadesse, A. W., Tinkasimile, A., Hussen, Y., Ngeba, J., Sherfi, H., Drysdale, R., Mwanyika-Sando, M., Codjia, P., Chitekwe, S., Bärnighausen, T., Sharma, D., & Fawzi, W. W. (2025). School health and nutrition

environments: A multicountry survey in five countries of sub-Saharan Africa region—Burkina Faso, Ethiopia, South Africa, Sudan, and Tanzania. *Maternal and Child Nutrition*, *21*(S1), https://doi.org/10.1111/mcn.13614

Nurbaya, N., Najdah, N., & Irwan, Z. (2023). Education on balanced nutrition and healthy snacks in the school environment to prevent nutritional problems among adolescents. *Poltekita: Jurnal Pengabdian Masyarakat*, *4*(3), 821–827. https://doi.org/10.33860/pjpm.v4i3.2618

Patimah, S., Sundari, Idrus, H. H., & Noviasty, R. (2023). Effect of school-integrated interventions on improvement of nutrition-health knowledge and nutritional status among adolescent girls: A quasi-experimental study. *Current Research in Nutrition and Food Science*, *11*(2), 880–893. https://doi.org/10.12944/CRNFSJ.11.2.35

Peace, K., Andrew, T., & Atuheire, C. G. (2022). Nutritional knowledge, attitude and practices of adolescents towards healthy eating in secondary schools in Sheema municipality, Sheema district, Uganda. *IAA Journal of Scientific Research*, *9*(1), 34–51. www.iaajournals.org

Quaidoo, E., Ohemeng, A., Kushitor, M. K., & Antwi, J. (2022). Nutrition education incorporation into mainstream primary school curriculum in Ghana: Stakeholders' sources of nutrition information and perceived barriers. *PLoS ONE*, *17*(1 January), e0262359. https://doi.org/10.1371/journal.pone.0262359

Raut, S., Kc, D., Singh, D. R., Dhungana, R. R., Pradhan, P. M. S., & Sunuwar, D. R. (2024). Effect of nutrition education intervention on nutrition knowledge, attitude, and diet quality among school-going adolescents: a quasi-experimental study. *BMC Nutrition*, *10*(1), 1–10. https://doi.org/10.1186/s40795-024-00850-0

Rukmana, E., Fransiari, M. E., Damananik, K. Y., & Nurfazriah, L. R. (2023). Assessment of knowledge, attitudes and behaviors regarding balanced nutrition and nutritional status among adolescents at the Yayasan Bandung Senior High School, Deli Serdang Regency. *Amerta Nutrition*, *7*(2SP), 178–183. https://doi.org/10.20473/amnt.v7i2SP.2023.178-183

Sigdel, A. (2024). Assessing the Role of Nutrition Knowledge in Shaping Dietary Practices Among Secondary School Level School Students. Implication for Healthcare Management . *International Journal of Atharva* , *2*(2), 85–95.

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*, *18*(January), 1679–1693. https://doi.org/10.2147/JMDH.S507564

Macias , F. Y., & Glasauer, P. (2014). World Health Organization Guidelines for assessing nutrition-related knowledge, attitudes and practices manual. In *Food and Agriculture Organization of the United Nations*. www.fao.org/docrep/019/i3545e/i3545e00.htm

Wang, D., Katalambula, L.K., Modest, A.R., Tinkasimile, A., Young, T., Ismail, A., Mwanyika, M., Mosha, D., Malero, A., Vuai, S., & Fawzi, W.W. (2022). Meals, education, and gardens for in-school adolescents (MEGA), *Study protocol for a cluster randomised trial of an integrated adolescent nutrition intervention in Dodoma* (pp. 1–7). https://doi.org/10.1136/bmjopen-2022-062085

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. https://doi.org/10.56303/jhnresearch.v2i3.174