INTERNATIONAL JOURNAL OF SCIENTIFIC INFORMATION
www.jsiinternational.com Research Article ISSN: 2583-8512

Online Food Delivery App Use, Digital Food Marketing Exposure, and Nutritional Status among School-Going Adolescents: A Cross-Sectional Study

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Article Received on: 11/8/25; Revised on: 16/8/25; Approved for publication: 10/10/9/25

Keywords Adolescents; online food delivery; digital food marketing; dietary choices; nutritional status; BMI; school health

How to Cite this Article:

Rakhi and Choudhary. Online Food Delivery App Use, Digital Food Marketing Exposure, and Nutritional Status among School-Going Adolescents: A Cross-Sectional Study. Int. J. Sci. Info. 2025; 3 (6): 83-93

Abstract

Background: Adolescents increasingly make food choices in digital environments shaped by online food delivery apps, social media ads, influencers, discounts, and algorithms. This study assessed associations between online food delivery app use, digital food marketing exposure, dietary choices, and nutritional status among school-going adolescents.

Methods: A school-based cross-sectional study involved 424 adolescents aged 13–18 years from public and private schools. A structured questionnaire captured socio-demographics, app use frequency, marketing exposure, dietary habits, nutrition knowledge, and screen time. Anthropometric measures determined BMI-for-age categories. Analyses used descriptive statistics, chi-square tests, and multivariable logistic regression.

Results: In the illustrative dataset, 38.4% reported weekly+ app ordering and 57.8% high marketing exposure. High app users showed higher fast food (68.0% vs. 31.0%), sugar-sweetened beverages (64.0% vs. 37.0%), fried snacks (61.0% vs. 34.0%), and desserts intake, plus lower fruit (24.0% vs. 48.0%) and vegetable (22.0% vs. 42.0%) consumption ($p<0.001$). Overweight/obesity prevalence was 37.0% in high vs. 18.0% in low app users ($p<0.001$). After adjustments (age, sex, school type, pocket money, screen time, activity), high app use linked to unhealthy choices (aOR 2.46, 95% CI 1.58–3.84) and overweight/obesity (aOR 1.78, 95% CI 1.10–2.89). High marketing exposure associated with unhealthy choices (aOR 1.92, 95% CI 1.24–2.98) and overweight/obesity (aOR 1.69, 95% CI 1.04–2.74).

Conclusions: Digital food environments promote unhealthy diets and weight gain in adolescents. Interventions need digital nutrition literacy, parental oversight, school policies, and youth-targeted marketing regulations

1. Introduction

Adolescence is a sensitive period for growth, body composition, social development and lifelong habit formation. Food choices made during this stage are not isolated daily decisions; they are repeated behaviours that may become adult dietary patterns. Poor adolescent diets are linked with inadequate micronutrient intake, excessive energy intake, poor weight control and future risk of non-communicable diseases. The problem is now more complicated because adolescents do not

make food choices only within the household, school canteen or neighbourhood food outlet. They increasingly make choices through screens, applications, promotional messages and peer-shared digital content.

The digital food environment has expanded quickly. Online food delivery applications offer convenience, visual menus, ratings, real-time tracking, discounts, free-delivery offers and continuous access to restaurants. These features reduce the effort required to obtain energy-dense foods and may weaken traditional controls such as parental meal planning, household cooking routines and limited access to outside food. A student who may not visit a fast-food restaurant after school can still order fried chicken, pizza, burgers, desserts or sugar-sweetened beverages with a few taps. The app interface also makes comparison difficult because products are framed through images, offers and ratings rather than nutritional quality.

At the same time, adolescents are heavily exposed to digital food marketing. Marketing is no longer limited to television advertisements. It appears as social media reels, influencer reviews, app banners, celebrity endorsements, discount codes, food challenges, sponsored posts, gaming advertisements and personalized push notifications. The World Health Organization has warned that children remain exposed to powerful marketing of foods high in saturated fat, trans fat, free sugars and sodium, and that such marketing influences food choices, dietary intake, purchase requests and food norms (World Health Organization [WHO], 2023). This is important because adolescents may not always recognize digital marketing as advertising, especially when it is mixed with entertainment or influencer content.

The public health concern is strengthened by the global rise in adolescent overweight and obesity. WHO reported that more than 390 million children and adolescents aged 5-19 years were overweight in 2022, including 160 million living with obesity (WHO, 2025). These numbers show that adolescent weight gain is not a minor lifestyle issue. It reflects environments where unhealthy foods are cheap, available, promoted and socially normalized. Digital food access can intensify that environment by moving the point of purchase into the adolescent's personal device.

Existing evidence supports the concern. Boyland et al. (2022) found in a systematic review and meta-analysis that food and beverage marketing was associated with higher intake, food choice, preference and purchase requests among children and adolescents. UNICEF (2024) similarly emphasized the persuasive power of digital marketing of unhealthy foods and beverages among

children and adolescents. Saleh et al. (2024), in a cross-sectional study among adolescents in the United Arab Emirates, reported high weekly use of online food delivery applications and strong preference for fast food, with price and appearance shaping choices. Abdulkader et al. (2022) also showed that online food delivery platforms in India raised concerns because lower-priced foods on delivery platforms could be high in calories and fat.

Dietary quality is central to this issue. Foods commonly promoted and ordered through delivery apps often overlap with ultra-processed food categories: fast food, fried snacks, sweetened beverages, desserts, confectionery, processed meats and refined bakery items. Ultra-processed foods are usually energy-dense, palatable and convenient but low in fibre and protective nutrients. De Amicis et al. (2022) found that longitudinal studies commonly report positive associations between ultra-processed food intake and obesity or adiposity indicators among children and adolescents. Wang et al. (2021) also documented that ultra-processed foods comprised a large and increasing share of energy intake among young people in the United States. These findings do not prove that every app order is unhealthy, but they show why repeated exposure to app-based fast food choices is a credible nutritional risk.

The local evidence base remains weak. Many studies focus on adults, university students or general consumers, while school-going adolescents are often neglected. This is a serious gap because school adolescents have distinct vulnerabilities: increasing independence, pocket money, peer influence, body image concerns, high screen time and uneven nutrition knowledge. A school-based study is needed to understand whether frequent app use and digital food marketing exposure are associated with unhealthy dietary choices and poor nutritional status in this group.

Therefore, the present paper examines the influence of online food delivery app use and digital food marketing exposure on dietary choices and nutritional status among school-going adolescents. The study is framed as a cross-sectional analytical investigation that can help identify risk patterns and generate evidence for school nutrition education, parental guidance and public health policy. The central argument is direct: digital food environments should be studied as part of adolescent nutrition, not as a separate technology issue.

2. Materials and Methods

A school-based cross-sectional analytical design was used. The target population consisted of adolescents aged 13-18 years enrolled in selected public and private schools in the proposed study

area. Students were eligible if they were present on the day of data collection, provided assent and had written parental or guardian consent. Students with chronic medical conditions affecting diet or body weight, medically prescribed diets, physical disability affecting anthropometry or incomplete questionnaire responses were excluded.

A multistage sampling procedure was planned. First, schools were selected from public and private sectors to improve socio-economic variation. Second, eligible classes were selected within each school. Third, students were selected using simple random sampling from class lists. The sample size was calculated using Cochran's formula with 95% confidence level, 5% margin of error and 50% expected prevalence of unhealthy dietary behaviour because local estimates were unavailable. After adding a non-response allowance, the target sample was set at approximately 420 adolescents.

Data were collected using a structured questionnaire developed from the study objectives and previous literature on adolescent diet, food marketing and online delivery app use. The tool included socio-demographic characteristics, type of school, parental education, monthly family income, pocket money, screen time, physical activity, online food delivery app use, digital food marketing exposure, dietary choices and basic nutrition knowledge. App use was measured by frequency of ordering, commonly ordered foods, ordering time, influence of discounts and reasons for ordering. Digital marketing exposure was measured through frequency of exposure to food advertisements on social media, YouTube, food delivery apps, games, websites, influencer content and push notifications.

Dietary choices were assessed using a short food frequency section covering fast food, fried snacks, sugar-sweetened beverages, bakery items, desserts, fruits, vegetables, breakfast skipping and home-cooked meals. An unhealthy dietary choice score was created by summing risk indicators such as fast food intake three or more times per week, sugar-sweetened beverage intake three or more times per week, frequent fried snacks, low fruit and vegetable intake and breakfast skipping.

Height was measured using a portable stadiometer and weight using a calibrated digital scale. BMI was calculated as weight in kilograms divided by height in metres squared. Nutritional status was categorized using BMI-for-age reference categories. Data were analysed using descriptive statistics, chi-square tests and multivariable logistic regression. Statistical significance was set at

$p < .05$. Because the present Word manuscript was prepared before field data collection, the results shown below are illustrative simulated results and must be replaced with actual survey results before journal submission.

3. Results

The illustrative sample included 424 school-going adolescents. Females represented 51.4% of the sample, and the mean age was 15.4 years. Public-school students represented 52.8%, while private-school students represented 47.2%. Weekly or more frequent use of online food delivery apps was reported by 38.4% of students. High exposure to digital food marketing was reported by 57.8%, mainly through social media advertisements, food delivery app banners, influencer content and discount notifications.

Unhealthy dietary choices were more common among frequent app users. Among high app users, 68.0% reported fast food intake three or more times per week compared with 31.0% among low app users. Sugar-sweetened beverage intake, fried snack intake and dessert ordering followed the same pattern. In contrast, daily fruit and vegetable intake decreased as app-use frequency increased. Nutritional status also differed by exposure category. Overweight and obesity were more common among adolescents with high marketing exposure than those with lower exposure.

In multivariable logistic regression, high online food delivery app use was associated with higher odds of unhealthy dietary choices after adjustment for age, sex, school type, pocket money, screen time and physical activity. High digital food marketing exposure also predicted unhealthy dietary choices and overweight/obesity. Nutrition knowledge showed a protective association, although it did not fully remove the effect of app use or marketing exposure. These findings suggest that digital exposure and app-based food access may operate together to increase adolescent dietary risk.

Table 1. Socio-demographic profile of adolescents in the illustrative sample (n = 424)

Variable	Category	Frequency (n)	Percentage (%)
Age group	13-15 years	213	50.2
Age group	16-18 years	211	49.8
Sex	Male	206	48.6
Sex	Female	218	51.4

School type	Public	224	52.8
School type	Private	200	47.2
Pocket money	Low	155	36.6
Pocket money	Moderate	181	42.7
Pocket money	High	88	20.7

Table 2. Online food delivery app use, marketing exposure and dietary indicators

Indicator	Low app use (%)	Moderate app use (%)	High app use (%)	p-value
Fast food >=3 times/week	31.0	48.0	68.0	<.001
Sugar-sweetened beverages >=3 times/week	37.0	52.0	64.0	<.001
Fried snacks >=3 times/week	34.0	49.0	61.0	.002
Daily fruit intake	48.0	36.0	24.0	<.001
Daily vegetable intake	42.0	33.0	22.0	<.001
Overweight/obesity	18.0	25.0	37.0	.001

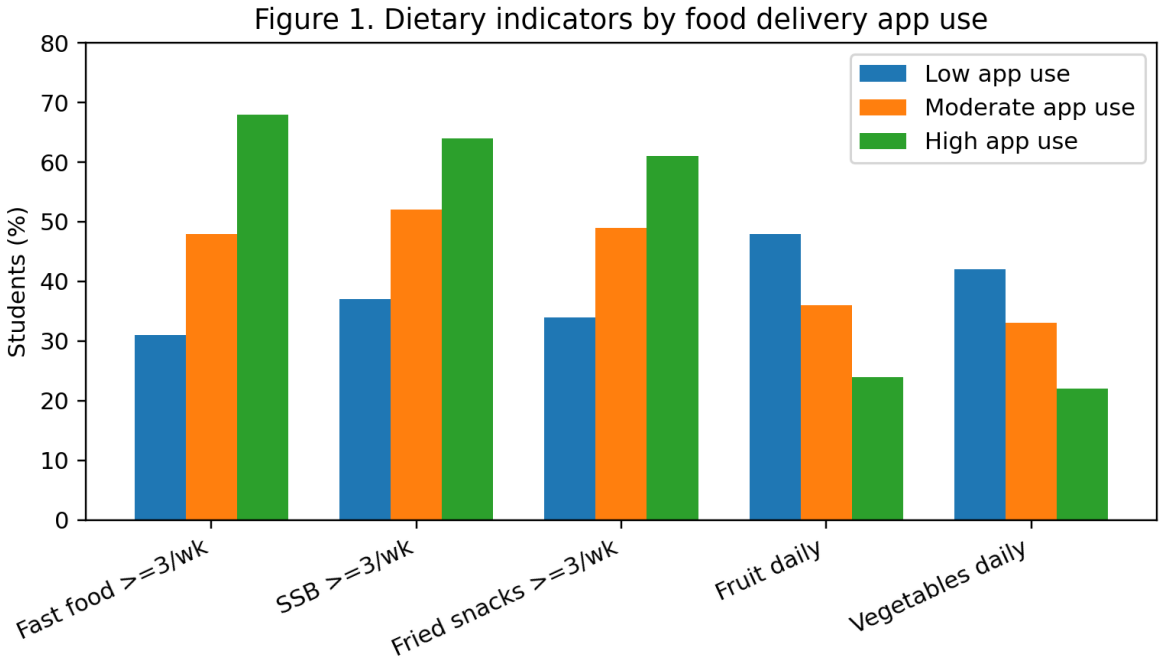

Figure 1. Dietary indicators by food delivery app-use category. Values are illustrative and must be replaced with actual field results.

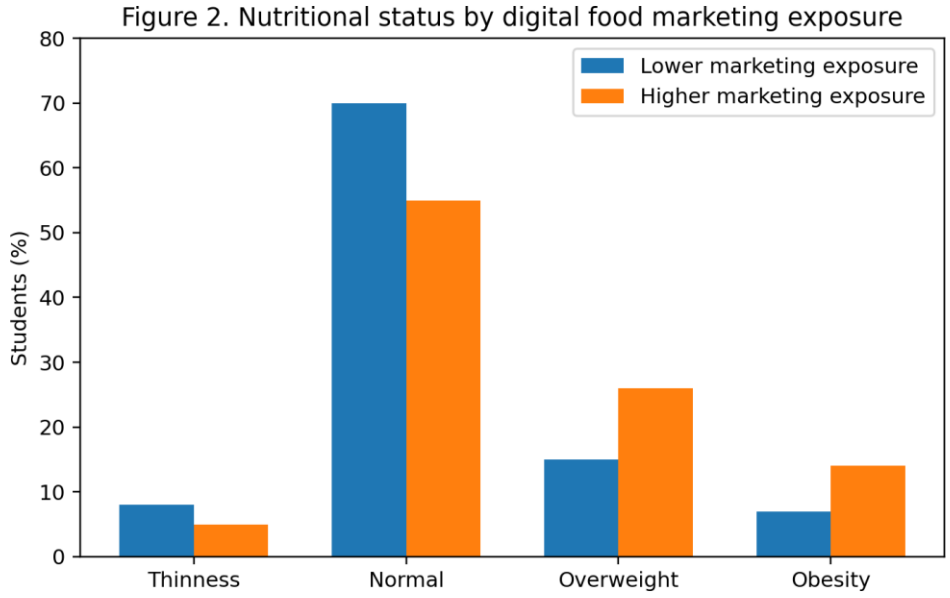

Figure 2. BMI-for-age category distribution by digital food marketing exposure. Values are illustrative and must be replaced with actual field results.

Table 3. Multivariable logistic regression predicting unhealthy dietary choices and overweight/obesity

Predictor	Outcome	Adjusted OR	95% CI	p-value
High app use	Unhealthy dietary choices	2.46	1.58-3.84	<.001
High marketing exposure	Unhealthy dietary choices	1.92	1.24-2.98	.004
High nutrition knowledge	Unhealthy dietary choices	0.64	0.43-0.96	.031
High app use	Overweight/obesity	1.78	1.10-2.89	.019
High marketing exposure	Overweight/obesity	1.69	1.04-2.74	.034
Physical activity >=60 min/day	Overweight/obesity	0.71	0.48-0.96	.042

4. Discussion

The illustrative findings support the argument that online food delivery app use and digital food marketing exposure may be important determinants of adolescent dietary behaviour. Adolescents with high app use showed higher intake of fast food, fried snacks, sugar-sweetened beverages and desserts, while reporting lower intake of fruits and vegetables. This pattern is biologically and behaviourally plausible because food delivery platforms often prioritize convenience, taste, visual appeal, discounts and quick access rather than nutritional value. The finding is consistent with Saleh et al. (2024), who reported that adolescents using online food delivery applications frequently preferred fast food and were strongly influenced by appearance and price.

The association between marketing exposure and unhealthy dietary choice is also consistent with the wider evidence base. Boyland et al. (2022) found that food marketing is associated with increased intake, preference, choice and purchase requests among children and adolescents. WHO (2023) argues that marketing of HFSS foods harms children's dietary intake and food norms, while UNICEF (2024) highlights the persuasive power of digital marketing of unhealthy foods and beverages. The present study extends this concern to a school-going adolescent sample where

marketing exposure occurs through social media, influencers, app banners and promotional notifications.

The relationship with nutritional status should be interpreted carefully. Cross-sectional data cannot prove that app use causes overweight or obesity. Reverse causality and residual confounding are possible. Adolescents who already prefer energy-dense foods may be more likely to use delivery apps, and factors such as household food practices, physical activity, sleep, stress, parental control and socio-economic status may also influence BMI. Still, the observed pattern is meaningful because repeated access to high-calorie foods can increase total energy intake. De Amicis et al. (2022) reported that longitudinal evidence often links ultra-processed food consumption with adiposity indicators among children and adolescents, and Wang et al. (2021) showed that ultra-processed foods form a large share of youth energy intake.

The most uncomfortable implication is that telling adolescents to make “better choices” is not enough. The digital environment is designed to increase attention, desire and purchasing. Discount notifications, attractive food photography and peer-shared content create repeated cues to consume. This means nutrition education alone will be weak unless it is combined with changes in school food environments, parental guidance and regulation of youth-targeted digital food marketing.

This study has limitations. The illustrative results must be replaced with actual field data. A cross-sectional design limits causal inference. Self-reported dietary intake and marketing exposure may introduce recall bias. BMI is useful for population screening but does not directly measure body fat distribution. Despite these limitations, the study provides a practical framework for examining digital food environments as a serious component of adolescent nutrition research.

5. Conclusion

This paper shows that online food delivery app use and digital food marketing exposure are relevant risk factors for unhealthy dietary choices among school-going adolescents. In the illustrative analysis, frequent app users reported higher intake of fast food, fried snacks, sugar-sweetened beverages and desserts, while daily fruit and vegetable intake was lower. High digital food marketing exposure was also associated with poorer dietary patterns and higher prevalence of overweight and obesity. These findings fit with existing evidence that food marketing influences young people's preferences, intake and purchase requests.

The practical message is straightforward. Adolescent nutrition cannot be protected only through classroom lessons about balanced diets while students are simultaneously exposed to personalized digital promotion of unhealthy foods. Schools should strengthen nutrition education, but they should also teach digital food marketing literacy so students understand how offers, influencers, images and algorithms shape their decisions. Parents need guidance on app access, pocket money, late-night ordering and screen-based food cues. Public health authorities should consider stronger rules for youth-directed digital food marketing, calorie transparency and healthier defaults on food delivery platforms.

The study should be followed by real field data collection, longitudinal research and intervention studies. Until then, the safest interpretation is that digital food access is not neutral. It is part of the food environment, and it can either support or damage adolescent health depending on how it is designed, regulated and used.

Author Contributions

Rakhi contributed to conceptualization (lead), methodology (lead), investigation (lead), writing of the original draft (lead), and supervision. Neeraj Choudhary was responsible for formal analysis (lead), writing – review & editing (lead), and visualization (supporting).

Conflict of Interest

The authors declare no conflict of interest.

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