



Research Article

IMPACT OF COVID-19 ON ONLINE FOOD ORDERING AND CONSUMPTION PATTERN AMONG COLLEGE STUDENTS

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Abstract: To investigate the effect of COVID-19 on online food ordering of college students, data was collected from 400 students of Punjab Agricultural University. The students were segregated on the basis of gender (male/female), background (rural/urban), residence (hosteller/days scholar) and family annual income and the data was interpreted. The survey was conducted to obtain data pertaining to their demographic profile, Healthy Eating Index (HEI), usage of online food ordering apps and effect of COVID-19 on it. Majority of the respondents (55%) were ordering food on weekly basis. It was observed that snacks were the most commonly ordered meal followed by major meals like dinner and lunch. Eighty percent of the students need improvement in the diet as revealed by their HEI score. Effect of COVID-19 pandemic was seen on online food ordering and it was observed that the frequency of ordering food especially non-veg and cold items faced a significant slump during COVID-19 scenario. The major reasons reported for ordering food online were time saving of people working from home, pleasure/ for a change and dining out was no longer a safe experience whereas focusing on immunity so preferring home-cooked food and wanted to reduce contact with third person were reported reasons for decreased in online food ordering after COVID-19.

Keywords: Food ordering apps, Healthy Eating Index, COVID-19, Online food orders

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Introduction

In today's competitive scenario, people are compelled to work for longer hours, therefore they are left with less time for household chores. As a result, cooking has become a third-party job where the mobile applications play a significant role in quick ordering. Although food ordering apps have made life easier, one should make the right choices (in terms of frequency and type of food) while choosing foods that are ordered online. A study revealed that users of food ordering apps mostly choose items which are less nutrient dense (high calories, saturated fats and sugar) [1].

Given the pandemic situation, food outlet services were severely affected rushing the Indian government to classify food and other related services under essential services. Despite that, the customers are hesitant to place orders during this pandemic even though many food delivery apps have mandated their delivery partners to use protective measures and encouraged contactless delivery with digital payment. The two critical issues for the reduction in food delivery services were the health of the delivery agent and the hygiene of the restaurant [2].

Though many businesses faced a slump during the pandemic, food ordering apps also crashed for some time but there was a huge growth after a few months of lockdown phase. This is one of the few businesses that has gained from this outbreak. On New Year's Eve (2020), Zomato claims to have got GMV (Gross Merchandise Value) of Rs.75 crore in a single day which is approximately 60% higher than last year. Peak orders per minute rate (OPM) for Zomato and Swiggy reached over 4,000 and 5,000 respectively [3]. Zomato app has come up with an initiative where the food is delivered as a contactless delivery [4].

Working from home can affect diet, food choice, and access to food and, also, limit the practice of physical activity. A pro-healthy diet with adequate activity is a crucial approach to build-up the immune system and fight viral infections such as COVID-19 [5].

Food items on these applications do not comply with healthy eating recommendations. Given the expected constant growth of online food delivery services, particularly in the midst of a global pandemic, future surveillance and research on these services and the nutritional health of the population is warranted [6]. Therefore, the present study aimed to identify change in food ordering patterns and their perception about food ordering during the pandemic.

Material and Methods

The current study was carried at Punjab Agricultural University, Ludhiana, Punjab. Overall, 400 respondents were selected from the two categories of Under-Graduate and Post-Graduate students. The students were segregated on the basis of gender (male/female), background (rural/urban), residence (hosteller/days scholar) and family annual income and the data was interpreted. The survey was conducted in the form of google forms to obtain data on the following aspects:

Demographic profile

Demographic profile of the respondents related to gender (male/female), annual family income, background (rural/urban), educational backgrounds of parents, occupation of parents, food habits, meal patterns was collected.

Usage of online food ordering apps

Respondents were enquired about the type of food /meal ordered using a rating scale of 1-5 (1- never; 5-always).

Healthy Eating Index (HEI)

It was computed proportionately to the recommended number of servings and amount consumed by the subjects. HEI score was calculated based on the sum of scores of 13 components, each of which related to different aspects of a healthful

diet [7]. Diet quality of the subjects was assessed and rated on the basis of Healthy Eating Index scores. Score of 80 depicted a good quality diet. Diet needed improvement if the score was between 51-80. Score of 50 or below shows a poor diet.

Impact of COVID-19 on food ordering

The effect of COVID-19 on their extent of ordering was assessed using a rating of 1-5 (1: Decreased considerably, 5: Increased considerably). Usage of food delivery apps and the type of food ordered during the pandemic was also enquired.

Statistical analysis

Data would be analyzed using suitable statistical techniques such as frequency, mean, percentage, one sample t-test, standard deviation, ANOVA etc.

Results and discussion

Demographic profile

Data indicated that the mean age of the respondents who were using food delivery apps was 21.7 years. Similar results were reported by Doub *et al.*, [8] those young adults and parents were more likely to be involved in mobile technology and food. In a study conducted by Gokul and Gayathridevi [9], a large number of users (81.3%) belonged to the 19-25 years of age group and majority of them (67.3%) were students. It can be seen from the [Table-1] that a large proportion of the subjects were females (317) making up to 79.25% as compared to 20.75% (83) males. When nutrition knowledge of college boys residing in Udaipur city was reported by Chaudhary [10], it was noted that most of the boys *i.e.*, 81.67 percent were in very poor category and no subject was having good level of knowledge pertaining to nutrition. More than half (53.75%) of the population were from UG courses and 46.25% were pursuing their PG. Iyer [11] claimed that there was no effect of educational qualification on the usage of food ordering apps as young generation is becoming very tech savvy and are familiar with its usage. Highly educated respondents were engaged with online food ordering [12, 13]. In the present study, maximum number (59.25%) of the respondents were urban inhabitants in contrast to 40.75% of the rural inhabitants. Most of the respondents were hostellers (61%) in contrast to the day scholars (39%). Gokul and Gayathridevi [9] showed that most of the users of food ordering apps were staying in institutional hostels followed by people staying home and least were from PG's (paying guest). A large number of respondents (71.50%) in the current study belonged to nuclear families. Nearly a quarter of respondents *i.e.*, 144 (28.50%) belonged to joint families. Joshi and Chopra [14] reported the main factors contributing to online food ordering were rational buying decision of customers, fast food consumption as status symbol, cooking at home is considered to be less priority work, nuclear family related problems, and importance given to comfort and convenience. The parents of the respondents in the present study were well educated *i.e.*, graduate or above with 60.25% fathers and 53.75% mothers. There is a great influence of parent's education on child's nutritional status [15, 16]. In the present study, it was seen that most of the fathers were in service sector (40.5%) and mothers were housewives (72.5%). A high intake of fast food was reported in children of nuclear families [17]. Income has been a significant determining factor on person's buying behavior. In the present study, most of the respondents were in the income category of Rs 2.5-Rs 5 lacs (32%) and Rs 5-Rs 10 lacs (29.5%). Gokul and Gayathridevi [9] reported that the expenditure on online food ordering is directly proportional to the monthly income. For every Rs.1000 a consumer earns, his expenses on food ordered online increases by Rs.114.

Frequency of usage of food ordering apps

Frequency of usage of online food ordering has been recorded in order to know to what extent the respondents were using these food apps as shown in Figure 1. It was found that more than half of the respondents (55.00%) were using food apps on a weekly basis. Twenty percent of 400 respondents were using these apps fortnightly followed by once in a month (15.00%), twice a week (5.75%) and more than twice a week (4.25%). Similar results were reported by previous studies, that young generation were more indulged in using food ordering apps for ordering

outside food on regular basis [9, 18].

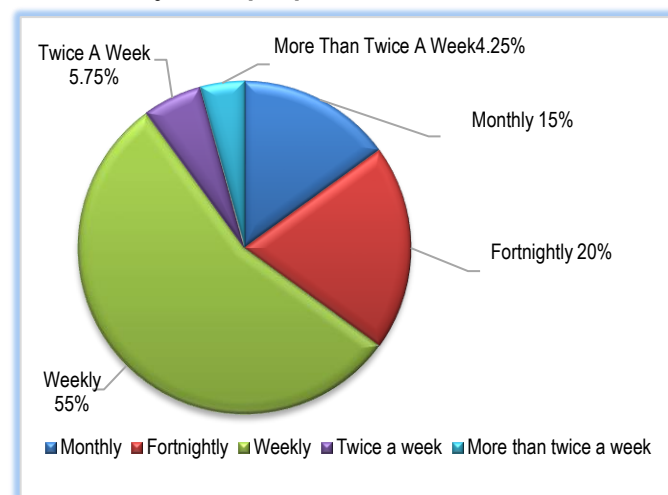


Fig-1 Frequency of usage of food ordering apps

Table-1 Demographic profile of respondents (n=400)

Parameters		Frequency	Percentage
Background	Rural	163	40.75
	Urban	237	59.25
Gender	Males	83	20.75
	Females	317	79.25
Graduation Category	Undergraduate	215	53.75
	Postgraduate	185	46.25
Place of accommodation	Hosteller	244	61.00
	Day scholar	156	39.00
Type of family	Nuclear	286	71.50
	Joint	144	28.50
Father's Education	Matriculation or below	72	18.00
	10+2	87	21.75
	Graduate	167	41.75
	Post Graduate and above	74	18.50
Mother's Education	Matriculation or below	90	22.50
	10+2	95	23.75
	Graduate	136	34.00
	Post Graduate and above	79	19.75
Father's Occupation	Service	162	40.50
	Business	138	34.50
	Agriculture	56	14.00
	Other	44	11.00
Mother's Occupation	Service	71	17.75
	Business	16	04.00
	Housewife	290	72.50
	Other	23	05.75
Annual family income	Less than Rs 2.5 lacs	103	25.75
	Rs 2.5- 5 lacs	128	32.00
	Rs 5- 10 lacs	118	29.50
	More than Rs 10 lacs	51	12.75

Type of meal ordered

Respondents were enquired about the type of meal ordered by them. It can be seen from [Table-2] that breakfast was ordered significantly more by the hostellers (1.59 ± 0.93) and male respondents (1.67 ± 0.89). In case of lunch, no significant difference was observed in any of the category. Dinner was ordered significantly more by the hostellers (3.04 ± 1.20), urban respondents (2.99 ± 1.19), males (3.15 ± 1.27) and upper income category (3.47 ± 1.22). This shows that hostellers did not prefer to consume their major meals from mess which may be due to taste or quality of food being served. In case of snacks, it was found that day scholars (3.51 ± 1.19), urban respondents (3.40 ± 1.23) and females (3.37 ± 1.27) were ordering more of energy dense snacks with the significant results. Thus, depicting more consumption of calorie-dense food by these respondents. The results of the present study concluded that online food ordering was directly correlated with the income of the family, with more the income more was the habit of spending money on ordering food from outside.

Table-2 Meal typically ordered online by the respondents

Meal	Residence		Background		Gender		Family annual income			
	Hosteller (n=244)	Day scholar (n=156)	Rural (n=163)	Urban (n=237)	Male (n=83)	Female (n=317)	<Rs 2.5 lacs (n=103)	Rs 2.5-Rs 5 lacs (n=128)	Rs 5-Rs 10 lacs (n=118)	>Rs.10 lacs (n=51)
Breakfast	1.59±0.93	1.34±0.69	1.50±0.84	1.49±0.86	1.67±0.89	1.45±0.84	1.36±0.74	1.62±0.94	1.41±0.75	1.64±1.01
t-value/F value(p value)	3.081(0.0022)		0.059(0.9526)		2.014(0.0461)		2.619(0.0506)			
Lunch	2.35±1.12	2.28±1.19	2.39±1.20	2.28±1.10	2.48±1.14	2.29±1.15	2.39±1.30	2.20±1.14	2.36±1.03	2.43±1.10
t-value/F value(p value)	0.569(0.5694)		0.975(0.3301)		1.360(0.1762)		0.804(0.4919)			
Dinner	3.04±1.20	2.64±1.30	2.73±1.33	2.99±1.19	3.15±1.27	2.81±1.24	2.45±1.26	2.88±1.23	3.01±1.16	3.47±1.22
t-value/F value(p value)	3.030(0.0026)		2.041(0.0420)		2.172(0.0317)		8.556(<.0001)			
Snacks	3.16±1.28	3.51±1.19	3.14±1.28	3.40±1.23	3.00±1.17	3.37±1.27	3.03±1.25	3.42±1.25	3.40±1.22	3.27±1.29
t-value/F value(p value)	2.761(0.0061)		2.083(0.0379)		2.561(0.0115)		2.181(0.0898)			

Table-3 Healthy eating index (HEI) of subjects

SN	Components	Max. score	Hosteller (n=244)		Day scholar (n=156)		t-value	p-value	Rural (n=163)		Urban (n=237)		t-value	p-value	Male (n=83)		Female (n=317)		t-value	p-value
			Mean	SD	Mean	SD			Mean	SD	Mean	SD			Mean	SD	Mean	SD		
(A) Adequacy components																				
1	Total fruits	5	3.77	1.87	3.75	1.85	0.150	0.8808	3.73	1.91	3.78	1.83	0.275	0.7830	4.16	1.50	3.66	1.93	2.559	0.0114
2	Whole fruits	5	3.59	1.98	3.62	1.93	0.137	0.8910	3.61	1.99	3.59	1.95	0.071	0.9432	3.98	1.68	3.50	2.02	2.225	0.0276
3	Total vegetables	5	0.97	0.92	0.99	0.91	0.236	0.8135	0.93	0.87	1.00	0.95	0.757	0.4495	1.07	0.86	0.95	0.93	1.072	0.2855
4	Greens and beans	5	0.59	1.14	0.62	1.19	0.194	0.8460	0.68	1.27	0.55	1.07	1.099	0.2726	0.60	1.15	0.60	1.16	0.044	0.9642
5	Whole grains	10	2.79	2.19	2.83	2.29	0.183	0.8548	2.79	2.19	2.81	2.25	0.120	0.9044	2.92	2.33	2.77	2.20	0.533	0.5946
6	Dairy	10	8.06	3.16	7.64	3.47	1.233	0.2185	8.03	3.18	7.80	3.36	0.696	0.4868	7.86	3.28	7.90	3.29	0.101	0.9195
7	Total protein foods	5	2.70	1.58	2.55	1.71	0.861	0.3894	2.71	1.61	2.60	1.65	0.652	0.5144	2.51	1.61	2.68	1.64	0.818	0.4144
8	Sea food and plant proteins	5	0.45	0.96	0.46	0.82	0.144	0.8851	0.51	1.05	0.42	0.79	0.960	0.3374	0.54	1.01	0.43	0.87	0.850	0.3969
9	Fatty acids	10	2.03	3.92	1.38	3.43	1.739	0.0828	1.93	3.85	1.67	3.68	0.668	0.5046	1.72	3.65	1.79	3.78	0.158	0.8740
(B) Moderation components																				
10	Refined grains	10	2.92	3.71	2.83	3.68	0.234	0.8147	3.09	3.70	2.74	3.68	0.944	0.3455	3.15	3.86	2.81	3.65	0.720	0.4725
11	Sodium	10	9.84	1.07	9.70	1.51	1.025	0.3063	9.83	1.06	9.76	1.39	0.573	0.566	9.56	1.76	9.85	1.09	1.406	0.1627
12	Added sugars	10	9.87	0.42	9.92	0.33	1.207	0.2281	9.94	0.29	9.86	0.44	2.262	0.0242	9.93	0.23	9.88	0.42	1.593	0.1124
13	Saturated fats	10	9.95	0.28	9.88	0.49	1.520	0.1298	9.96	0.17	9.89	0.47	2.235	0.0261	9.93	0.23	9.92	0.40	0.533	0.5944
	Total Healthy eating index score	100	57.59	8.24	56.21	8.83	1.555	0.1209	57.80	8.65	56.53	8.35	1.466	0.1434	58.01	7.63	56.80	8.69	1.244	0.2153

Table-4 Impact of COVID-19 on online food ordering

Parameter	Residence		Background		Gender		Family annual income			
	Hosteller (n=244)	Day scholar (n=156)	Rural (n=163)	Urban (n=237)	Male (n=83)	Female (n=317)	<Rs.2.5 lacs (n=103)	Rs.2.5-Rs.5 lacs (n=128)	Rs.5-Rs.10 lacs (n=118)	>Rs.10 lacs (n=51)
Frequency of ordering	2.43±1.42	2.69±1.44	2.57±1.41	2.50±1.45	2.84±1.40	2.45±1.43	2.51±1.49	2.43±1.36	2.72±1.44	2.37±1.49
t value/F value(p value)	1.775(0.0768)		0.511(0.6094)		2.247(0.0263)		1.073(0.3604)			
Type of food ordered										
Veg	2.86±1.31	3.07±1.16	3.00±1.31	2.91±1.22	3.01±1.23	2.93±1.27	2.91±1.39	2.96±1.28	2.97±1.14	2.92±1.23
t value/F value(p value)	1.686(0.0925)		0.679(0.4972)		0.531(0.5958)		0.055(0.9826)			
Non-veg	2.36±1.22	2.45±1.10	2.50±1.24	2.32±1.11	2.59±1.22	2.34±1.16	2.36±1.35	2.44±1.15	2.48±1.01	2.13±1.18
t value/F value(p value)	0.800(0.4237)		1.461(0.1449)		1.633(0.1048)		1.132(0.3356)			
Cold foods	2.34±1.19	2.53±1.16	2.47±1.17	2.38±1.18	2.59±1.18	2.37±1.17	2.43±1.21	2.46±1.25	2.44±1.09	2.23±1.14
t value/F value(p value)	1.580(0.1148)		0.700(0.4840)		1.446(0.1504)		0.494(0.6862)			
Warm foods	2.81±1.26	3.04±1.09	2.92±1.19	2.89±1.21	2.97±1.14	2.88±1.22	2.79±1.22	2.87±1.20	3.04±1.17	2.86±1.23
t value/F value(p value)	1.954(0.0514)		0.244(0.8069)		0.645(0.5194)		0.837(0.4739)			

The results were supported by the studies done in the previous years where more of the hostellers (64%) ordered food during dinner time, 22% ordered lunch and 7% ordered snacks [19]. Rani and Garg [20] reported that increase in income and change in eating habits were the main contributors of online food ordering among urban population. In contrast to the results of the present study, Grech *et al.*, [21] reported that the mean frequency of taking energy-dense diet was more for men than women. It was observed that women were in the habit of ordering healthier foods when using online food ordering apps [22]. Contrasting results were reported by Grech *et al.*, [21] and French *et al.*, [23] that low-income group were more likely to have energy-dense foods.

Healthy eating index

The average HEI score of all the 400 respondents was 57.05±8.49 which was in the category of requirement of diet improvement. HEI was computed and diet of the respondents were categorized on HEI rating scale. Diet of 80.25% respondents needed improvement while 19.75% had poor diet. This showed poor relation of food components by the respondents that lead to unhealthy food consumption.

Adequacy Components

As clear from [Table-3], dairy and fruit score were found to be the best among the respondents as their intake was good. There was a significant higher score for total and whole fruit among males as compared to the female respondents. Score for greens and beans, sea food and plant protein and fatty acid was minimum which reflects an image of low intake of green leafy vegetables, protein food and unsaturated fats. No significant variation was seen among rural-urban and hostellers-day scholars.

Moderate components

Amongst these components, sodium, added sugar and saturated fat score was

good (above 9) because of its consumption being in limit in the diet. Score for saturated fat and added sugar was significantly high among rural respondents depicting their less intake as compared to those living in urban areas. Refined grains score was very low (below 4 out of 10) which indicated that the respondents consumed more of processed food items and junk foods. No significant difference was observed among male-female and hostellers-day scholars.

Overall, HEI score

The average overall HEI score for hostellers, rural respondents and males was 57.59, 57.80 and 58.01 which was greater as compared to their counterparts i.e., for day scholars, urban respondents and females was 56.21, 56.53 and 56.80 with no significant difference. This depicts poor diet and more fast-food intake among the later groups. HEI scores were from the total score of 100 which means that the diet of the adolescents needs a lot of improvement in terms of the quality of food as it fell in the range of 51-80. Doostan *et al.*, [24] examined dietary habits of dormitory students of a university in Iran, based on HEI-2005. It was observed that 8.1% of the students had poor diet, 63.4% had to improve their diet, and 28.5% had a good diet. Assumpção *et al.*, [25] found that women showed higher scores in the components of fruits, vegetables and milk. Amongst men, the score was higher only in the component of meat and eggs. The average HEI for adults aged between 20 and 59 at global level was found to be 52.70 with male (51.22) scoring less than female (54.10) at p=0.000.

Impact of COVID-19 on online food delivery

Due to COVID-19 pandemic, there was huge loss in many businesses and economy. On a rating scale of 1-5 (Decreased considerably:1, Increased considerably:5), impact of the pandemic was seen on different parameters of working of the apps [Table-4]. It was seen that vegetarian and warm food had slightly more mean value than non-vegetarian and cold food indicating a slight decrease in ordering of non-veg and cold food items.

Table-5 Usage of online food delivery during pandemic

Statement	Residence		Background		Gender		Family annual income			
	Hosteller (n=244)	Day scholar (n=156)	Rural (n=163)	Urban (n=237)	Male (n=83)	Female (n=317)	<Rs. 2.5 lacs (n=103)	Rs. 2.5-Rs. 5 lacs (n=128)	Rs. 5-Rs. 10 lacs (n=118)	>Rs. 10 lacs (n=51)
Food delivery apps are keeping the economy alive	3.57±0.82	3.64±0.79	3.51±0.91	3.66±0.72	3.45±0.91	3.64±0.77	3.67±0.73	3.49±0.84	3.68±0.81	3.54±0.85
t value / F value (p value)	0.843(0.3993)		1.762(0.0790)		1.696(0.0925)		1.606 (0.1874)			
Online food delivery promotes social distancing	3.60±0.89	3.64±0.88	3.55±0.94	3.65±0.85	3.74±0.90	3.58±0.88	3.75±0.83	3.41±0.88	3.72±0.92	3.60±0.89
t value / F value (p value)	0.421(0.6733)		1.077(0.2819)		1.465(0.1453)		3.647 (0.0128)			
Ordering food online saves time of the people doing work-from-home	3.88±0.84	4.02±0.76	3.83±0.86	4.01±0.77	4.03±0.86	3.91±0.80	4.03±0.72	3.80±0.84	4.01±0.82	3.90±0.90
t value / F value (p value)	1.709(0.0883)		2.101(0.0363)		1.156(0.2499)		2.057 (0.1053)			
Food delivery apps help elderly people to order food	3.51±0.97	3.51±0.94	3.47±0.97	3.54±0.96	3.50±1.04	3.51±0.94	3.56±0.88	3.41±1.02	3.54±0.99	3.60±0.91
t value / F value (p value)	0.070(0.9438)		0.625(0.5323)		0.089(0.9285)		0.739 (0.5293)			
Food delivery apps help in ordering grocery	3.52±0.93	3.75±0.94	3.50±1.05	3.69±0.85	3.50±1.05	3.64±0.91	3.52±0.87	3.47±0.98	3.72±0.97	3.90±0.83
t value / F value (p value)	2.289(0.0227)		1.895(0.0589)		1.087(0.2789)		3.342 (0.0193)			
Food delivery apps help people who are quarantined and are unable to cook	3.85±0.94	3.95±0.90	3.84±0.97	3.92±0.89	4.02±0.94	3.86±0.92	3.97±0.79	3.69±0.99	4.02±0.89	3.94±1.02
t value / F value (p value)	1.045(0.296)		0.849(0.3961)		1.399(0.1640)		3.071 (0.0277)			

Table-6 Type of food ordered online during pandemic by the respondents

Meal	Residence		Background		Gender		Family annual income			
	Hosteller (n=244)	Day scholar (n=156)	Rural (n=163)	Urban (n=237)	Male (n=83)	Female (n=317)	<Rs. 2.5 lacs (n=103)	Rs. 2.5-Rs. 5 lacs (n=128)	Rs. 5-Rs. 10 lacs (n=118)	>Rs. 10 lacs (n=51)
Grocery/ raw foods	2.27±1.37	2.82±1.55	2.34±1.41	2.59±1.50	2.38±1.43	2.52±1.47	2.21±1.43	2.50±1.44	2.50±1.47	3.00±1.46
t value/F value (p value)	3.593(0.0004)		1.632(0.1035)		0.756(0.4507)		3.325(0.0197)			
Dietary supplements	2.06±1.25	1.98±1.22	2.11±1.23	1.97±1.23	2.06±1.26	2.02±1.23	1.99±1.25	2.14±1.21	1.83±1.15	2.29±1.38
t value/F value (p value)	0.638(0.5234)		1.159(0.2470)		0.246(0.8059)		2.190(0.0887)			
Prepared meals	2.50±1.43	2.38±1.37	2.39±1.38	2.50±1.42	2.85±1.44	2.35±1.38	2.18±1.28	2.51±1.44	2.61±1.41	2.49±1.52
t value/F value (p value)	0.832(0.4055)		0.766(0.4437)		2.836(0.0053)		1.895(0.1298)			

This decrease could be because of belief that cold and non-veg items get contaminated more easily. Frequency of ordering food after the pandemic was significantly more in males with mean of 2.84 ± 1.40 as compared to 2.45 ± 1.43 in females. Food ordering whether in terms of frequency or the type (veg/non-veg/hot/cold) was more in day scholars, rural respondents, males and Rs.5-Rs.10 lacs income group as compared to their counterparts after the COVID-19 situation. According to Statista Research Department [26], in the survey by Local Circles in May 2020, nearly 65 percent of respondents did not want to order restaurant food for delivery within 30 days after the coronavirus (COVID-19) lockdown got lifted. In contrast, about three percent said they would order more than four times within this period. Zhao and Bacao [27] showed that satisfaction was the most significant factor, and perceived task-technology fit, trust, performance expectancy, social influence and confirmation have direct or indirect positive impacts on users' continuance usage of food ordering apps amid COVID-19 pandemic. The World health Organization (WHO) advised that there is currently no evidence that people can catch COVID-19 from food or food packaging. WHO recommended that foods such as meat, poultry and eggs should always be thoroughly cooked; raw animal products should be handled with care to avoid cross-contamination; and meat from diseased animals should not be eaten [28]. Ali *et al.*, [29] found that optimism and innovativeness significantly and positively influence the consumers intention to use food delivery services. These effects were stronger in the male subgroup. Results also indicated that the effects of insecurity and discomfort are higher in the female subgroup. Also, customer's adoption of food delivery services after the pandemic and it was revealed that effect of optimism and innovativeness was higher in the high-income subgroups towards adoption of new technology. On the other hand, the effects of insecurity and discomfort are higher in the low-income groups.

Ordering of food using online food apps after COVID 19- Major reasons

The study reported an increase of ordering food after COVID-19 situation was due to the reason that ordering food online saved time of the people doing work-from-home and pleasure or for a change from the routine. Mehrolia *et al.*, [2] found that the customers who were ordering food online amid COVID-19 pandemic were linked with less perceived threat and were associated with a high level of purchase pattern, high perceived benefits and high product involvement. On the other hand, there were the respondents who decreased ordering food online as they were focusing on their immune system, so preferred home cooked meals only. Also, they wanted to reduce contact with third person. This depicts that the fear of COVID-19 transmission was faced by them. It was found by Mehrolia *et al.*, [2], in disease-based outbreak, perception of threat was very high in online food delivery (OFDs), since the chances of disease spreading were higher through delivery partners, which suggested that respondents think about the uncertainty involved in their purchase. It concluded that respondents exhibiting

high-perceived threat, less product involvement, less perceived benefit on OFDs and less frequency of online food orders are less likely to order food through OFDs.

Usage of online food delivery apps

[Table-5] represents different statements which were rated by the respondents from strongly disagree to strongly agree. Lower income category respondents were agreeing to the statement that food delivery apps promote social distancing significantly more (3.75 ± 0.83) as compared to their counterparts. Urban respondents agreed significantly more to the statement that 'Ordering food online saves time of the people doing work-from-home' with mean of 4.01 ± 0.77 . Mean frequency of day scholars and upper income category agreeing to 'food delivery apps help in ordering grocery' was 3.75 ± 0.94 and 3.90 ± 0.83 respectively with significant results. Significant result was seen for 'Food delivery apps help people who are quarantined and are unable to cook' with higher mean (4.02 ± 0.89) of Rs.5-Rs.10 lacs income group. As per Li *et al.*, [30], online food delivery provided a critical lifeline during the pandemic for the tens of millions of people quarantined at home. It also facilitated consumer access to prepared meals and enabled food providers to keep operating. From an economic standpoint, while online food delivery provides job and sale opportunities, it has been criticized for the high commission it charged restaurants and questionable working conditions for delivery people. Alagoz and Hekimoglu [31] in their study indicate that working females prefer ordering online food regularly. According to Prabhaskar [32], in this fastest growing economy, as both men and women are income producer, online food delivery services save time of working people. According to Jadeja and Singh [33], most of the people feel safer to order food online than visiting restaurants in the COVID times. Khan [34] also reported that many restaurants have responded to the crisis by introducing contactless delivery options to eliminate the risk of spreading the virus between the staff and customers. Moreover, many restaurants do not have space to maintain social distancing.

Type of food ordered online during the pandemic

[Table-6] shows the type of food ordered online during the pandemic. It was found that grocery items were more likely to be ordered than prepared meals. Dietary supplements were rarely ordered among the three categories. Grocery was significantly more preferred by the day scholars (2.82 ± 1.55) and income group of more than Rs.10 lacs (3.00 ± 1.46). Results for the prepared meals are significant as more of the males (2.85 ± 1.44) were preferring prepared meals as compared to the females (2.35 ± 1.38). According to Statista Research Development [35], online grocery orders raised during the coronavirus (COVID-19) pandemic in India. Big Basket had about 283 thousand orders on the 28th day of the lockdown. Bigbasket - the online grocery store had the highest market share among online groceries in India in 2019.

Ali *et al.*, [29] found customer's adoption of food delivery services after the pandemic and it was revealed that effect of optimism and innovativeness was higher in the high education subgroups towards adoption of new technology. On the other hand, the effects of insecurity and discomfort are higher in the low education groups. Chandini and Nagendra [36] noted that females and employed people were more involved in online grocery shopping. In the study on Maine families conducted by Zatz *et al.*, [37], low-income shoppers were significantly less likely to utilize online grocery ordering with curb side pickup. There is a need to choose healthy foods when ordering foods using online apps [38]

Conclusion

It can be concluded from the data related to food ordering app usage that a major proportion (55%) of the students were using the food ordering apps on a weekly basis. Snacks were the most ordered meal by all the students with significant results. HEI rating scale showed that diet of 80.25% of the respondents needed improvement. Data analysis showed that HEI score of males, hostellers, rural respondents and subjects from income group of Rs.2.5-Rs.5 lacs was more as compared to their counterparts. However, all the groups were having low overall score. It was found that there was slight decrease in frequency of ordering food during COVID-19, that too with a major impact on non-vegetarian foods and items at cold temperature. The major reason of decreased frequency was that they were focusing on their immunity and preferring home-cooked food. On the other hand, major reasons chosen by the subjects who increased frequency of ordering involved time-saving of the people doing work-from-home and pleasure. Most of the subjects agreed that food ordering helped people doing work-from-home and also helped people who're quarantined and were unable to cook. It was also reported in the study, grocery/raw food items were significantly more ordered by the subjects as compared to the prepared meals and dietary supplements during the pandemic.

Application of research: Food delivery apps have gained popularity in a short period of time by offering a variety of meals that too with discounts and offers. These food apps came as a blessing to mankind which made jobs a lot easier in an efficient way. Food apps might promote mindless eating as order could be made when a person is getting bored, at irregular hours (late nights) or even over weekends and therefore, it also fuels Binge Eating Disorder. Online food delivery services could lead to consumption of extra calories and adverse health consequences. Hence, there is a need to create awareness among adolescents to choose right foods when order food online and also to improve the nutritional content of food available online.

Research Category: Ecology and Environmental Sciences

Abbreviations: BMI-Body Mass Index, HEI-Healthy Eating Index

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