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Abstract

Background Adolescence is a period of increasing independence in food choices. During these years, dietary behaviour may be influenced by peers, media exposure, and the availability of different types of food. Junk food consumption among adolescents in Nepal has emerged as a public health concern due to its potential long-term effects on health. Frequent consumption of such foods may increase the risk of obesity and dental caries during adolescence and may also contribute to the development of chronic conditions such as diabetes and cardiovascular disease later in life. Studies in Nepal using the knowledge–attitude–practice approach have generally examined knowledge and dietary practices as separate aspects and have often assumed that greater knowledge results in healthier food choices. However, having knowledge about the health effects of junk food does not necessarily mean that students will avoid or reduce its consumption. This study therefore examined the level of knowledge and patterns of junk food consumption among secondary-level students in Pokhara.

Methods A descriptive cross-sectional study was carried out among 290 students enrolled in grades 9 and 10 in six public schools in Pokhara Metropolitan City. Participants were selected through a multistage sampling procedure. Data were gathered using a pretested, self-administered questionnaire. Students' knowledge of junk food was measured using 21 items for which objectively verifiable answers were available, with an overall reliability coefficient of KR-20 = 0.634. Knowledge levels were categorised using Bloom's cut-off criteria. Practice was assessed mainly in terms of the number of times students consumed junk food during a typical week, with consumption three or more times per week considered frequent. In addition, a four-component index was developed to provide a broader assessment of dietary practices. Relationships between the study variables were examined using independent-samples t-tests, one-way analysis of variance, chi-square tests with Cramér's V, correlation analysis, and binary logistic regression.

Results The mean knowledge score was 15.41 ± 2.99 out of 21, corresponding to 73.4% of the items answered correctly. Overall, 33.4% of students had high knowledge, 51.0% had moderate knowledge, and 15.5% had low knowledge. Most students correctly recognised common characteristics of junk food. However, fewer students were able to explain why processed junk food has a long shelf life (37.9%) or identify the nutrient that is generally lacking in such foods (42.4%). Junk food consumption was almost universal, with 97.2% of students reporting consumption, and 59.3% consuming it frequently. Taste was the most commonly reported reason for consumption (61.0%). Grocery stores were the main source of junk food (83.8%), while only 6.6% of students reported obtaining it from school canteens. Mother's education was the only socio-demographic factor significantly associated with knowledge ($F = 3.387$, $p = 0.010$). Daily pocket money was the only factor associated with frequent junk food consumption ($\chi^2 = 10.150$, $p = 0.017$), indicating a threshold effect rather than a gradual increase in consumption with increasing pocket money. However, the results demonstrated that students with higher knowledge scores reported more frequent junk food consumption. The mean knowledge score was 13.12 among

students who did not consume junk food and 16.01 among those who consumed it five or more times per week (F = 3.310, p = 0.021). After adjustment for other variables, knowledge remained the only independent predictor of frequent junk food consumption. For each one-standard-deviation increase in the knowledge score, the odds of frequent consumption increased by 35.9% (adjusted OR = 1.359, 95% CI: 1.057–1.746, p = 0.017).

Conclusions Students at the secondary level in Pokhara demonstrated a generally good understanding of junk food; however, greater knowledge was not accompanied by lower consumption. Rather, students with higher knowledge scores reported consuming junk food more frequently. This finding suggests that knowledge about the health effects of junk food, by itself, may not be sufficient to bring about changes in adolescents' dietary practices. Strategies aimed at reducing frequent junk food consumption should therefore address the wider factors that shape students' food choices. The availability and affordability of these foods, their prices and portion sizes, exposure to food marketing, and the amount of pocket money available to students may all play a role in consumption patterns. Restricting or regulating the sale and availability of junk food in and around schools could also be considered as part of a broader intervention. Nutrition education should remain an important component of such efforts, but it could place greater emphasis on helping students understand food processing and acquire practical skills for reading and interpreting food labels.

Keywords Junk food consumption, Knowledge–practice gap, Secondary school students

Introduction

Junk food is generally defined as food that is high in energy, fat, salt, and free sugars but low in dietary fibre, protein, and micronutrients [1,2]. This category includes confectionery, bakery products, salty snacks, instant noodles, processed meat, sugar-sweetened and carbonated drinks, and commercially prepared fast foods. These foods are generally manufactured on an industrial scale and are widely available and promoted [2,3].

Adolescence is an important stage of development characterised by physical changes associated with puberty as well as social, economic, and psychological changes [4]. During this period, adolescents become increasingly independent in their food choices. They spend more time with peers, seek greater independence from parents, and may have access to their own spending money. These changes can make their food choices more susceptible to influences outside the home, including advertising, peer behaviour, the availability of food around schools, and the price and convenience of ready-to-eat foods [5,6]. As dietary habits developed during adolescence may continue into adulthood, this period provides an important opportunity for health promotion and intervention.

Junk food consumption among adolescents is a global concern. Frequent consumption was particularly common in Southeast Asia [7]. Regular consumption of fast food has been associated with obesity, insulin resistance, type 2 diabetes, dyslipidaemia, cardiovascular risk, and poor overall diet quality [8,9]. Early exposure to junk food has also been associated with severe dental caries and the coexistence of undernutrition in South Asian populations [10]. In addition, children's food choices and weight status can be influenced by food consumption patterns within the family, including those of mothers and other household members [11,12].

Nepal is undergoing a transition in food choices particularly becoming more evident in urban settings. As dietary patterns change, traditional foods prepared at home are increasingly being replaced by packaged, shelf-stable, and ready-to-eat food products. A socio-ecological study examining junk food consumption among Nepalese schoolchildren found that consumption is influenced by factors at several levels, including individual, interpersonal, school, community, and policy contexts. The study further indicated that providing nutrition education at the individual level may have limited impact when the wider food environment remains unchanged [13]. Studies conducted in Pokhara Valley have reported high levels of junk food consumption among adolescents and identified factors such as pocket money, peer influence, and easy availability as important determinants [14].

Evidence on adolescents' knowledge of junk food in Nepal is not consistent. A study conducted among higher-level students in Kathmandu found that only 19.1% demonstrated adequate knowledge of the harmful effects of junk food, whereas 45.2% had poor knowledge. Despite these differences in knowledge, junk food consumption was reported by all participants in the study [15]. Similarly, a study in Hetauda found that most adolescents had inadequate knowledge, while taste preference and exposure to mass media were important reasons for consumption [16]. Among private school students in Kalyanpur, Saptari, 31.7% had good knowledge, whereas 65.0% had poor practices [17]. In contrast, a study conducted in Kanakasundari Rural Municipality of Jumla reported a considerably higher level of adequate knowledge [18]. Similar differences have been reported in other countries. The proportion of adolescents with adequate knowledge has ranged from relatively low levels in studies conducted in Belagavi and Greater Noida, India [19, 20], and Beni Suef and Assiut, Egypt [21, 22], to more than 80% in Sialkot, Pakistan [23].

An important limitation of the existing literature is that many studies examine knowledge and practice separately. Knowledge–attitude–practice studies often report levels of knowledge and practice and then assume that poor practice results from inadequate knowledge. Based on this assumption, health education is commonly proposed as the main solution. However, studies that have directly examined the relationship between knowledge and practice have reported weak or unexpected associations [24, 25]. Behavioural theories also suggest that food-related behaviour is influenced not only by knowledge but also by factors such as perceived control, social norms, and the availability and accessibility of food [26]. Therefore, understanding the relationship between students' knowledge and their actual junk food consumption is important for informing the design of effective interventions.

Pokhara Metropolitan City is an urban centre in Nepal, where the number of school-going adolescents is increasing alongside the growing availability of commercially prepared and packaged foods. Despite these changes, there is limited research on students' knowledge of junk food and their consumption practices at the secondary level in Pokhara. This study was conducted to assess students' knowledge and patterns of junk food consumption, examine the socio-demographic factors related to these outcomes, and assess the relationship between knowledge and actual consumption practices among secondary-level students in Pokhara.

Methods

Study design and setting

A descriptive cross-sectional study was conducted among students attending public secondary schools in Pokhara Metropolitan City, Kaski District, Gandaki Province, Nepal. Pokhara is the second-largest city in Nepal and comprises 33 administrative wards with diverse socio-demographic characteristics. Data were collected over a three-month period in 2025.

Study population and eligibility

The study population comprised students enrolled in grades 9 and 10 in the selected public schools. Students who were present during the data collection period and agreed to participate were eligible for inclusion after parental consent had been obtained. Students who were absent during data collection were excluded.

Sample size

The required sample size was initially estimated using Cochran's formula for a single population proportion. A proportion of 0.826 was used based on a study conducted in Sialkot, Pakistan, which reported that 82.6% of students had adequate knowledge of junk food and its harmful effects [23]. The calculation assumed a 95% confidence level ($Z = 1.96$) and 5% absolute precision ($d = 0.05$), giving an initial sample size of 221. Because the total number of students in grades 9 and 10 in the selected schools was 851, a finite population correction was applied, reducing the sample size to 176. A design effect of 1.5 was then applied to account for the additional variance associated with the sampling procedure, resulting in a sample size of 264. Finally, 10% was added to allow for possible non-response, giving a required sample size of 290 students.

Sampling technique

Participants were selected using a multistage sampling procedure. At the first stage, six of the 33 wards of Pokhara Metropolitan City, representing approximately 20% of the total wards, were selected using a lottery method. At the second stage, one public school was selected from each of the six selected wards using the same procedure. These schools had a combined enrolment of 851 students in grades 9 and 10. At the third stage, the required number of participants was allocated proportionately to each school and grade using a sampling fraction of 290/851 (0.34). In the final stage, students within each stratum were selected through simple random sampling using the lottery method. All 290 selected students participated and returned complete questionnaires, resulting in a 100% response rate.

Research instrument

A structured, self-administered questionnaire was developed based on the study objectives, a review of relevant literature, and consultation with subject experts. The questionnaire comprised three sections. The first section collected socio-demographic and economic information, including sex, religion, ethnicity, family type, grade, number of siblings, living arrangement, parental education, parental occupation, monthly family income, and daily pocket money. The second section contained 15 questions assessing knowledge of junk food. These questions addressed the meaning and examples of junk food, its composition and nutrient content, shelf life, and potential effects on physical and mental health. The third section consisted of 12 questions concerning junk food consumption practices. These covered the frequency and timing of consumption, preferred types of junk food, places of purchase, availability in school canteens, reasons for consumption, food-label reading, storage of junk food at home, and perceived effects after consumption. The questionnaire was first prepared in English and subsequently translated into Nepali. The Nepali version was then back-translated into English to assess the consistency of meaning between the two versions.

Validity and reliability

Content validity was assessed by five subject experts. Their suggestions were incorporated into the questionnaire, resulting in a content validity index of 0.90. The revised questionnaire was subsequently pretested among 29 students, equivalent to 10% of the calculated sample size, at a public school in Pokhara that was comparable to the study schools but was not included in the main study. Data from the pretest were not included in the final analysis. No further modifications to the questionnaire were considered necessary following the pretest. The internal consistency of the knowledge items was assessed using the Kuder–Richardson formula 20 (KR-20), while Cronbach's alpha was used to assess the reliability of the practice index.

Data collection

Data collection commenced after ethical approval had been obtained and written permission had been secured from the concerned school authorities. Consent forms were distributed to selected students in their classrooms and taken home for completion by their parents or guardians. The signed forms were collected on the following day. Written assent was subsequently obtained from each participating student. Students completed the questionnaire individually during a free period under the supervision of the investigator. Completed questionnaires were collected immediately after completion. Each questionnaire was reviewed at the time of collection to identify any missing or unclear responses.

Variables and scoring

The primary outcome variables were knowledge of junk food and junk food consumption practice. The independent variables included sex, religion, ethnicity, family type, grade, number of siblings, parental education, parental occupation, monthly family income, daily pocket money, and reported availability of junk food in the school canteen.

Knowledge scoring

Knowledge was assessed using 21 questionnaire items for which an objectively correct response could be determined. These comprised 11 single-response items, four items concerning the constituents of junk food, and six items addressing potential health risks. For the health-risk items, the response option "increases energy" was treated as an incorrect response and reverse-scored. Each correct response was awarded one point, resulting in a total possible knowledge score ranging from 0 to 21. Eleven additional questions examined students' views regarding factors that encourage junk food consumption and possible measures for reducing consumption. Because these questions did not have objectively correct responses, they were not included in the knowledge score and were analysed separately as perception variables. Knowledge levels were categorised using Bloom's cut-off criteria. Scores of 17–21 (≥80%) were classified as high knowledge, scores of 13–16 (60–79%) as moderate knowledge, and scores below 13 (<60%) as low knowledge [27].

Practice scoring

Junk food consumption practice was primarily assessed according to the reported frequency of consumption per week. Students who reported consuming junk food three or more times per week were classified as frequent consumers. Those reporting consumption two or fewer times per week, including those who reported no consumption, were classified as infrequent consumers. A supplementary Junk Food Practice Index was also developed to provide a broader summary of consumption behaviour. The index consisted of four components: weekly consumption frequency, consumption while studying, the number of preferred types of junk food (0–5), and the number of reported consumption occasions (0–6). The resulting score ranged from 0 to 17, with higher scores representing greater or more frequent consumption. The index was used as a formative summary measure of consumption behaviour and was not treated as a unidimensional reflective scale.

Statistical analysis

Completed questionnaires were first reviewed, edited, and coded before being entered into EpiData version 3.1. To assess the accuracy of data entry, 10% of the records were entered a second time. The dataset was then exported to IBM SPSS Statistics for statistical analysis. Categorical variables were summarised using frequencies and percentages, and 95% confidence intervals (CIs) were calculated using the Wilson score method. Continuous variables were described using the mean, standard deviation (SD), median, and range. The distribution of the knowledge score was approximately symmetrical, with skewness of −0.11 and kurtosis of −0.11; therefore, the score was analysed as a continuous variable. Independent-samples t-tests and one-way analysis of variance (ANOVA) were used to compare mean knowledge scores between groups. Tukey's HSD test was used for post-hoc comparisons following ANOVA. Cohen's d and eta-squared (η^2) were reported as measures of effect size. Associations between categorical variables were examined using Pearson's chi-square test, while Cramér's V was used to assess the strength of association. None of the reported chi-square analyses had an expected cell count below five. Pearson's and Spearman's correlation coefficients were used to assess relationships between continuous variables, as appropriate.

Binary logistic regression was performed to identify independent predictors of frequent junk food consumption. Multiple linear regression was used to identify independent predictors of the knowledge score. Model calibration was assessed using the Hosmer–Lemeshow test. Statistical significance was assessed using a two-tailed p-value of <0.05. Where multiple related statistical tests were performed, Bonferroni-adjusted significance levels were applied. Complete data were available for all 290 participants; consequently, no imputation was required.

Results

Socio-demographic and economic profile

A total of 290 secondary-level students participated in the study. Female students comprised 53.1% of the sample, and 53.8% were in grade 9. Most students were Hindu (80.7%). Brahmin/Chhetri was the largest ethnic group (42.1%), followed by Dalit (28.3%) and Janjati (26.9%). Most students lived in nuclear families (62.1%). The mean number of siblings was 1.44

± 0.81. Nearly two-thirds of the students (63.4%) had one sibling, while 3.4% had none. The educational attainment of both parents was generally at or below the secondary level. Only 4.1% of fathers and 5.9% of mothers had completed a bachelor's degree or higher, whereas 17.6% of fathers and 21.0% of mothers were reported to be illiterate. Regarding occupation, 42.1% of mothers were housewives. Fathers were mainly engaged in business (21.4%), service-related occupations (21.0%), foreign employment (19.3%), and agriculture (19.0%). The median monthly household income was Rs. 40,000, while the mean income was Rs. 44,607 ± 18,593, ranging from Rs. 10,000 to Rs. 100,000. About 61.0% of households reported a monthly income of Rs. 40,000 or less. Students received a mean daily pocket money of Rs. 54.55 ± 30.84, with a median of Rs. 50 and a range of Rs. 10–150. More than one-quarter of the students (27.6%) received more than Rs. 60 per day (Table 1).

Table 1 Socio-demographic and economic profile of respondents (n = 290)

Characteristic	Frequency (f)	Percentage (%)	95% CI (%)
Sex			
Male	136	46.9	41.2–52.6
Female	154	53.1	47.4–58.8
Religion			
Hinduism	234	80.7	75.8–84.8
Buddhism	35	12.1	8.8–16.3
Christianity	19	6.6	4.2–10.0
Islam	2	0.7	0.2–2.5
Ethnicity			
Brahmin/Chhetri	122	42.1	36.5–47.8
Dalit	82	28.3	23.4–33.7
Janjati	78	26.9	22.1–32.3
Madhesi	6	2.1	0.9–4.4
Muslim	2	0.7	0.2–2.5
Type of family			
Nuclear	180	62.1	56.3–67.5
Joint	100	34.5	29.3–40.1
Extended	10	3.4	1.9–6.2
Grade			
Grade 9	156	53.8	48.0–59.4
Grade 10	134	46.2	40.6–52.0
Number of siblings (mean 1.44 ± 0.81)			
None	10	3.4	1.9–6.2
One	184	63.4	57.7–68.8
Two	61	21.0	16.7–26.1
Three	28	9.7	6.8–13.6
Four	7	2.4	1.2–4.9
Living arrangement			
With family	290	100.0	98.7–100.0
Education level of father			
Illiterate	51	17.6	13.6–22.4
Can read and write	74	25.5	20.9–30.8
Basic level	55	19.0	14.9–23.9
Secondary level	98	33.8	28.6–39.4
Bachelor and above	12	4.1	2.4–7.1
Education level of mother			
Illiterate	61	21.0	16.7–26.1
Can read and write	72	24.8	20.2–30.1
Basic level	61	21.0	16.7–26.1
Secondary level	79	27.2	22.4–32.7
Bachelor and above	17	5.9	3.7–9.2

Characteristic	Frequency (f)	Percentage (%)	95% CI (%)
Occupation of father			
Business	62	21.4	17.0–26.5
Service related	61	21.0	16.7–26.1
Foreign employment	56	19.3	15.2–24.2
Agriculture	55	19.0	14.9–23.9
Retired / pension	38	13.1	9.7–17.5
Daily wage labour	18	6.2	4.0–9.6
Occupation of mother			
Housewife	122	42.1	36.5–47.8
Business	49	16.9	13.0–21.6
Agriculture	47	16.2	12.4–20.9
Service related	36	12.4	9.1–16.7
Foreign employment	20	6.9	4.5–10.4
Retired / pension	9	3.1	1.6–5.8
Daily wage labour	7	2.4	1.2–4.9
Monthly family income (mean Rs. 44,607 ± 18,593)			
Rs. 10,000–40,000	177	61.0	55.3–66.5
Rs. 40,001–70,000	88	30.3	25.3–35.9
Rs. 70,001–100,000	25	8.6	5.9–12.4
Daily pocket money (mean Rs. 54.55 ± 30.84)			
Below Rs. 20	58	20.0	15.8–25.0
Rs. 21–40	55	19.0	14.9–23.9
Rs. 41–60	97	33.4	28.3–39.0
Above Rs. 60	80	27.6	22.7–33.0

CI confidence interval (Wilson score method). Percentages within each characteristic sum to 100.

Knowledge of Junk Food

Most students were able to recognise what constitutes junk food. Nearly all participants (97.9%) correctly identified an example of junk food, while 96.6% correctly identified its meaning. Students demonstrated good knowledge of the main characteristics of junk food. High calorie content was the most frequently identified characteristic (91.0%), followed by high fat (79.3%), high salt (71.0%), and high sugar (66.2%). However, knowledge was lower for questions that required explanation or understanding rather than simple recognition.

Only 42.4% of the students correctly identified the nutrient that is generally lacking in junk food. Similarly, 37.9% were able to explain why processed junk foods have a long shelf life, which was the least correctly answered item in the questionnaire. About three-quarters of the students (76.2%) correctly identified the ingredient mainly associated with obesity, while 80.7% recognized the major reason why junk food is preferred (Table 2).

Table 2 Knowledge of junk food (n = 290)

Knowledge item	Correct (f)	Correct (%)	95% CI (%)
Single-response items			
Example of junk food	284	97.9	95.6–99.0
Meaning of junk food	280	96.6	93.8–98.1
Major reason for preferring junk food	234	80.7	75.8–84.8
Ingredient contributing most to obesity	221	76.2	71.0–80.7
Nutrient generally missing from junk food	123	42.4	36.9–48.2
Reason for long shelf life of processed junk food	110	37.9	32.5–43.6
Constituents correctly identified (multiple response)			
High calories	264	91.0	87.2–93.8
High fats	230	79.3	74.3–83.6
High salt	206	71.0	65.6–76.0

Knowledge item	Correct (f)	Correct (%)	95% CI (%)
High sugar	192	66.2	60.6–71.4

Multiple-response percentages are of all 290 respondents and therefore sum to more than 100.

Knowledge regarding health effects of junk food

Students generally had a good understanding of the health consequences of junk food consumption. Most students correctly identified the organ that is most affected by excessive junk food consumption (74.1%), understood its possible effects on mental health (84.1%), and knew the importance of a balanced diet (83.1%). Among the specific health problems associated with junk food, obesity was the most commonly recognised consequence (88.6%). This was followed by heart disease (67.6%), tooth decay (63.8%), cancer (59.3%), and diabetes (57.9%). Only 2.4% of the students incorrectly believed that junk food increases energy. However, some gaps in knowledge were also observed. About one-third of the students (33.4%) could not identify the main reason why junk food is considered unhealthy. Similarly, 41.4% did not know which type of junk food contains the highest amount of sugar. This represents an important gap because such knowledge may help students compare food products and make more informed choices when purchasing food (Table 3).

Table 3 Knowledge regarding health effects of junk food (n = 290)

Knowledge item	Correct (f)	Correct (%)	95% CI (%)
Single-response items			
Major impact of junk food on mental health	244	84.1	79.5–87.9
Action required to maintain a balanced diet	241	83.1	78.4–87.0
Organ most affected by excessive consumption	215	74.1	68.8–78.8
Primary reason junk food is unhealthy	193	66.6	60.9–71.7
Junk food item containing the most sugar	170	58.6	52.9–64.1
Health risks correctly identified (multiple response)			
Obesity	257	88.6	84.4–91.8
Heart disease	196	67.6	62.0–72.7
Tooth decay	185	63.8	58.1–69.1
Cancer	172	59.3	53.6–64.8
Diabetes	168	57.9	52.2–63.5
Increases energy (incorrect option endorsed)	*7*	*2.4*	*1.2–4.9*

Perceived drivers of consumption and endorsed control strategies

Students were also asked about the factors they believed contributed to junk food consumption and the measures they considered appropriate for controlling it. Since these questions reflected personal perceptions and did not have objectively correct or incorrect answers, they were not included in the knowledge score. Taste and cravings were the most commonly reported factors influencing junk food consumption (87.6%). Other commonly identified factors were easy availability (67.9%), peer pressure (66.9%), advertising (64.5%), low cost (54.1%), and stress (52.4%). Students generally showed strong support for measures to reduce junk food consumption. Eating more home-cooked food received the highest level of support (75.5%), followed by increasing awareness through schools, families, and communities (73.1%). Other supported measures included restricting advertising (71.4%), stricter parental restrictions (69.3%), and banning the sale of junk food in school canteens (66.9%). Only 25.5% supported the more permissive approach of encouraging moderation rather than restricting consumption. Overall, the responses indicate greater support for parental, school, and environmental measures to control junk food consumption than for relying mainly on individual self-regulation (Table 4).

Table 4 Perceived drivers of junk food consumption and endorsed control strategies (n = 290, multiple response)

Statement	f	%	95% CI (%)
Perceived factors influencing consumption			
Taste and cravings	254	87.6	83.3–90.9
Easy availability	197	67.9	62.4–73.0
Peer pressure	194	66.9	61.3–72.1
Advertisements	187	64.5	58.8–69.8
Low cost	157	54.1	48.4–59.8
Stress	152	52.4	46.7–58.1
Endorsed strategies to minimise consumption			

Statement	f	%	95% CI (%)
Eating more home-cooked meals	219	75.5	70.3–80.1
Raising awareness at school, family and community	212	73.1	67.7–77.9
Minimising advertising of junk food	207	71.4	65.9–76.3
Strict restriction by parents	201	69.3	63.8–74.3
Banning sale of junk food in school canteens	194	66.9	61.3–72.1
Encouraging students to eat junk food in moderation	74	25.5	20.8–30.8

Perception items with no objectively correct answer; not included in the knowledge score. Percentages are of all 290 respondents.

Overall knowledge score and level of knowledge

The mean knowledge score was 15.41 ± 2.99 out of a possible 21, with 73.4% of the questions answered correctly. The median score was 15, with scores ranging from 6 to 21. Based on Bloom's cut-off points, 51.0% of the students had moderate knowledge, 33.4% had high knowledge, and 15.5% had low knowledge. The two areas of knowledge were similar. Students answered 73.9% of the questions related to the definition and composition of junk food correctly, compared with 72.9% of the questions related to its health effects. The difference was not statistically significant (paired $t = 0.934$, $p = 0.351$). Overall, the findings suggest that students had a reasonable general understanding of junk food. However, their knowledge was stronger for identifying and recognising junk food than for understanding the underlying reasons for its health effects. This indicates that there may be a gap between general awareness and the practical knowledge needed to make informed food choices (Table 5).

Table 5 Knowledge score, subscale scores and level of knowledge (n = 290)

Measure	Mean ± SD	% correct	KR-20
Overall knowledge score (0–21)	15.41 ± 2.99	73.4	0.634
Definition and composition (0–10)	7.39 ± 1.70	73.9	0.517
Health effects (0–11)	8.01 ± 1.93	72.9	0.512
Median 15.0; range 6–21; skewness −0.11; kurtosis −0.11			
Level of knowledge (Bloom's cut-off)	**f**	**%**	**95% CI (%)**
High (≥ 80%; score 17–21)	97	33.4	28.3–39.1
Moderate (60–79%; score 13–16)	148	51.0	45.3–56.7
Low (< 60%; score < 13)	45	15.5	11.8–20.1

KR-20 Kuder–Richardson formula 20 (internal consistency for dichotomous items).

Practice of junk food consumption

Junk food consumption was very common among the students. Almost all respondents (97.2%, 95% CI: 94.7–98.6) reported consuming junk food, while only eight students (2.8%) reported that they never consumed it. Frequent consumption was also common, with 59.3% of students (95% CI: 53.6–64.8) consuming junk food three or more times per week. Nearly one-third (29.0%) reported consuming it five or more times per week. Junk food consumption at breakfast was also reported by 67.6% of students at least occasionally, while 12.4% reported consuming it at breakfast every day.

Among the listed food items, chocolates were the most preferred (64.5%), followed by noodles (52.8%), panipuri (51.7%), potato chips (46.9%), and cold drinks (43.1%). On average, students reported consuming 2.59 ± 1.73 of the five listed types of junk food. Consumption was most commonly reported during leisure activities and travel. Watching television or films was the most common occasion (67.6%), followed by travelling (57.6%). Students reported an average of 2.40 ± 1.69 consumption occasions. More than half of the respondents (52.8%) reported eating junk food while studying at least sometimes. Grocery stores were the main source of junk food, reported by 83.8% of students. Restaurants (8.6%), school canteens (6.6%), and online delivery services (1.0%) were less commonly reported sources. Despite the low proportion purchasing junk food from school canteens, 69.3% of students reported that their school canteen sold junk food, including 26.2% who reported that a wide variety of junk food was available.

Taste was the most commonly reported reason for consuming junk food (61.0%), followed by convenience and easy availability (30.0%). Peer influence was reported by only 5.5% of students. Personal taste was also the most important factor influencing the choice of a particular junk food item (38.3%), followed by availability (27.9%), friends' choices (21.0%), and advertising (12.8%). Food label-reading practices varied among the students. About 30.7% reported always reading food labels, while 48.6% reported reading them sometimes. The remaining 20.7% rarely or never read food labels. Regarding storage, 41.4% reported keeping junk food in their own room, indicating that these foods were readily accessible to them. After consuming junk food, satisfaction (39.3%) and no noticeable change (39.3%) were the most frequently reported responses, while only 10.7% reported feeling guilty. Overall, students more commonly reported neutral or positive responses

following junk food consumption than negative feelings. The supplementary Junk Food Practice Index had a mean score of 8.21 ± 3.61 out of 17, with a median of 7 and a range of 2–17 (Table 6).

Table 6 Practice of junk food consumption among respondents (n = 290)

Practice	f	%	95% CI (%)
Frequency of consumption per week			
1–2 times	110	37.9	32.5–43.6
3–4 times	88	30.3	25.3–35.9
5 or more times	84	29.0	24.0–34.4
Never	8	2.8	1.4–5.3
Junk food at breakfast			
Yes, always	36	12.4	9.1–16.7
Sometimes	119	41.0	35.5–46.8
Occasionally	41	14.1	10.6–18.6
Never	94	32.4	27.3–38.0
Preferred types (multiple response; mean 2.59 ± 1.73)			
Chocolates	187	64.5	58.8–69.8
Noodles	153	52.8	47.0–58.4
Panipuri	150	51.7	46.0–57.4
Potato chips	136	46.9	41.2–52.6
Cold drinks	125	43.1	37.5–48.9
Occasions of consumption (multiple response; mean 2.40 ± 1.69)			
While watching TV or films	196	67.6	62.0–72.7
While travelling	167	57.6	51.8–63.1
During tiffin time	97	33.4	28.3–39.1
During meal time	84	29.0	24.0–34.4
When bored or stressed	77	26.6	21.8–31.9
While alone	75	25.9	21.2–31.2
Usual source of purchase			
Grocery stores	243	83.8	79.1–87.6
Restaurant	25	8.6	5.9–12.4
School canteen	19	6.6	4.2–10.0
Online delivery	3	1.0	0.4–3.0
Availability of junk food in school canteen			
Yes, but only a few options	125	43.1	37.5–48.9
Yes, in a wide variety	76	26.2	21.5–31.6
No, only healthy food is sold	65	22.4	18.0–27.6
I do not buy from there	24	8.3	5.6–12.0
Main reason for consuming junk food			
Taste preference	177	61.0	55.3–66.5
Convenience and easy availability	87	30.0	25.0–35.5
Peer influence	16	5.5	3.4–8.8
Lack of time for cooking	10	3.4	1.9–6.2
Basis for choosing which junk food to eat			
Personal taste preference	111	38.3	32.9–44.0
What is easily available	81	27.9	23.1–33.4
What friends eat	61	21.0	16.7–26.1
Advertisements and promotions	37	12.8	9.4–17.1
Reading food labels before purchase			
Always	89	30.7	25.7–36.2

Practice	f	%	95% CI (%)
Sometimes	141	48.6	42.9–54.4
Rarely	25	8.6	5.9–12.4
Never	35	12.1	8.8–16.3
Storage of junk food at home			
In my room	120	41.4	35.9–47.1
Only buy when needed	98	33.8	28.6–39.4
In the kitchen for easy access	36	12.4	9.1–16.7
Do not store junk food at home	36	12.4	9.1–16.7
Consumption of junk food while studying			
Always	14	4.8	2.9–7.9
Sometimes	153	52.8	47.0–58.4
Rarely	47	16.2	12.4–20.9
Never	76	26.2	21.5–31.6
Perceived effect after consumption			
Satisfied	114	39.3	33.9–45.0
No change	114	39.3	33.9–45.0
Energetic	31	10.7	7.6–14.8
Guilty	31	10.7	7.6–14.8

Multiple-response percentages are of all 290 respondents and sum to more than 100; all other percentages sum to 100 within each practice.

Association of knowledge with socio-demographic characteristics

Mother's education was the only socio-demographic characteristic significantly associated with students' knowledge scores ($F = 3.387$, $p = 0.010$, $\eta^2 = 0.045$). Students whose mothers had a bachelor's degree or higher had a higher mean knowledge score (17.35 ± 2.52) than those whose mothers were illiterate (14.74 ± 3.25). Tukey's HSD post-hoc test showed that this difference was statistically significant (mean difference = 2.62, 95% CI: 0.40–4.83, $p = 0.011$). No other pairwise comparison was statistically significant. Female students had a slightly higher mean knowledge score than male students (15.68 ± 2.83 vs. 15.10 ± 3.14), but the difference was not statistically significant ($t = −1.633$, $p = 0.104$, $d = −0.19$). Knowledge scores also showed little variation by religion, ethnicity, family type, grade, or parental occupation, with all effect sizes being small ($|d| \leq 0.15$) and p-values greater than 0.20. There was no significant correlation between knowledge and household income ($r = 0.053$, $p = 0.369$), daily pocket money ($r = −0.032$, $p = 0.592$), or number of siblings ($r = 0.007$, $p = 0.905$) (Table 7). A multiple linear regression model was also fitted using sex, grade, education of both parents, family type, household income, and daily pocket money as predictors. None of the variables was a significant independent predictor of knowledge. The model explained only 3.3% of the variation in knowledge scores and was not statistically significant (adjusted $R^2 = 0.009$, F test $p = 0.218$).

Table 7 Knowledge score by socio-demographic characteristics (n = 290)

Characteristic	N	Knowledge score (mean ± SD)	Test statistic	p-value	Effect size
Sex			**t = −1.633**	**0.104**	**d = −0.19**
Male	136	15.10 ± 3.14			
Female	154	15.68 ± 2.83			
Religion			**t = 0.089**	**0.929**	**d = 0.01**
Hindu	234	15.41 ± 2.96			
Non-Hindu	56	15.38 ± 3.14			
Ethnicity			**t = 0.173**	**0.863**	**d = 0.02**
Relatively advantaged	122	15.44 ± 3.04			
Disadvantaged	168	15.38 ± 2.96			
Type of family			**t = −1.226**	**0.221**	**d = −0.15**
Nuclear	180	15.24 ± 2.99			
Joint / extended	110	15.68 ± 2.98			
Grade			**t = −1.401**	**0.162**	**d = −0.17**
Grade 9	156	15.18 ± 2.80			

Characteristic	N	Knowledge score (mean ± SD)	Test statistic	p-value	Effect size
Grade 10	134	15.67 ± 3.18			
Education level of father			**F = 1.863**	**0.117**	**η² = 0.026**
Illiterate	51	15.76 ± 3.40			
Can read and write	74	14.65 ± 3.03			
Basic level	55	15.40 ± 2.45			
Secondary level	98	15.69 ± 2.91			
Bachelor and above	12	16.25 ± 3.31			
Education level of mother			**F = 3.387**	**0.010***	**η² = 0.045**
Illiterate	61	14.74 ± 3.25			
Can read and write	72	15.24 ± 2.94			
Basic level	61	15.98 ± 2.84			
Secondary level	79	15.22 ± 2.84			
Bachelor and above	17	17.35 ± 2.52			
Occupation of father			**t = −0.107**	**0.915**	**d = −0.02**
Business	62	15.37 ± 2.51			
Non-business	228	15.42 ± 3.11			
Occupation of mother			**t = −0.622**	**0.534**	**d = −0.07**
Unemployed / housewife	122	15.28 ± 2.99			
Employed	168	15.50 ± 2.99			
Monthly family income			**F = 0.571**	**0.566**	**η² = 0.004**
Rs. 10,000–40,000	177	15.27 ± 2.95			
Rs. 40,001–70,000	88	15.68 ± 3.09			
Rs. 70,001–100,000	25	15.44 ± 2.90			
Daily pocket money			**F = 0.166**	**0.919**	**η² = 0.002**
Below Rs. 20	58	15.52 ± 2.90			
Rs. 21–40	55	15.58 ± 3.39			
Rs. 41–60	97	15.37 ± 2.98			
Above Rs. 60	80	15.25 ± 2.81			

*Independent-samples t-test for two-group comparisons; one-way ANOVA for multi-group comparisons. d Cohen's d; η² eta-squared. *Significant at p < 0.05. Post-hoc (Tukey HSD) for mother's education: illiterate vs bachelor and above, mean difference 2.62 (95% CI 0.40–4.83), p = 0.011; all other pairwise comparisons p > 0.05.*

Association of practice with socio-demographic characteristics

Daily pocket money was the only characteristic significantly associated with frequent junk food consumption ($\chi^2 = 10.150$, df = 3, $p = 0.017$, Cramér's V = 0.187). The relationship did not follow a consistent increase across the pocket-money categories. Students who received less than Rs. 20 per day were less likely to consume junk food frequently (41.4%) than those receiving higher amounts (61.3–67.3%). This pattern suggests a possible threshold effect, where having a minimum amount of discretionary money may make regular purchase of junk food possible, while additional pocket money above this level has relatively little effect. Grade showed a borderline association with frequent consumption. Grade 10 students were more likely to report frequent consumption than grade 9 students (65.7% vs. 53.8%), although the difference was not statistically significant ($\chi^2 = 3.701$, $p = 0.054$, V = 0.113). No significant association was found with sex, religion, ethnicity, family type, parental occupation, mother's education, or household income (all $p > 0.20$). Reported availability of junk food in school canteens was also not significantly associated with frequent consumption ($\chi^2 = 2.483$, $p = 0.478$). The proportion of frequent consumers was similar among students whose canteens sold only healthy food (64.6%) and those reporting a wide variety of junk food in the canteen (63.2%) (Table 8). Differences between male and female students in preferred types of junk food were also examined. Female students were more likely than male students to report a preference for chocolates (70.1% vs. 58.1%; $\chi^2 = 4.062$, $p = 0.044$) and panipuri (57.8% vs. 44.9%; $\chi^2 = 4.338$, $p = 0.037$). No significant sex differences were observed for preferences for potato chips, cold drinks, or noodles (all $p > 0.20$). However, five related comparisons were conducted. After applying the Bonferroni adjustment, the significance threshold was $p < 0.010$. Therefore, neither of the observed associations remained statistically significant after adjustment, and these findings should be considered exploratory.

Table 8 Frequent junk food consumption (≥ 3 times per week) by socio-demographic characteristics (n = 290)

Characteristic	n	Frequent consumers f (%)	χ^2	p-value	Cramér's V
Sex			**0.268**	**0.605**	**0.030**
Male	136	78 (57.4)			
Female	154	94 (61.0)			
Grade			**3.701**	**0.054**	**0.113**
Grade 9	156	84 (53.8)			
Grade 10	134	88 (65.7)			
Religion			**0.008**	**0.931**	**0.005**
Hindu	234	138 (59.0)			
Non-Hindu	56	34 (60.7)			
Ethnicity			**1.550**	**0.213**	**0.073**
Relatively advantaged	122	78 (63.9)			
Disadvantaged	168	94 (56.0)			
Type of family			**0.850**	**0.357**	**0.054**
Nuclear	180	111 (61.7)			
Joint / extended	110	61 (55.5)			
Occupation of father			**1.181**	**0.277**	**0.064**
Business	62	41 (66.1)			
Non-business	228	131 (57.5)			
Occupation of mother			**0.076**	**0.782**	**0.016**
Unemployed / housewife	122	74 (60.7)			
Employed	168	98 (58.3)			
Education level of mother			**3.722**	**0.445**	**0.113**
Illiterate	61	34 (55.7)			
Can read and write	72	43 (59.7)			
Basic level	61	39 (63.9)			
Secondary level	79	43 (54.4)			
Bachelor and above	17	13 (76.5)			
Monthly family income			**2.512**	**0.285**	**0.093**
Rs. 10,000–40,000	177	101 (57.1)			
Rs. 40,001–70,000	88	58 (65.9)			
Rs. 70,001–100,000	25	13 (52.0)			
Daily pocket money			**10.150**	**0.017***	**0.187**
Below Rs. 20	58	24 (41.4)			
Rs. 21–40	55	37 (67.3)			
Rs. 41–60	97	62 (63.9)			
Above Rs. 60	80	49 (61.3)			
Junk food sold in school canteen			**2.483**	**0.478**	**0.093**
Yes, in a wide variety	76	48 (63.2)			
Yes, but only a few options	125	68 (54.4)			
No, only healthy food is sold	65	42 (64.6)			
Do not buy from there	24	14 (58.3)			

*Frequent consumption defined as consuming junk food 3 or more times per week (172 respondents, 59.3%). Pearson's chi-square test; continuity correction applied to 2 × 2 tables. No expected cell count fell below 5. *Significant at $p < 0.05$.*

Association between knowledge and practice

Contrary to the expected relationship, students with higher knowledge scores reported more frequent and heavier junk food consumption. The mean knowledge score increased across the consumption categories, from 13.12 ± 2.26 among students who never consumed junk food to 16.01 ± 2.72 among those who consumed it five or more times per week. This difference was statistically significant ($F = 3.310$, $p = 0.021$, $\eta^2 = 0.034$). The association remained significant when the eight students

who never consumed junk food were combined with those who consumed it occasionally (F = 3.345, p = 0.037). This suggests that the finding was not solely due to the small number of students who reported never consuming junk food.

A similar pattern was observed using the composite Junk Food Practice Index. Knowledge score was positively correlated with the practice index (Pearson r = 0.174, p = 0.003; Spearman ρ = 0.182, p = 0.002). Mean practice index scores also increased with the level of knowledge, from 7.51 ± 3.49 among students with low knowledge to 9.35 ± 3.71 among those with high knowledge (F = 7.675, p = 0.001). Knowledge was also positively correlated with the ordinal measure of consumption frequency (ρ = 0.148, p = 0.012).

Other practice-related measures did not show the expected protective relationship. The frequency of reading food labels was not associated with knowledge score (F = 0.027, p = 0.994) or with the Junk Food Practice Index (F = 0.610, p = 0.609). Similarly, students who reported feeling guilty after consuming junk food did not have significantly different knowledge scores from those who did not report guilt (15.52 vs. 15.39; t = 0.215, p = 0.830) (Table 9).

Table 9 Relationship between knowledge and junk food consumption practice (n = 290)

Comparison	n	Mean ± SD	Test	p-value
Knowledge score by frequency of consumption			**F = 3.310**	**0.021***
Never	8	13.12 ± 2.26		
1–2 times per week	110	15.05 ± 3.13		
3–4 times per week	88	15.48 ± 2.93		
5 or more times per week	84	16.01 ± 2.72		
Practice index by level of knowledge			**F = 7.675**	**0.001***
Low knowledge	45	7.51 ± 3.49		
Moderate knowledge	148	7.67 ± 3.42		
High knowledge	97	9.35 ± 3.71		
Correlations with knowledge score			**Coefficient**	**p-value**
Junk Food Practice Index (Pearson r)	290	—	0.174	0.003*
Junk Food Practice Index (Spearman ρ)	290	—	0.182	0.002*
Consumption frequency (Spearman ρ)	290	—	0.148	0.012*

*$\eta^2 = 0.034$ for knowledge score by consumption frequency. *Significant at $p < 0.05$. Higher practice index scores indicate heavier consumption.*

Independent predictors of frequent consumption

Binary logistic regression was conducted to determine whether the association between knowledge and frequent junk food consumption remained after controlling for socio-demographic and environmental factors. Knowledge score was the only variable that independently predicted frequent consumption. For each one standard deviation increase in knowledge score, the odds of consuming junk food three or more times per week increased by 36% (adjusted OR = 1.359, 95% CI: 1.057–1.746, p = 0.017). Grade 10 students had higher odds of frequent consumption than grade 9 students (aOR = 1.596, 95% CI: 0.981–2.596), although the association was not statistically significant (p = 0.060). Sex, daily pocket money, household income, family type, mother's education, and reported availability of junk food in the school canteen were not independent predictors of frequent consumption. The model showed adequate calibration according to the Hosmer–Lemeshow test (χ^2 = 10.76, df = 8, p = 0.216). However, it explained only a small proportion of the variation in frequent consumption (pseudo-R^2 = 0.039). The overall model was also of borderline statistical significance (model χ^2 p = 0.053). These findings indicate that the variables included in the model explain only a limited part of the factors influencing how frequently students consume junk food (Table 10).

Table 10 Binary logistic regression predicting frequent junk food consumption (≥ 3 times per week) (n = 290)

Predictor	Adjusted OR	95% CI	p-value
Knowledge score (per 1 SD increase)	1.359	1.057–1.746	0.017*
Grade 10 (vs grade 9)	1.596	0.981–2.596	0.060
Pocket money (per Rs. 10 per day)	1.069	0.984–1.161	0.113
Female (vs male)	1.071	0.658–1.742	0.784
Household income (per Rs. 10,000)	0.911	0.795–1.045	0.183
Mother educated to secondary level or above	0.925	0.541–1.581	0.776
Joint or extended family (vs nuclear)	0.727	0.441–1.197	0.210
Junk food sold in school canteen	0.726	0.418–1.259	0.254

*OR odds ratio; CI confidence interval. Events = 172 (59.3%). Pseudo-R^2 = 0.039; model χ^2 p = 0.053; Hosmer–Lemeshow χ^2 = 10.76, df = 8, p = 0.216. *Significant at $p < 0.05$.*

Discussion

This study assessed knowledge and junk food consumption practices among 290 secondary-level students in Pokhara and examined whether students' knowledge was associated with their consumption behaviour. Five findings are particularly important. First, most students had moderate or high knowledge of junk food, although their understanding was weaker for some of its nutritional characteristics and health effects. Second, junk food consumption was very common, with almost all students reporting consumption and more than half consuming junk food at least three times per week. Third, taste was the most commonly reported reason for consumption, while grocery stores were the main source of purchase. Fourth, maternal education and daily pocket money showed some association with knowledge and consumption, respectively. Finally, and most importantly, higher knowledge was positively associated with more frequent junk food consumption. This finding differs from the commonly assumed expectation that greater knowledge should lead to healthier food choices and suggests that knowledge alone may not be sufficient to influence adolescents' dietary behaviour.

Level of knowledge about junk food

Overall, students demonstrated a moderate to good level of knowledge, with 73.4% of the knowledge questions answered correctly and 84.4% of students classified as having moderate or high knowledge. Knowledge was strongest for the basic identification and meaning of junk food. Almost all students could identify an example of junk food (97.9%), while 96.6% correctly understood its meaning. However, their responses were less consistent when questions required more specific knowledge about food processing, nutritional composition, and health effects. For example, only 37.9% could correctly explain why processed junk food can have a long shelf life, and only 42.4% correctly identified a nutrient that is generally lacking in such foods. Similarly, 41.4% could not identify the food containing the highest amount of sugar.

These findings indicate that familiarity with junk food does not necessarily mean that students have a detailed understanding of its nutritional characteristics or potential health consequences. The relatively high overall level of knowledge may partly reflect students' frequent exposure to information about unhealthy foods through school, family, social media, advertising, and everyday experience. However, the weaker performance on more specific questions suggests that general awareness may not be sufficient for students to critically evaluate the nutritional quality of foods they consume.

The level of knowledge observed in this study was higher than that reported in some previous studies conducted among school students in Nepal. Studies from Kathmandu, Hetauda, Kalyanpur in Saptari, and Jumla have reported lower levels of adequate or good knowledge among adolescents [15–18]. In contrast, the present finding is broadly comparable with the relatively high level of knowledge reported among school students in Sialkot, Pakistan, where 82.6% were classified as having adequate knowledge [23]. Differences between studies may reflect variation in study populations, educational exposure, measurement instruments, definitions of adequate knowledge, and the types of questions included in the knowledge assessment.

The findings also suggest that nutrition education may need to move beyond simply defining junk food or listing its harmful effects. Students may benefit more from practical knowledge, such as how to read food labels, recognise high levels of sugar, salt and fat, understand ingredient lists, compare similar products, and identify the implications of processing and long shelf life. Such skills may be more directly relevant to everyday food choices than general information alone.

Junk food consumption practices

Despite the relatively favourable level of knowledge, junk food consumption was widespread. Overall, 97.2% of students reported consuming junk food, and 59.3% reported consumption at least three times per week. This indicates that frequent consumption is a common behaviour among secondary-level students in Pokhara.

The prevalence observed in this study is consistent with evidence from other settings showing that consumption of commercially prepared and processed foods is increasingly common among adolescents. Studies from different parts of Nepal have also reported frequent consumption of fast foods and other commercially available foods among school students [15,30]. International evidence similarly indicates that regular consumption of fast foods and energy-dense processed foods is common among adolescents, particularly in rapidly changing urban food environments [7].

Taste was the most frequently reported reason for consuming junk food, identified by 61.0% of students. This finding is consistent with studies from India and Nepal in which taste and palatability were among the main reasons adolescents preferred fast or junk foods [16,28,31]. Chocolates and noodles were among the commonly preferred foods in the present study, which is also comparable with findings reported among school students in Banke [30].

The importance of taste suggests that knowledge-based interventions alone may have limited effects if healthier alternatives are not equally attractive, affordable, and convenient. Adolescents make food choices within a social and commercial environment in which taste, convenience, peer influence, availability, advertising, and leisure activities can all shape behaviour. Therefore, improving knowledge should be considered one component of a broader strategy rather than a complete solution.

Another notable finding was that grocery stores were the main source of junk food purchases, reported by 83.8% of students, whereas only 6.6% identified school canteens as their source. Although 69.3% reported that junk food was available in their school canteens, canteen availability was not significantly associated with frequent consumption. Students who reported having only healthy foods available in their canteens were not clearly less likely to consume junk food frequently than students who reported a wider range of junk food.

This finding has an important practical implication. Restricting junk food within schools may be useful, but school-based measures alone may not substantially reduce consumption when students can easily purchase similar products from nearby grocery stores. The wider food environment surrounding schools may therefore be at least as important as the school canteen itself.

Only 30.7% of students reported always reading food labels. This suggests another area where practical nutrition education could be strengthened. Teaching students how to interpret food labels may help them move from general awareness to more informed food choices. However, the effect of such education is likely to depend on whether students have realistic access to healthier alternatives and whether healthier foods are affordable and attractive.

Socio-demographic factors associated with knowledge and consumption

Knowledge did not differ significantly according to most socio-demographic characteristics examined in this study, including sex, religion, ethnicity, family type, grade, parental occupation, and household income. Maternal education was the only characteristic showing a statistically significant association with knowledge. Students whose mothers had a bachelor's degree or higher had higher knowledge scores than those whose mothers were illiterate.

This finding is consistent with previous research suggesting that parental education, particularly maternal education, may influence children's dietary knowledge and food-related behaviour [11,12,32,35]. Mothers may influence children's food choices through household food practices, communication about health, and exposure to health-related information. However, the higher education category in the present study represented a relatively small subgroup. Therefore, this finding should be interpreted cautiously and should not be taken as evidence of a causal relationship.

Daily pocket money was the only socio-demographic characteristic significantly associated with frequent junk food consumption. Students receiving less than Rs. 20 per day were less likely to report frequent consumption than students receiving higher amounts. However, the relationship was not strictly linear, as consumption did not progressively increase across every higher pocket-money category. The similar proportions among students receiving more than Rs. 20 per day may indicate that once students have a certain minimum amount of discretionary money, additional pocket money does not necessarily result in proportionally greater junk food consumption. This may suggest a possible threshold effect, but the present cross-sectional data cannot establish such an explanation.

The finding is nevertheless consistent with previous research showing that pocket money can influence adolescents' access to commercially available snack foods [14]. Greater disposable money may increase students' ability to purchase foods independently of their parents. At the same time, availability, peer influence, preferences, and local food prices may determine how that money is actually used.

Relationship between knowledge and junk food consumption

The most important finding of this study was the positive relationship between knowledge and junk food consumption. Students with higher knowledge scores reported more frequent junk food consumption, and knowledge was positively correlated with the Junk Food Practice Index. Knowledge also remained associated with frequent consumption after adjustment for other variables in the regression analysis.

This finding is different from the common assumption that better knowledge should lead to healthier dietary behaviour. A possible explanation is that knowledge and behaviour do not necessarily develop in the same direction. Adolescents may understand that junk food can be unhealthy while continuing to consume it because of taste, convenience, social influence, availability, habit, or personal preference. In this sense, knowledge may coexist with unhealthy behaviour rather than automatically preventing it.

The Theory of Planned Behaviour provides one possible framework for understanding this finding [26]. According to this perspective, behaviour is influenced not simply by knowledge but also by attitudes, subjective norms, perceived behavioural control, and behavioural intentions. A student may therefore know that a particular food is unhealthy but still choose it if the food is perceived as tasty, convenient, affordable, socially desirable, or easily accessible.

The positive association may also reflect a reverse or bidirectional relationship, although this cannot be established from the present study. Students who consume junk food frequently may have greater exposure to product labels, advertisements, health messages, and discussions about the possible health effects of such foods. Their greater exposure could increase their knowledge without necessarily reducing their consumption. In addition, students who have greater access to information may also have greater access to commercially available foods. Thus, knowledge and consumption may both be influenced by other factors that were not fully measured in this study.

Another possible explanation is that knowledge may be necessary but insufficient for behavioural change. Adolescents may recognise the health risks of junk food while placing greater immediate value on taste and enjoyment. Similar gaps between nutrition knowledge and dietary practice have been reported in other contexts, suggesting that information does not always translate directly into healthier behaviour.

The present finding should therefore not be interpreted as showing that knowledge causes higher junk food consumption. Because the study was cross-sectional, the temporal direction of the relationship cannot be established. The finding is better understood as an association that raises questions about the assumption that increasing knowledge alone will necessarily improve dietary practices. Longitudinal and intervention studies are needed to determine whether changes in knowledge lead to changes in consumption, whether changes in consumption influence knowledge, or whether both are shaped by common underlying factors.

Implications

The findings have several implications for schools, families, health educators, and policymakers. First, nutrition education should focus on practical decision-making rather than only increasing general awareness. Students should be taught how to interpret food labels, recognise high levels of sugar, salt and fat, understand ingredient lists, and compare products before purchasing them. Second, interventions should address the broader food environment. The finding that grocery stores were the main source of junk food and that school canteen availability was not significantly associated with frequent consumption suggests that restricting food within schools alone may not be sufficient. School interventions could be complemented by measures addressing food availability around schools and the marketing and promotion of highly processed foods to young people. Third, taste should be considered when promoting healthier choices. If healthier foods are presented as less attractive or less convenient, knowledge-based messages may have limited behavioural impact. Schools and families could therefore encourage healthier alternatives that are affordable, convenient, and acceptable to adolescents. Fourth, the relationship between pocket money and frequent consumption suggests that economic access should also be considered. Measures aimed at improving adolescent diets may need to recognise the role of discretionary spending and the availability of inexpensive processed foods. However, any fiscal or regulatory intervention would require careful assessment of the Nepalese context, including affordability, household circumstances, local markets, and potential unintended consequences [33,34,36]. Finally, interventions may need to involve families as well as students. The association between maternal education and knowledge suggests that household-level information and parental involvement may contribute to adolescents' food-related knowledge and practices. A socio-ecological approach may therefore be more appropriate than interventions focused solely on individual knowledge [13].

Strengths and limitations

This study has several strengths. The use of multistage probability sampling provided representation of students from six public schools in different wards of Pokhara Metropolitan City. The study achieved a 100% response rate among the selected students, and the questionnaire was administered under the supervision of the investigator, which helped minimise missing responses. Knowledge was assessed using objectively scored items, and the analysis included effect sizes and confidence intervals in addition to statistical significance. The study also examined the relationship between knowledge and actual consumption rather than treating knowledge as an outcome in isolation.

Several limitations should also be considered. First, the cross-sectional design prevents conclusions about temporal direction or causality. The positive relationship between knowledge and consumption should therefore be interpreted as an association rather than evidence that greater knowledge leads to greater consumption. Second, both knowledge and consumption were based on self-reported responses and may have been affected by recall or social desirability bias. Students with greater knowledge may also have been more aware of what constitutes junk food and may have reported their consumption differently from other students. Third, consumption was measured primarily through frequency rather than the quantity or nutritional composition of foods consumed. A student reporting frequent consumption may not necessarily consume the same amount as another student with the same reported frequency. Fourth, the knowledge measure showed a KR-20 coefficient of 0.634, indicating acceptable but modest internal consistency. The practice index had a Cronbach's alpha of 0.572. Because the practice index combines different aspects of consumption behaviour and was designed as a formative summary measure rather than a reflective unidimensional scale, alpha should not be interpreted as evidence that the index is invalid; nevertheless, its relatively low internal consistency warrants cautious interpretation.

The finding concerning maternal education should also be interpreted carefully because the higher education category contained relatively few students. Similarly, some observed differences in food preferences did not remain statistically significant after Bonferroni adjustment for multiple comparisons. These findings are therefore better considered exploratory. Finally, the study included students from public schools in Pokhara and may not be generalisable to students in private schools, rural areas, or other regions of Nepal.

Conclusion

This study found that secondary-level students in Pokhara generally had moderate to good knowledge of junk food, but their knowledge was stronger for basic identification than for detailed nutritional characteristics and health effects. At the same time, junk food consumption was highly prevalent, with more than half of the students consuming junk food at least three times per week. Taste was the main reported reason for consumption, while grocery stores were the dominant source of purchase. The most important finding was the positive association between knowledge and junk food consumption. Rather than indicating that knowledge is harmful, this finding suggests that knowledge alone does not necessarily translate into healthier dietary behaviour. Adolescents may understand the health risks of junk food while continuing to consume it because of taste, convenience, availability, social influences, and other factors within the wider food environment. The finding may also reflect reverse or bidirectional relationships between knowledge and consumption, although this cannot be determined from a cross-sectional study. These findings suggest that efforts to reduce junk food consumption among adolescents in Nepal should move beyond information-based education alone. Practical nutrition skills, family involvement, healthier and acceptable food alternatives, food availability around schools, and the wider commercial environment should also be considered. Further longitudinal and intervention research is needed to clarify the direction of the relationship between

knowledge and consumption and to identify approaches that can effectively improve dietary practices among adolescents in Nepal.

Supplementary Information The supplementary information consists of ethical approval letter, survey questionnaire, and data set.

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Author contributions SS and JO developed the concept of the study. SS and JO acquired and managed the data. SKG analysed the data. PC and ST drafted the manuscript. SKG and JO critically revised the manuscript. All authors gave final approval and agreed to be accountable for all aspects of the work, ensuring integrity and accuracy.

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Data availability The data is available at the supplementary section of the manuscript.

Declarations

Ethics approval and consent to participate This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Committee of Pokhara University (Ref. No. 194/2081/82), dated 31/01/2082, meeting number 87. Written informed consent was obtained from a parent or guardian of each participant, and written assent was obtained from every student before administration of the questionnaire. Participation was voluntary, and students were free to decline participation or withdraw from the study at any stage without penalty. Written permission was also obtained from the authorities of all participating schools. Confidentiality and anonymity were maintained by assigning identification codes to questionnaires rather than recording students' names. The information collected was used solely for the purposes specified in the study.

Consent to publish Not applicable.

Competing interests The authors declare no competing interests

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