

Original Research Article

Impact of online food delivery applications on eating habits of medical undergraduates in district Ludhiana: a cross-sectional study

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ABSTRACT

Background: Online food delivery applications (OFDAs) have emerged as a popular food-ordering option among young adults, potentially affecting their dietary patterns. This study examined the impact of OFDA usage on eating habits among medical undergraduates in Ludhiana district.

Methods: This cross-sectional study included 420 medical undergraduates between March and May 2026. Data were obtained through a pretested Google Form following informed consent. Statistical analysis was performed using SPSS version 26, employing descriptive statistics, Chi-square/Fisher's exact tests and multivariable logistic regression. Statistical significance was defined as $p < 0.05$.

Results: Among 420 participants, 407 (96.9%) reported using OFDAs, primarily for convenience (68.6%), cravings (62.1%) and dissatisfaction with hostel food (55.0%). Food was ordered once weekly by 38.6% and 2-3 times weekly by 36.6%, predominantly during evenings (73.5%). Meal skipping was reported by 64.8%, while 54.8% consumed fast food 2-3 times weekly. Increased unhealthy food consumption was perceived by 75.0%. Frequent OFDA usage was significantly associated with meal skipping (AOR=1.75; 95% CI: 1.10-2.79; $p=0.018$), delayed meals (AOR=2.03; 95% CI: 1.27-3.23; $p=0.003$), earlier meals (AOR=2.27; 95% CI: 1.06-4.87; $p=0.036$) and increased snacking (AOR=1.93; 95% CI: 1.05-3.57; $p=0.036$).

Conclusions: OFDA utilization was highly prevalent and associated with unfavourable eating behaviours among medical undergraduates. Targeted nutritional awareness initiatives and improved access to healthier food choices may encourage better dietary practices.

Keywords: Dietary behaviour, Eating habits, Fast food, Medical undergraduates, Online food delivery applications

INTRODUCTION

Online food delivery applications (OFDAs) have emerged as an important component of the digital food environment, enabling consumers to browse menus, compare food items, place orders and receive restaurant-prepared meals through smartphones.¹ Their popularity has increased due to convenience, food variety, promotional offers and accessibility, particularly among young adults and university students.² The use of these services has expanded across countries, highlighting their

growing role in food purchasing behaviour.³ However, frequent reliance on delivery platforms has raised concerns regarding food choices and dietary quality.⁴ Convenience, personal preferences and other factors may influence the frequency of ordering meals online.⁵ Food purchased through these platforms may include energy-dense, nutrient-poor items high in fat, sugar and salt.⁶ Research among young adults has also explored the relationship between mobile food delivery application use and dietary behaviours, including sugar-sweetened beverage consumption and vegetable intake.⁷

Healthy dietary practices during young adulthood are essential for preventing obesity and other diet-related non-communicable diseases.⁸ The World Health Organization identifies overweight and obesity as major global public health concerns.⁹ In India, the National Family Health Survey-5 reported that 24.0% of women and 22.9% of men aged 15-49 years were overweight or obese.¹⁰ The Indian Council of Medical Research–National Institute of Nutrition Dietary Guidelines for Indians 2024 recommend limiting foods high in fat, sugar and salt and reducing the consumption of ultra-processed foods.¹¹

Medical undergraduates may be particularly vulnerable to unhealthy dietary practices because of hostel living, demanding academic schedules, clinical postings, examination stress and irregular meal timings. Despite their health-related knowledge, their food choices may be influenced by convenience, affordability, taste preferences and the easy availability of outside food. An Indian study among medical and dental students reported that only 21.4% of participants had good dietary habits.¹²

International studies have examined OFDA utilisation and perceptions of healthy food availability among university students. Research in the United Arab Emirates explored students' use of delivery applications and their perceptions of healthy food options.² Studies in Malaysia investigated the association between perceived healthy food availability on delivery platforms and food choices among university students.¹³ Research among adolescents has also examined OFDA use, perceptions of healthy food availability and food safety.¹⁴ An Indian mixed-methods study among postgraduate students described the use of food delivery applications and their perceived effects on eating habits.¹⁵

Despite the growing use of online food delivery services in India, evidence regarding their association with dietary practices among medical undergraduates, particularly in North India, remains limited. Understanding these patterns is important because medical students are future healthcare professionals who are expected to promote healthy lifestyles.

Therefore, the present study was conducted among medical undergraduates in district Ludhiana, with the objective of assessing the impact of online food delivery applications on eating habits, including application usage patterns, dietary behaviours, perceived dietary changes and factors associated with frequent use.

METHODS

Study design and period

This was a cross-sectional study carried out from 1st March 2026 to 31st May 2026.

Study setting

The study was conducted in a tertiary care medical college and hospital.

Study population

The study population included undergraduate medical students studying in a tertiary care medical college and hospital.

Sample size

All eligible students available during the study period and willing to participate were included after informed consent. Informed consent was obtained from all eligible students.

Inclusion criteria

Medical undergraduate students studying in a tertiary care medical college and hospital who were willing to participate and gave informed consent were included in the study.

Exclusion criteria

Students who did not give consent or submitted incomplete responses were excluded from the study.

Data collection tool and technique

Data were collected using a predesigned and pretested questionnaire as a Google Form. The questionnaire included information regarding socio-demographic profile, academic year, residence status, use of online food delivery applications, frequency of ordering, preferred time of ordering, commonly ordered food items, reasons for ordering and perceived changes in dietary habits. Information regarding the use of individual online food delivery platforms was also collected. For reporting purposes, the names of these platforms were anonymized and represented using alphabetical codes (Platforms Z, S, D, K, B, I, P, E, U, and O) to maintain commercial neutrality and avoid brand-specific interpretation.

Study variables

The study variables included age, gender, professional year, residence status, use of online food delivery applications, frequency of ordering, preferred time of ordering, commonly ordered food items, reasons for use, meal skipping, snacking behaviour, late-night eating, preference for outside food and perceived changes in body weight or digestive symptoms.

Statistical analysis

Data were entered in Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0 software. Categorical

variables were expressed as frequencies and percentages. Quantitative variables were expressed as mean $\pm$ standard deviation. Association between categorical variables was assessed using Chi-square test. Fisher's exact test was applied wherever expected cell count was less than 5. Variables showing significant association on bivariate analysis and those considered biologically relevant were included in a multivariable logistic regression model to identify factors independently associated with frequent OFDA use. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations

Participation in the study was voluntary. Informed consent was included in the Google Form. Confidentiality and anonymity of responses were maintained. The study was duly approved by the Institutional Ethics Committee.

RESULTS

A total of 420 medical undergraduates were included. The mean age was 20.42 ± 1.93 years, with a median of 20 years (range: 18-25 years). Most participants were aged

18-21 years (72.6%), females (51.0%), and hostel residents (79.8%). The largest proportion belonged to first professional year (26.4%). Mean height, weight and BMI were 169.02 ± 9.90 cm, 70.44 ± 15.14 kg and 24.56 ± 4.36 kg/m², respectively (Table 1).

OFDA use was reported by 407 (96.9%) participants. The most common expenditure per order was ₹1,000-2,000 (29.0%). Ordering once weekly (38.6%) and 2-3 times weekly (36.6%) were the predominant patterns, while evening was the preferred ordering period (73.5%). Convenience (68.6%), food cravings (62.1%) and dissatisfaction with hostel/mess food (55.0%) were the leading reasons for OFDA use (Table 2).

Meal skipping was reported by 64.8% of participants, with breakfast being the most commonly skipped meal (49.3%). Fast-food consumption 2-3 times/week was reported by 54.8%, and fast/fried foods were the most commonly ordered category (66.4%). Overall, 75.0% perceived an increase in unhealthy food intake following OFDA use. Increased calorie intake (77.1%), snacking (76.7%) and processed food intake (75.0%) were the most commonly reported dietary changes. Weight gain was reported by 41.7% (Table 3).

Table 1: Socio-demographic, academic and anthropometric characteristics of the study participants (n=420).

Variables	Category	Frequency	Percentage
Age group (years)	18-21	305	72.6
	22-25	115	27.4
	Mean $\pm$ SD: 20.42 ± 1.93 ; Median (Range): 20 (18-25)		
Gender	Female	214	51.0
	Male	206	49.0
Professional year	First professional	111	26.4
	Second professional	78	18.5
	Final professional part-I	88	20.9
	Final professional part-II	77	18.3
	Interns	66	15.8
Residence	Hostel	335	79.8
	Day scholar	71	16.9
	Paying guest	14	3.3
Anthropometric characteristics	Height (cm), Mean $\pm$ SD: 169.02 ± 9.90		
	Weight (kg), Mean $\pm$ SD: 70.44 ± 15.14		
	BMI (kg/m ²), Mean $\pm$ SD: 24.56 ± 4.36		

Table 2: Pattern of online food delivery application use among medical undergraduates.

Variables	Category	Frequency	Percentage
Use of online food delivery applications (n=420)	Yes	407	96.9
	No	13	3.1
Average money spent per order (n=407)	<₹1000	88	21.6
	₹1000-2000	118	29.0
	₹2000-3000	79	19.4
	₹3000-4000	45	11.1
	₹4000-5000	40	9.8
	>₹5000	37	9.1
Frequency of ordering (n=407)	Rarely	77	18.9

Continued.

Variables	Category	Frequency	Percentage
	Once a week	157	38.6
	2-3 times/week	149	36.6
	Daily	24	5.9
Preferred time of ordering (n=407)	Morning	3	0.7
	Afternoon	14	3.4
	Evening	299	73.5
	Late night	91	22.4
Reasons for using OFDA (n=407)*	Convenience	288	68.6
	Cravings	261	62.1
	Hostel/mess food dissatisfaction	231	55.0
	Promotional offers/discounts	137	32.6
	Variety of food options	136	32.4
	Time constraints	135	32.1
	Social influence	48	11.4

*Multiple responses

Table 3: Dietary habits and perceived dietary changes associated with online food delivery application use among medical undergraduates.

Variable	Category	Frequency	Percentage
Meals consumed/day (n=420)	<3	110	26.2
	≥3	310	73.8
Meal skipping (n=420)	Yes	272	64.8
	No	148	35.2
Most commonly skipped meal (n=420)*	Breakfast	207	49.3
	Lunch	134	31.9
	Dinner	94	22.4
Fast-food consumption (n=420)	Rarely	34	8.1
	Once/week	112	26.7
	2-3 times/week	230	54.8
	Daily	44	10.4
Most commonly ordered food (n=420)	Fast/fried food	279	66.4
	Indian food	62	14.8
	Desserts/beverages	35	8.3
	Chinese food	20	4.8
	Healthy options	15	3.6
	Home-cooked/mess food	9	2.1
Perceived increase in unhealthy food intake (n=420)	Yes	315	75.0
	No	105	25.0
Reported dietary changes (n=420)*	Increased calorie intake	324	77.1
	Increased snacking	322	76.7
	Increased processed food intake	315	75.0
	Increased sugary drinks/desserts	250	59.5
Weight change (n=420)	No change	225	53.6
	Weight gain	175	41.7
	Weight loss	20	4.7

*Multiple responses

On bivariate analysis, Platforms Z, S, D, K, B, I and P were significantly associated with increased fast-food consumption ($p < 0.05$). The strongest association was observed for Platform Z (70.6% vs. 25.7%; $\chi^2 = 29.57$; $p < 0.001$). Significant associations were also observed for Platform S (71.2% vs. 54.6%; $p = 0.002$), D (74.6% vs. 54.4%; $p < 0.001$), K (78.5% vs. 62.9%; $p = 0.003$), B (70.5% vs. 43.9%; $p < 0.001$), I (72.5% vs. 60.9%;

$p = 0.014$) and P (73.4% vs. 63.2%; $p = 0.032$). Platforms E, U and O showed no significant association ($p > 0.05$). In multivariable logistic regression, participants were classified as infrequent users (ordering rarely or once a week) and frequent users (ordering 2-3 times/week or daily). Meal skipping, altered meal timing and increased snacking were significantly associated with frequent OFDA use. Students who skipped meals had higher odds

of frequent OFDA use (AOR=1.75; 95% CI: 1.10-2.79; $p=0.018$). Compared with those reporting no change in meal timing, delayed (AOR=2.03; 95% CI: 1.27-3.23; $p=0.003$) and earlier meal timing (AOR=2.27; 95% CI: 1.06-4.87; $p=0.036$) were significantly associated with frequent OFDA use. Increased snacking was also

associated with higher odds of frequent use (AOR=1.93; 95% CI: 1.05-3.57; $p=0.036$). Increased calorie intake, processed/packaged food intake, weight change and physical activity were not significantly associated with frequent OFDA use ($p>0.05$) (Table 4).

Table 4: Multivariable logistic regression analysis showing factors associated with frequent online food delivery application use among medical undergraduates (n=407).

Variables	Category	Infrequent users*, N (%)	Frequent users**, N (%)	AOR	95% CI	P value
Do you skip meals?	No	101 (70.6)	42 (29.4)	1.00 (Ref)	-	-
	Yes	135 (51.1)	129 (48.9)	1.75	1.10-2.79	0.018
Has your meal timing changed because of online food ordering?	No change	160 (67.2)	78 (32.8)	1.00 (Ref)	-	-
	Delayed	61 (45.2)	74 (54.8)	2.03	1.27-3.23	0.003
	Earlier	15 (44.1)	19 (55.9)	2.27	1.06-4.87	0.036
Impact on dietary patterns: Increased total calorie intake	No	55 (61.1)	35 (38.9)	1.00 (Ref)	-	-
	Yes	181 (57.1)	136 (42.9)	0.60	0.33-1.07	0.083
Impact on dietary patterns: Increased snacking	No	68 (73.9)	24 (26.1)	1.00 (Ref)	-	-
	Yes	168 (53.3)	147 (46.7)	1.93	1.05-3.57	0.036
Impact on dietary patterns: increased intake of packed/processed food	No	66 (68.8)	30 (31.2)	1.00 (Ref)	-	-
	Yes	170 (54.7)	141 (45.3)	1.34	0.76-2.35	0.313
Weight changes since using delivery apps	No change	140 (66.0)	72 (34.0)	1.00 (Ref)	-	-
	Weight gain	86 (49.1)	89 (50.9)	1.49	0.94-2.38	0.091
	Weight loss	10 (50.0)	10 (50.0)	1.17	0.44-3.08	0.752
Physical activity level	Rarely/never	33 (50.8)	32 (49.2)	1.00 (Ref)	-	-
	Occasional (1-2 times/week)	95 (60.1)	63 (39.9)	0.71	0.38-1.33	0.288
	Regular (>3 times/week)	108 (58.7)	76 (41.3)	0.88	0.48-1.62	0.674

*Infrequent Users: Students who ordered food rarely or once a week; **Frequent Users: Students who ordered food daily or 2-3 times a week

DISCUSSION

The present study demonstrated a very high prevalence of OFDA use (96.9%) among medical undergraduates. Ismail et al reported frequent OFDA use among 51.9% of UAE university students, with fast food being the most commonly selected category (88.4%). Affordability (78.0%) and food appearance (65.7%) were important determinants of food choice.² The higher utilization in the present study may be related to the predominance of hostel residents (79.8%), irregular academic schedules and easy accessibility of food delivery services. Convenience (68.6%), food cravings (62.1%) and dissatisfaction with hostel/mess food (55.0%) were the major reasons for OFDA use. Eu and Sameeha reported that 77.6% of Malaysian university students purchased unhealthy foods more frequently through OFDAs, while 76.9% perceived limited availability of healthy food choices. Price and convenience were the most influential determinant of food choice (mean score 4.29 ± 0.76).¹³ Fast/fried food was the most commonly ordered food item (66.4%), and 54.8% consumed fast food 2-3 times/week. Tham et al reported that 41.7% of young adults in Singapore used mobile food delivery

applications at least weekly and 22.2% used them at least twice weekly. More frequent use showed a trend towards lower vegetable intake and higher sugar-sweetened beverage consumption, although these associations were not statistically significant.⁷ Meal skipping was reported by 64.8% of participants, with breakfast being the most frequently skipped meal (49.3%). Srivastava et al found that only 21.4% of Indian medical and dental interns had good dietary habits, while 69.8% had fair and 8.9% had poor dietary habits. Approximately 75% ordered food at least once a week and nearly 88% ordered sugary drinks with meals.¹² Frequent OFDA use was strongly associated with fast-food consumption in the present study. Participants consuming fast food 2-3 times/week (AOR=18.55; 95% CI: 4.21-81.71; $p<0.001$) and daily (AOR=10.63; 95% CI: 2.15-52.52; $p=0.004$) had higher odds of frequent OFDA use. Dana et al similarly reported an association between online meal ordering and more frequent fast-food and sugar-sweetened beverage consumption among 2010 Australian adults.⁵ Tiwari et al reported that 84% of postgraduate public health students in Kolkata used food delivery applications, while weight gain (23.6%), indigestion (23.6%) and irregular meal timing (22.4%) were commonly perceived health effects.

Additionally, 92% considered food delivery applications convenient and time-saving, while 74% perceived that they promoted overeating.¹⁵ These findings are comparable with the increased calorie intake, snacking and perceived weight gain reported in the present study.

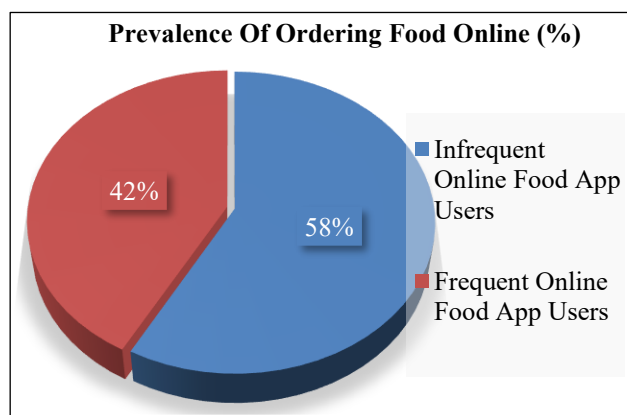


Figure 1: Prevalence of ordering food online.

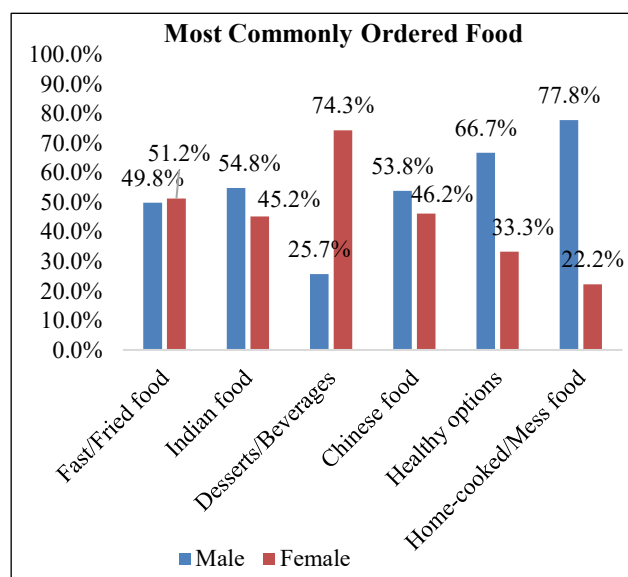


Figure 2: Most commonly ordered food.

This study has few strengths. The study included a relatively large sample of medical undergraduates from all professional years. It comprehensively assessed online food delivery application use, dietary behaviours and perceived dietary changes. Multivariable logistic regression was performed to identify factors independently associated with frequent online food delivery application use. The present study has certain limitations. The study was conducted among medical undergraduates in only one medical college in district Ludhiana. Therefore, the findings may not be generalizable to all students. Data were self-reported and may be subject to recall bias and social desirability bias. Dietary intake was not assessed quantitatively in terms of portion size, calorie intake or nutrient composition.

CONCLUSION

The present study demonstrated that online food delivery applications were widely used among medical undergraduates in district Ludhiana. The major reasons for using these applications were convenience, food cravings, dissatisfaction with hostel or mess food, and promotional offers or discounts. Food ordering was most commonly reported during the evening, and the frequently ordered food items included fast or fried foods, Indian food, and desserts or beverages. Frequent use of online food delivery applications was associated with higher fast-food consumption and increased calorie intake, with participants also reporting increased snacking, greater consumption of processed foods and sugary drinks, meal skipping, and delayed meal timings. These findings highlight the need for nutrition education, improvement in hostel food services, promotion of healthier food choices on online food delivery platforms, and encouraging responsible use of these applications among medical students to support healthier dietary practices.

Recommendations

Medical colleges should organize regular nutrition education sessions focusing on healthy eating during hostel life, academic stress and examination periods. Hostel mess facilities should provide nutritious, affordable and acceptable food choices. Students should be encouraged to limit frequent late-night food ordering and reduce intake of fast food, fried snacks, desserts and sugar-sweetened beverages. Online food delivery platforms should also improve visibility, affordability and promotion of healthier food options.

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Ethical approval: The study was approved by the Institutional Ethics Committee (letter no: DMCH/IEC/2026/558)

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