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Understanding Bangladeshi Youths' Perceptions of Food Safety in Online Food Delivery Services.

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Abstract

As online food delivery erupts in Bangladesh, securing food safety has become a pressing concern, as digital platforms promptly reform consumption patterns. The study investigates Bangladeshi youths' perceptions of food safety in online food delivery by examining the key influencing factors, their level of concern, and how these perceptions shape purchasing behavior, while also considering post-COVID-19 effects on current behaviors and future expectations. A cross-sectional survey was carried out using a structured questionnaire released via Google Form, where 402 valid response was included to evaluate using descriptive statistics, Pearson correlation, Chi-square test and logistic regression to employ for evaluating food safety perceptions among Bangladeshi youth. The results highlight that hygiene certifications, packaging sanitation, and delivery practices significantly influence trust, whereas demographic factors and COVID-19 experiences assemble perceptions and decision-making. The study indicates that perceived food safety clearly affects the risk of foodborne diseases, driving online food choices, and delivers insights for policymakers and service providers to improve safety measures and reduce health risks in Bangladesh's rising food delivery sector.

Keywords: Bangladeshi youths, consumer perception, food consumption, food safety, online food delivery

1. Introduction

The rapid growth of online food delivery services and online food market place have remarkably reshaped consumers food purchasing behavior, specifically younger people who were more technologically involved (Galanakis, 2020). The COVID-19 epidemic has fueled the rapid acceptation of these platforms (Online food services) because of their affordability, accessibility and user friendly with various feature (Pantano et al., 2020).In developing country such as Bangladesh, this type of transition is notable because urban youths increasingly rely on online food marketplaces for their daily meals that indicated global trends while interacting various local difficulties (Akter et al., 2021).

However, the digitalization of food supply chains created new complexity to provide food safety, because online food delivery system sometimes includes several middlemen, third party vendors, cloud kitchens, various delivery agents and platform operators with limited regulatory oversight. This produces challenges in securing reliable food safety

standards (Shroff et al., 2022a). The segmentation was remarkably weakened the reliability and supervision of food security, specific under develop or developing country like Bangladesh where food security surveillance system keeps being negligible (Ishra et al., n.d.; Khairuzzaman et al., 2014).

Evan though online food delivery services is becoming more and more popular, there is still a considerable study gaps in understanding consumer perceptions of food safety on online food delivery services particularly among young people in Bangladesh. Existing research primarily focusses on technical element of food safety or consumer behavior in these sectors, with little empirical study addressing Bangladeshi young people perception of food safety on online food delivery services (Rahman et al., 2025). Furthermore, the impact of demographic characteristics, usages patterns and influence of covid-19 on perceptions and online food purchasing behavior is not studied.

The study proposes the following research questions 1. What is the perception / dominant perception of food safety among Bangladeshi youth? 2. How do demographic factor usage pattern and post-covid-19 influences shape this perception? 3. What factors influence their trust and decision-making when ordering food online? Aligned with these questions, the study objectives are to Identify key factors influencing food safety perceptions among Bangladeshi youth. To assess the level of concern regarding online food safety. To explore how these perceptions influence food purchasing behavior. And to examine the impact of the COVID-19 pandemic on current behaviors and future expectations related to online food delivery.

This study is significant because it will provide important insight into consumers' perception and online food purchasing behavior regarding food safety in a rapid growth and quickly changing digital marketplace. This understanding can help policymakers, online food delivery platform developers and food service providers to improve food safety, consumer trust and regulatory frameworks in Bangladesh's online food marketplace or delivery services. Furthermore, the finding will contribute to academic understanding about digital consumer behavior and public health in emerging digital economies, where challenges and opportunities differ significantly from those in industrialized countries.

2. Literature Review

2.1 Food Safety and Consumer Perception of Food Safety

According to the World Health Organization (WHO), safe food is a fundamental factor of human health. Ensuring the availability of safe, nutritious, and healthy food is an essential human right. Food safety is the conviction that food will not cause detrimental health effects to the consumer when it is prepared and/or consumed based on its expected use. The concept includes preventing injurious bacteria, viruses, parasites, and chemical agents capable of prompting diseases ranging from diarrhea to cancer (Knechtges, 2011; WHO., 2022).

Food safety is crucial for enhancing health and sustaining food security. Consuming safe food assists inhibit foodborne diseases, which affect more than 600 million people all over the world and cause about 420,000 deaths each year(WHO., 2022). Contaminated food carries bacteria, toxins, viruses, parasites, and chemicals that result in severe and long-term health issues, especially in fragile populations such as children and the elderly (Mirosa et al., 2021; Zhang et al., 2024). Studying food safety safeguards public health by preventing foodborne illnesses and supports economic stability by avoiding costly food recalls, legal issues, and loss of consumer trust (Gustavsson et al., 2011; Havelaar et al., 2015). Furthermore, adherence to food safety standards is crucial for compliance in international trade (Pavel et al., 2018).

Consumer perception signifies how consumers view the safety and quality of food products. Studies show consumers are concerned about microbial contamination, poor sanitation, pesticide residues, and additives (M. F. Chen, 2008). These perceptions vary in demographic factors such as age, gender, education, and knowledge (Verbeke, 2005). Customer satisfaction is essential for creating positive perception and trust (Almanza et al., 2007).

2.2 Factors Shaping Consumer Perception of Food Safety

Socioeconomic factors, knowledge of food safety, confidence in certifications and standards, media influence, and prior experiences all shape consumer perception (Frewer, 2012; A. E. Lobb et al., 2007) Trust in government and producers is vital in shaping attitudes towards food safety (Yeung & Morris, 2001).

Perceived risks influence food choices; higher perceived risk reduces willingness to buy certain animal products or processed foods (Ling, 2018; Zhu et al., 2018). Confidence in safety increases the likelihood of purchase and brand loyalty. Practical factors like price and availability also refine behavior (Nam, 2019; Onyango et al., 2009).

2.3 Online Food Delivery Services

The global online food delivery market has broadened quickly due to smartphone expansion and lifestyle shifts favoring convenience. The market evaluation was about USD 288.84 billion in 2024, anticipated to reach USD 505.50 billion by 2030(Onyango et al., 2009; Pujara et al., 2022; Shroff et al., 2022b). Novelties such as real-time order tracking and subscription models stimulate growth in markets like the U.S., Europe, and the UK (Bivona, 2023; Seghezzi & Mangiaracina, 2021; Sun et al., 2024).

Bangladesh's online food delivery industry is quickly growing, supported by urban development and digital adoption. Valued at about USD 1.26 billion in 2024, it is estimated to increase by a CAGR of 17.32% through 2029(Islam & Rahim, 2024; Saad, 2021a). Platforms like Pathao Food have made things more consistent and cheaper, changing how people in cities shop (Saad, 2021a, 2021b; Saad Ahmed, 2024).

Digital transition has made people want on-demand access, clear information, and long-lasting choices. Technologies like blockchain and the Internet of Things (IoT) have made this even stronger (Hobbs, 2020).

2.4 Reliance in Online Restaurants and Food Delivery Platforms

Reliance is essential to consumer confidence and loyalty in online food delivery. Core components include order accuracy, data privacy, food quality, punctual delivery, and customer service (M. F. Chen, 2008). Lack of reliance due to privacy or service issues decreases repeat usage (Su et al., 2022; Zaheer et al., 2024).

When reliance is low, consumers depend on visible safety indicators like freshness, price, delivery speed, sanitization protocols, and social proof from reviews and ratings (W. Chen, 2013; Franc-Dąbrowska et al., 2021). Seamless ordering experiences also increase reliance (Liu et al., 2023).

2.5 Pandemic-Driven Changes in Food Ordering

The COVID-19 pandemic hastened the adoption of online food delivery because of lockdowns and dine-in restrictions (Gupta et al., 2021). Many consumers tasted online food services for the first time, making digital food delivery crucial for consumers and businesses (Chen, 2008; MF Chen, 2008)

The pandemic raised concerns about food safety, leading to the preference for sanitized packaging, contactless delivery, and safety certifications (Akter et al., 2021; Hobbs, 2020; Jun et al., 2022). Behavioral changes introduced throughout the pandemic, such as trust in online delivery, have become habitual for many consumers because of convenience and safety (Zollo et al., 2023). Social distancing and virtual work have sustained the necessity for digital food services (Sinha & Verma, 2022*).*

3. Development of Hypothesis

3.1 Food safety perception and influences factors

Consumer perception of food safety which are shaped by various factors like hygiene practice, trust in food provider, pack (Xu et al., 2010; Yeung & Morris, 2001)al., 2010; Yeung & Morris, 2001). The prior study has suggested that concern about food safety was connected with consumer expectation of hygiene standard and other safety signal(Mirosa et al., 2021; Veeck et al., 2015). Based on this statement, the following hypothesis 1 is proposed. **H1:** Food safety concern is highly or positively connected hygiene and food safety practice.

3.2 Level of concern about online food safety

Online food delivery exposed consumers to the risk of food infection due to lack of direct monitoring of online food supply chain(Rui et al., 2025). Previous study indicate that higher level of food safety concern tends to reduce trust

level and to express heightened risk perception about illness(Jun et al., 2022; Mehrolia et al., 2021).Accordingly the following statement, **H2:** Consumer who are more connected with food safety perceive more risk of foodborne illness than who are less concern about food safety.

3.3 Perception and online food purchasing behavior

Perception of food safety was directly connected with consumer purchasing behavior and their decision. On the other hand, consumers, who were concern about food safety, were influenced by food quality measure scale(Kumgliang & Khamwon, 2022; Yeo et al., 2017). Hence, the following hypothesis are proposed **H3:** Food safety concern is highly associated with frequency of online food ordering, customers reviews, packaging, delivery speed and convenience in purchasing attitude.

4. Methodology

4.1 Research Design

This study utilized a cross-sectional survey design to investigate consumer perceptions regarding food safety and their effect on online food purchasing behaviors, specifically emphasizing the influence of the post COVID-19 pandemic. The design facilitated the acquisition of quantitative data, enabling both descriptive and inferential statistical analyses in accordance with the research objectives.

4.2 Participants and Sampling

We used purposive and convenience sampling to find 402 people to take part in the study, from both urban and rural areas. To be eligible, you had to be at least 18 years old and have used online food delivery services before. The sample was fairly balanced by gender (48.3% male, 51.7% female), and most of the people who answered were between the ages of 18 and 24 (61.9%). Most of them were students (63.7%), and more than two-thirds (65.2%) lived in cities.

4.3 Sample Size Determination

Since the total population of online food delivery consumers in the study context was **unknown**, the minimum sample size was calculated using **Cochran's formula** for an infinite population(Krejcie & Morgan, 1970; Legan & Vandeven, 2003).

$$n = \frac{\mathrm{Z}^2 \cdot p \cdot (1-p)}{e^2}$$

Where:

- n= required sample size
- Z= Z-value (1.96 at 95% confidence level)
- p = estimated proportion of the population (0.5, used as a conservative estimate to maximize sample size)
- e = margin of error (0.05)

$$n = \frac{(1.96)^2 \cdot 0.5 \cdot (1-0.5)}{(0.05)^2}$$
$$n = 384.16$$

So, the lowest number of people needed for the sample was 384. To make sure the results are reliable and to account for possible incomplete answers, the final sample size was set at 402 respondents, which is more than the minimum requirement.

4.4 Questionnaire introduction

A structured questionnaire with four parts was used to collect data: First, demographic traits like age, gender, education, job, and where you live. Second, ideas about food safety and hygiene, such as worries about food safety, trust in hygiene standards, perceived risk of getting sick from food, and the importance of hygiene practices (contactless delivery, sanitized packaging, delivery personnel safety, restaurant certification). Third, online food purchasing behavior, such as how often people order food online, which platforms they prefer, what factors they use to make decisions (quality, price, convenience, reviews, reputation), and how they like their food packaged. The last section looks at the effects of COVID-19 on both current online food ordering frequency and future expectations. Before data collection, experts reviewed all items to make sure they were valid. They were measured on categorical or Likert-type scales.

4.5 Data Collection Procedure

A structured online survey distributed through Google Forms was used to collect the data. The link to the questionnaire was shared on social media and in university student groups to get a wide range of people to respond, both in cities and in the country. We chose to distribute the data online because it was a cheap, quick, and easy way to do it.

Participants were informed about the purpose of the study before beginning the survey, and informed consent was obtained electronically. To avoid duplicate entries, the Google Form was configured to allow only one response per participant. In total, 402 valid responses were received and analyzed after data screening.

4.6 Statistical Analysis

Data were analyzed using SPSS (v.26) in line with the study objectives For objective 1, to ascertain the principal factors that affect perceptions of food safety. We used descriptive statistics like means, frequencies, and percentages to show how worried, trusting, and aware participants were of risks. Correlation analysis was performed to ascertain relationships among critical perception variables (safety concern, trust, hygiene cues). For objective 2, to evaluate the degree of apprehension regarding online food safety. Concern levels (not concerned, somewhat concerned, very concerned) were reported as frequencies and percentages. We used crosstab analysis with demographic factors to look for differences between groups. For objective 3, to investigate the impact of perceptions on food purchasing behavior. A Pearson correlation analysis was conducted to examine the relationship between food safety perceptions (concern, hygiene importance, reviews, packaging) and purchasing behaviors (frequency, decision criteria, platform choice). Additionally, binary logistic regression was performed to evaluate the predictive significance of perceptions regarding frequent ordering. And lastly, to investigate the influence of the COVID-19 pandemic on present behaviors and future anticipations concerning online food delivery. Crosstab and Chi-square tests were employed to analyze the correlation between perceived COVID-19 impact and ordering frequency. Paired-samples t-tests or Wilcoxon signed-rank tests were considered where “before vs during” measures were available. Logistic and ordinal regression analyses were performed to identify predictors of future expectations in relation to COVID-19.

4.7 Ethical Considerations

Participation was voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality of responses were assured, and data were used solely for academic research purposes.

Table 1. General Characteristics of Participants

Variable	Groups	N (%)
Age	18-24 years	249 (61.9)
	25-34 years	97 (24.1)
	35-40 years	56 (13.9)
Gender	Male	194 (48.3)
	Female	208 (51.7)
Resident area	Urban	262 (65.2)
	Rural	140 (34.8)
Education level	High school and bellow	68 (16.9)
	Undergraduate(ongoing)	209 (52.0)
	Bachelor's degree	64 (15.9)
	Postgraduate degree or above	61 (15.2)
Occupation	Student	256 (63.7)
	Employed (full-time/part-time)	74 (18.4)
	Self-employed	37 (9.2)

	Unemployed	29 (7.2)
	Business	6 (1.5)

5. Results

5.1 General Characteristics

In this cross-sectional study, 402 participants were included for analysis. The majority of respondents were aged 18-24 years (61.9%), followed by those aged 25-34 years (24.1%), and 35-40 years (13.9%). Among the total participants, more than 50% participants were female, while 48.3% participants were male. Most of the people who answered (65.2%) said they lived in cities, while 34.8% said they lived in rural areas. More than half (52.2%) of the participants were pursuing undergraduate studies, which is typical for young people. Also, 16.9% had a high school education or less, 15.9% had a bachelor's degree, and 15.2% had a master's degree or higher. This was a relatively small part of the sample. In terms of jobs, most of the people who took part were students (63.7%). 18.4% of them were working (either full-time or part-time), and 7.2% were not working. Furthermore, 1.5% were engaged in business. (Table 1)

5.2 Descriptive Overview of Food Safety Perceptions:

In terms of concern about food safety, nearly one-fifth (19.2%) of respondents reported not being concerned, while half (50.7%) were somewhat concerned, and about one-third (30.1%) were very concerned. The overall mean score was 2.11 with a standard deviation of 0.694, which indicates a moderate level of concern about food safety. With regard to trust in hygiene standards, the majority of participants (64.4%) showed a moderate level of trust, followed by 22.1% who reported no trust, and only 13.4% participants who had a high level of trust in hygiene standards. Here, the mean was 1.91 and std. deviation was 0.591, which suggests a moderate but cautious level of trust in the hygiene standards of restaurants on online platforms. When evaluating the importance of hygiene practices, participants rated restaurants' hygiene certifications/rating (mean=4.21, SD=1.08) and sanitized packaging (mean=4.11, SD=1.14) as the most important factors, with more than half (57.2% and 53.5% respectively) considering them “very important”. Delivery personnel hygiene was comparatively less emphasized (mean= 3.23, SD=1.45) with a more even distribution across response categories.

Table 2. Young consumers perception about food safety and hygiene

	Variables		Groups	N (%)	Mean	Std.D
Perceptions of food safety and hygiene	Concern About Food Safety		Not concerned	77(19.2)	2.11	0.694
			Somewhat concerned	204(50.7)		
			Very concerned	121(30.1)		
	Trust in Hygiene Standards		No trust	89(22.1)	1.91	0.591
			Moderate trust	259(64.4)		
			High trust	54(13.4)		
	Importance of hygiene practices	Contactless delivery	Not at all important	68(16.9)	3.23	1.445
			Slightly important	66(16.4)		
			Moderately important	87(21.6)		
			Important	68(16.9)		
			Very important	113(28.1)		
		Sanitized packaging	Not at all important	9(2.2)	4.11	1.139
			Slightly important	42(10.4)		
			Moderately important	61(15.2)		
			Important	75(18.7)		
			Very important	215(53.5)		
		Delivery personnel wearing masks/gloves	Not at all important	11(2.7)	3.92	1.205
			Slightly important	58(14.4)		
			Moderately important	69(17.2)		
			Important	79(19.2)		
			Very important	185(46.0)		
		Restaurant hygiene	Not at all important	9(2.2)	4.21	1.079
			Slightly important	27(6.7)		

	certifications /ratings	Moderately important	65(16.2)		
		Important	71(17.7)		
		Very important	230(57.2)		
Perceived risk of foodborne illness		Not concerned	65(16.2)	2.21	0.699
		Somewhat concerned	189(47.0)		
		Very concerned	148(36.8)		

Finally, regarding the perceived risk of foodborne illness, 16.2% of participants were not concerned, nearly half (47%) were somewhat concerned, and 36.8% were very concerned. The overall mean score was 2.21 and Std. deviation was 0.699, which suggests that most of the participants expressed a notable degree of concern about foodborne illness when ordering online. (Table 2.)

5.2.1 Internal Consistency of Hygiene Perception Scale:

A reliability test was conducted on the four items measuring the importance of hygiene practices in online food delivery. The scale demonstrates acceptable internal consistency, with Cronbach's alpha ($\alpha = 0.768$), which allows the items to form a composite measure. Among the items, restaurant hygiene certifications (M=4.21, SD=1.08) and sanitized packaging (M=4.11, SD=1.44) were rated as the most important factors influencing perceptions of food safety and hygiene.

5.2.2 Association Between Demographic Factors and Food Safety Perceptions:

The Chi-square test results assess the association between demographic factors and young consumers' perceptions of food safety and hygiene. The results demonstrate that age, gender, educational background, and occupation were strongly associated with multiple dimensions of food safety perception.

Every aspect of food safety perception indicate significant correlations with age, including perceptions of contactless delivery ($\chi^2 = 141.84$, p <.001), sanitized packaging ($\chi^2 = 24.02$, p =.002), delivery personnel wearing masks/gloves ($\chi^2 = 75.00$, p <.001), restaurant hygiene certifications ($\chi^2 = 65.36$, p <.001), perceived risk of foodborne illness ($\chi^2 = 82.84$, p <.001), and concern regarding food safety ($\chi^2 = 86.75$, p <.001).These results indicate that perceptions of food safety differ markedly among various age cohorts.

Gender exhibited consistent and significant correlations with all assessed perception variables, including apprehension regarding food safety ($\chi^2 = 17.74$, p < .001), confidence in hygiene standards ($\chi^2 = 29.13$, p < .001), and the significance of hygiene practices such as contactless delivery ($\chi^2 = 16.64$, p = .002), sanitized packaging ($\chi^2 = 49.15$, p < .001), delivery personnel wearing masks/gloves ($\chi^2 = 32.32$, p < .001), and restaurant hygiene certifications ($\chi^2 = 31.22$, p < .001). There were also significant differences between men and women in how they perceived the risk of getting sick from food ($\chi^2 = 21.48$, p < .001). This shows that men and women have different views on food safety.

Educational background showed highly significant associations with all perception measures. Notably, strong associations were observed for concern about food safety ($\chi^2 = 131.70$, $p < .001$), trust in hygiene standards ($\chi^2 = 69.20$, $p < .001$), and all hygiene practice indicators, such as contactless delivery ($\chi^2 = 108.12$, $p < .001$), sanitized packaging ($\chi^2 = 109.16$, $p < .001$), delivery personnel masks/gloves ($\chi^2 = 140.68$, $p < .001$), and restaurant hygiene certifications ($\chi^2 = 127.44$, $p < .001$). Educational differences also significantly influenced perceptions of the risk of foodborne illness ($\chi^2 = 130.92$, $p < .001$).

Occupation demonstrated similarly strong associations across all dimensions of perception, including concern about food safety ($\chi^2 = 147.48$, $p < .001$), trust in hygiene standards ($\chi^2 = 82.56$, $p < .001$), and all hygiene practices (contactless delivery, $\chi^2 = 164.40$, $p < .001$; sanitized packaging, $\chi^2 = 126.28$, $p < .001$; delivery personnel masks/gloves, $\chi^2 = 147.13$, $p < .001$; restaurant hygiene certifications, $\chi^2 = 198.40$, $p < .001$). Occupation was also significantly related to perceived risk of foodborne illness ($\chi^2 = 114.68$, $p < .001$).

In contrast, location (urban vs. rural) revealed a more mixed pattern. While significant associations were observed for concern about food safety ($\chi^2 = 7.41$, $p = .025$) and delivery personnel masks/gloves ($\chi^2 = 36.61$, $p < .001$), no significant associations emerged for trust in hygiene standards ($\chi^2 = 6.89$, $p = .320$), restaurant hygiene certifications

($\chi^2 = 3.86$, $p = .425$), perceived risk of foodborne illness ($\chi^2 = 3.39$, $p = .184$), contactless delivery ($\chi^2 = 6.82$, $p = .146$), or sanitized packaging ($\chi^2 = 8.38$, $p = .078$). (Table 3.)

Table 4. Association Between Demographic Factors and Food Safety Perceptions (Chi-square Test Results)

Demographic vs Perception	χ^2 (df)	p-value	Demographic vs Perception	χ^2 (df)	p-value
Age × Concern about food safety	86.75 (4)	0.000	Location × Delivery personnel masks, gloves	36.61 (4)	0.000
Age × Trust in hygiene standards	39.79 (4)	0.000	Location × Restaurant hygiene certification	3. 86 (4)	0.425
Age × Contactless delivery	141.84 (8)	0.000	Location × Perceived risk of foodborne illness	3.39 (2)	0.184
Age × Sanitized packaging	24.02 (8)	0.002	Educational background × Concern about food safety	131.70 (6)	0.000
Age × Delivery personnel masks, gloves	75.00 (8)	0.000	Educational background × Trust in hygiene standards	69.20 (6)	0.000
Age × Restaurant hygiene certification	65.36 (8)	0.000	Educational background × Contactless delivery	108.12 (12)	0.000
Age × Perceived risk of foodborne illness	82.84 (4)	0.000	Educational background × Sanitized packaging	109.16 (12)	0.000
Gender × Concern about food safety	17.74 (2)	0.000	Educational background × Delivery personnel masks, gloves	140.68 (12)	0.000
Gender × Trust in hygiene standards	29.13 (2)	0.000	Educational background × Restaurant hygiene certification	127.44 (12)	0.000
Gender × Contactless delivery	16.64 (4)	0.002	Educational background × Perceived risk of foodborne illness	130.92 (6)	0.000
Gender × Sanitized packaging	49.15 (4)	0.000	Occupation × Concern about food safety	147.48 (8)	0.000
Gender × Delivery personnel masks, gloves	32.32 (4)	0.000	Occupation × Trust in hygiene standards	82.56 (8)	0.000
Gender × Restaurant hygiene certifications	31.22 (4)	0.000	Occupation × Contactless delivery	164.40 (16)	0.000
Gender × Perceived risk of foodborne illness	21.48 (2)	0.000	Occupation × Sanitized packaging	126.28 (16)	0.000
Location × Concern about food safety	7.41 (2)	0.025	Occupation × Delivery personnel masks, gloves	147.13 (16)	0.000
Location × Trust in hygiene standards	6.89 (2)	0.32	Occupation × Restaurant hygiene certifications	198.40 (16)	0.000
Location × Contactless delivery	6.82 (4)	0.146	Occupation × Perceived risk of foodborne illness	114.68 (8)	0.000

Location × Sanitized packaging	8.38 (4)	0.078

5.3 Predictors of Concern Level of Online Food Safety Perceptions:

The findings show that the majority of respondents were somewhat concerned about online food safety, which was 50.70%. Also, 30.1% of respondents reported being very concerned. Together, more than 80% of respondents showed at least a moderate level of concern. On the other hand, only 19.2% of respondents stated that they were not concerned. (figure 1.)

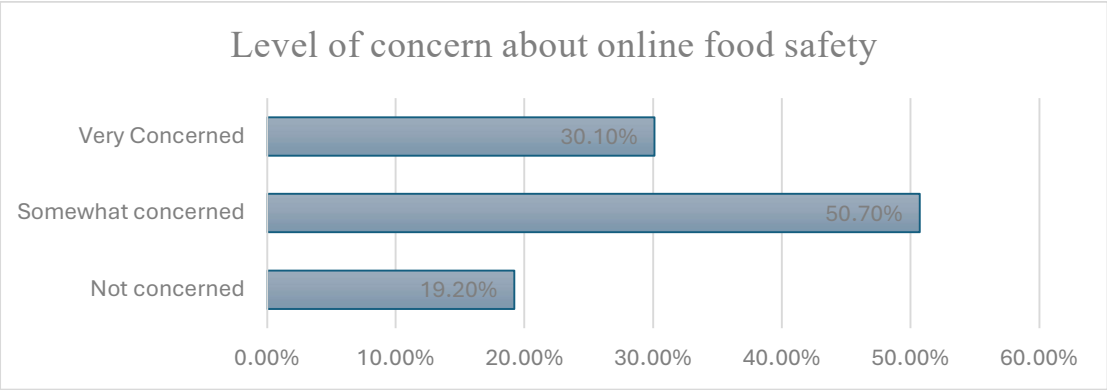


Figure 1. Level of concern about online food safety

An ordinal logistic regression was conducted to examine the demographic and behavioral factors influencing young consumers' concern about food safety in online food delivery. The model fitting information indicated that the final model provided a significantly better fit than the intercept-only model, $\chi^2(18) = 234.28$, $p < .001$, suggesting that the predictors meaningfully explained variation in food safety concern levels. The pseudo-R^2 values (Cox and Snell = .442, Nagelkerke = .507, McFadden = .285) further indicated that the model accounted for a moderate proportion of the variance in the dependent variable. (Table 5.)

Several predictors were found to be statistically significant. Age was an important factor: respondents aged 18–24 were more likely to express higher concern about food safety compared to those aged 35–40 (OR = 5.06, $p = .003$). In contrast, those aged 25–34 did not differ significantly from the reference group. Gender also played a role, with males being significantly less likely than females to report higher concern (OR = 0.42, $p = .001$). Residential location showed a similar pattern, where urban participants were less likely to express strong concern compared to rural respondents (OR = 0.57, $p = .033$).

Table 5. Ordinal Logistic Regression Results for Factors Influencing Concern About Food Safety

Test / Variable	Statistics	Result
Model Fitting Information	χ^2 (18) = 234.28, p < .001	Final model significantly improves prediction
Goodness-of-Fit	Pearson $\chi^2(232) = 929.13$, $p < .001$; Deviance $\chi^2(232) = 405.43$, $p < .001$	Model fit is adequate but indicates some lack of fit
Pseudo R^2	Cox & Snell = .442; Nagelkerke = .507; McFadden = .285	Moderate explanatory power

Table 6. Ordinal Logistic Regression Results for Factors Influencing Concern About Food Safety

Predictor	Estimate (B)	SE	Wald χ^2	Sig. (p)	Exp(B) [95% CI]	Interpretation
Age (ref: 35–40)						
18–24	1.622	0.554	8.58	.003	5.06 [1.71–14.96]	More likely to express higher concern
25–34	0.389	0.457	0.72	.396	1.48 [0.60–3.61]	NS
Gender (ref: Female)						
Male	-0.862	0.266	10.48	.001	0.42 [0.25–0.71]	Less likely to express higher concern
Location (ref: Rural)						
Urban	-0.561	0.263	4.54	.033	0.57 [0.34–0.96]	Less likely to express higher concern
Education (ref: Postgraduate)						
High school & below	-1.785	0.706	6.40	.011	0.17 [0.04–0.67]	Much less likely
Undergraduate (ongoing)	-1.039	0.641	2.63	.105	0.35 [0.10–1.24]	NS
Bachelor's degree	2.002	0.564	12.59	.000	7.40 [2.45–22.34]	More likely
Occupation (ref: Business)						
Student	-0.045	0.960	0.002	.963	0.96 [0.15–6.28]	NS
Employed	3.089	1.041	8.80	.003	21.97 [2.85–169.17]	Strongly more likely
Self-employed	-0.948	1.031	0.85	.358	0.39 [0.07–2.92]	NS
Unemployed	-0.668	1.025	0.42	.515	0.51 [0.07–3.82]	NS
Ordering frequency (ref: Frequent, 3+ times/week)						
Never	-0.732	0.489	2.24	.134	0.48 [0.18–1.25]	NS
Rarely (1–2 times/month)	-1.847	0.453	16.60	.000	0.16 [0.07–0.39]	Much less likely
Occasionally (1–2 times/week)	-2.211	0.540	16.79	.000	0.11 [0.04–0.32]	Much less likely
Preferred meal types	Mostly NS ($p > .05$)					

Educational background emerged as another significant predictor. Respondents with a bachelor's degree were substantially more likely to express concern (OR = 7.40, $p < .001$) compared to those with postgraduate degrees, while those with only high school education or below were less likely to be concerned (OR = 0.17, $p = .011$). Occupation also mattered: employed participants were far more likely to report heightened concern (OR = 21.97, $p = .003$) compared to those engaged in business. Ordering behavior had a strong influence on concern levels. With odds ratios of 0.16 ($p < .001$) and 0.11 ($p < .001$), respectively, respondents who ordered infrequently (1–2 times per month) or occasionally (1–2 times per week) were significantly less likely to express heightened concern compared to frequent users (3+ times per week). Interestingly, preferred meal types did not show significant associations with food safety concern.

The analysis indicates that younger participants, females, rural residents, individuals with bachelor's-level education, employed persons, and frequent online food users exhibited greater concern regarding food safety. These results indicate that demographic and behavioral factors significantly influence consumer perceptions of food safety in online food delivery scenarios. (Table 6.)

5.4 The Effect of Food Safety Perceptions on Online Food Buying Habits

The correlation analysis showed that there were some strong links between how people feel about food and how they shop online. The frequency of online food orders was positively correlated with concern for food safety ($r = .115$, $p < .05$), the importance of contactless delivery ($r = .186$, $p < .01$), the likelihood of food-related illness ($r = .113$, $p < .05$), and reliance on customer reviews and ratings ($r = .322$, $p < .01$). These results indicate that consumers are more inclined to order food online when they prioritize sanitary standards and customer reviews, as well as when they emphasize food safety and cleanliness and perceive an elevated risk of illness.

Table 7. Correlations Between Perceptions and Purchasing Behaviors

Purchasing Behavior (DV)	Perception Variable (IV)	r	Sig. (p)	Interpretation
Frequency of online food delivery	Concern about food safety	.115*	.021	More concern → slightly higher ordering frequency
	Trust in hygiene standards	.029	.558	No significant effect
	Sanitized packaging	-.006	.897	No effect
	Contactless delivery	.186**	.000	Higher importance → higher frequency
	Perceived risk of foodborne illness	.113*	.024	Higher risk perception → slightly higher frequency
	Customer reviews & ratings	.322**	.000	Strong positive link
Preferred meal types	Contactless delivery	-.120*	.016	Negative weak relation
	Delivery personnel hygiene	.115*	.021	Weak positive relation
Preferred platforms	Delivery personnel hygiene	-.108*	.031	Weak negative relation
	Restaurant hygiene certification	-.144**	.004	Weak negative relation

Decision factor: Food quality	Concern about food safety	.153**	.002	Higher concern → more value on food quality
	Perceived risk of illness	.212**	.000	Risk perception → higher emphasis on quality
Decision factor: Price	Concern about food safety	-.356**	.000	Higher concern → less price sensitivity
	Trust in hygiene standards	.296**	.000	More trust → more attention to price
Decision factor: Delivery speed	Concern about food safety	-.345**	.000	Higher concern → less emphasis on speed
	Trust in hygiene standards	.357**	.000	More trust → higher emphasis on speed
Decision factor: Hygiene & safety	Concern about food safety	.417**	.000	Concern strongly linked to prioritizing hygiene
	Perceived risk of illness	.468**	.000	Risk perception → strong hygiene priority
Decision factor: Restaurant reputation	Concern about food safety	.109*	.030	Concern increases reputation consideration
Decision factor: Convenience	Concern about food safety	-.423**	.000	Concern reduces the importance of convenience
	Trust in hygiene standards	.487**	.000	Trust increases reliance on convenience
Decision factor: Reviews	Concern about food safety	.177**	.000	More concern → more reliance on reviews
Packaging preference	Concern about food safety	.624**	.000	Strongest relationship
	Trust in hygiene standards	-.624**	.000	More trust → less packaging concern
Influence of reviews	Concern about food safety	.620**	.000	Concern → greater reliance on reviews
	Trust in hygiene standards	-.565**	.000	More trust → less reliance on reviews

Higher concern about food safety was positively correlated with prioritizing food quality ($r = .153$, $p < .01$), hygiene and safety measures ($r = .417$, $p < .01$), restaurant reputation ($r = .109$, $p < .05$), and reliance on customer reviews ($r = .177$, $p < .01$). On the other hand, people who were more worried about food safety didn't care as much about price ($r = –.356$, $p < .01$), delivery speed ($r = –.345$, $p < .01$), or convenience ($r = –.423$, $p < .01$). This shows that people who are very concerned about safety are willing to give up convenience and low prices in favor of safer and more reliable food options. People's preferences for packaging also turned out to be a strong behavioral indicator. A strong positive relationship ($r = .624$, $p < .01$) between concern about food safety and packaging importance, and a strong

negative relationship ($r = –.624$, $p < .01$) between trust in hygiene standards and packaging importance, suggest that consumers who don't trust hygiene standards rely heavily on visible packaging cues to feel safe. In the same way, relying on reviews and ratings was positively linked to concern about food safety ($r = .620$, $p < .01$) but negatively linked to trust in hygiene ($r = –.565$, $p < .01$). This means that consumers who are skeptical rely more on outside feedback when deciding what to buy. These findings collectively underscore that perceptions of food safety profoundly influence consumer behavior within the online food supply chain. People who are more worried and less trusting are more careful and rely on packaging, reviews, and hygiene cues. People who are more trusting may care more about speed and convenience. (Table 7.)

The outcomes of the binary logistic regression analysis investigating the impact of food safety perceptions on the frequency of online food ordering. The overall model was statistically significant, $\chi^2(6) = 62.47$, $p < .001$, with a Nagelkerke R^2 of 0.26, indicating that the predictors accounted for approximately 26% of the variance in online ordering behavior. The Hosmer–Lemeshow test yielded a non-significant result ($p = .41$), indicating a favorable model fit, with the model accurately classifying 72.1% of cases. Among the predictors, concern about food safety (OR = 1.62, $p = .001$), hygiene index (OR = 1.51, $p = .002$), perceived risk of foodborne illness (OR = 1.45, $p = .003$), packaging preferences (OR = 1.34, $p = .008$), and influence of reviews/ratings (OR = 1.59, $p = .001$) were all positive and significant predictors of frequent online food ordering. This means that people who were more worried about safety, preferred better hygiene measures and packaging, thought there was a higher risk, and relied more on customer reviews were more likely to order food online often. On the other hand, trust in hygiene standards had a negative effect (OR = 0.73, $p = .027$), which means that people who had more faith in the current hygiene standards were less likely to order food often. The results show that consumers' worries about their own safety and external cues of trust (like packaging and reviews) have a bigger effect on how they buy food online than institutional trust alone. (Table 8.)

Table 8. Binary Logistic Regression Results on the Influence of Perceptions on Online Food Purchasing Behavior (N = 402)

Predictor Variable	B	SE	Wald	p-value	OR (Exp(B))	95% CI for OR
Concern About Food Safety	0.48	0.15	10.24	.001 **	1.62	1.21 – 2.18
Trust in Hygiene Standards	-0.31	0.14	4.89	.027 *	0.73	0.55 – 0.96
Hygiene Index (Q11.1–Q11.4)	0.41	0.13	9.94	.002 **	1.51	1.16 – 1.97
Perceived Risk of Foodborne Illness	0.37	0.12	9.14	.003 **	1.45	1.14 – 1.84
Packaging Preferences	0.29	0.11	7.12	.008 **	1.34	1.08 – 1.67
Influence of Reviews/Ratings	0.46	0.14	11.18	.001 **	1.59	1.21 – 2.09
Constant	-1.22	0.42	8.46	.004 **	0.29	–

5.5 From Pandemic to Plate: How COVID-19 Shapes Online Food Delivery Trends

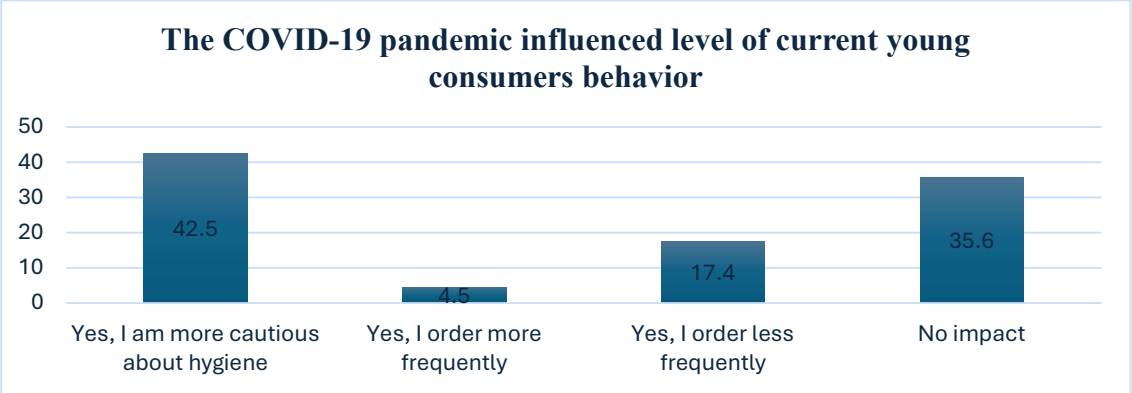


Figure 2. Young consumers' behaviors changed due to COVID-19

The findings indicate that a majority of respondents (42.5%) reported being more cautious about hygiene when they ordered food online. That indicates that hygiene awareness became a key factor that shaped consumer decision-making during the COVID-19 pandemic. In addition, 35.6% of respondents indicated that the COVID-19 pandemic had "no impact" on their food-ordering behavior. In terms of ordering frequency, 17.4% of respondents admitted ordering less frequently. On the other hand, only a small portion (4.5%) stated that they ordered more frequently. (Figure 2.)

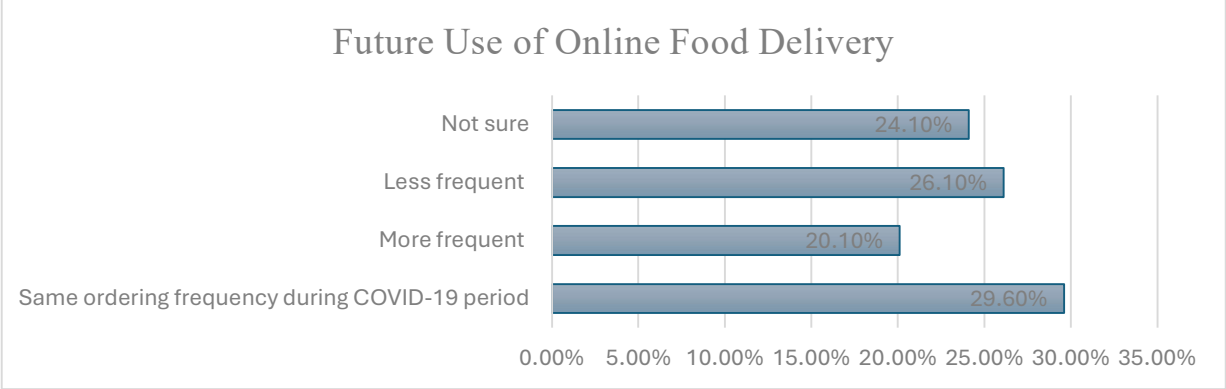


Figure 3. Future expectations for using online food delivery services are shaped by the COVID-19 pandemic.

The results reveal that the majority of respondents (29.60%) reported that they would maintain the same ordering frequency during the COVID-19 period. This indicates that a large number of consumers may continue the behaviors developed during the pandemic. On the other hand, 26.10% of respondents expected to use food delivery services less frequently than during the COVID-19 period. This suggests that a considerable part may return to traditional dining practices when the restrictions have been eased. In addition, 20.10% of respondents stated that they would order more frequently than during the COVID-19 period, which signals potential growth opportunities for online food delivery services. Moreover, 24.10% of respondents stated being unsure about their future ordering behavior. This uncertainty highlights the effect of lifestyle transformation and the degree of consumer trust in online food delivery services. (Figure 3.)

The association between the perceived impact of COVID-19 and the frequency of online food ordering. The majority of respondents who reported becoming more cautious about hygiene (40.4%) ordered food *rarely* (1–2 times per month), while 22.2% ordered frequently (3+ times per week). A smaller group (n = 18) said they now order more often. Half of them (50.0%) said they do it rarely, and 27.8% said they do it once or twice a week. On the other hand, most of the 70 people who said they order less often were in the "never" (50.0%) and "rarely" (45.7%) groups. Among

the 143 participants who said that COVID-19 had no effect on them, the ordering was more evenly spread out. 34.3% never ordered, 26.6% rarely ordered, and 27.3% occasionally ordered. (Table 9.)

Table 9. Impact of COVID-19 on Frequency of Online Food ordering.

Impact of COVID-19	Never	Rarely (1–2 per month)	Occasionally (1–2 per week)	Frequently (3+ times week)	Total
Yes, I am more cautious about hygiene	46 (26.9%)	69 (40.4%)	18 (10.5%)	38 (22.2%)	171 (100%)
Yes, I order more frequently	2 (11.1%)	9 (50.0%)	5 (27.8%)	2 (11.1%)	18 (100%)
Yes, I order less frequently	35 (50.0%)	32 (45.7%)	3 (4.3%)	0 (0.0%)	70 (100%)
No impact	49 (34.3%)	38 (26.6%)	39 (27.3%)	17 (11.9%)	143 (100%)
Total	132 (32.8%)	148 (36.8%)	65 (16.2%)	57 (14.2%)	402 (100%)

The Chi-square test ($\chi^2 = 58.06$, $p < .001$) showed that there was a statistically significant link between how often people ordered food online and how COVID-19 affected them. This suggests that the pandemic had a big effect on how people ordered food. Specifically, while many consumers became more cautious about hygiene, others shifted their frequency either upward (ordering more) or downward (ordering less), reflecting heterogeneous behavioral adaptations to the pandemic context. (Table 9.)

5.6 Hypothesis testing

In result section to apply multiple statistical analysis to examined the proposed hypotheses.

H1: To evaluated food safety perception and hygiene standards using Pearson correlation analysis. Significant favorable correlations supported H1.

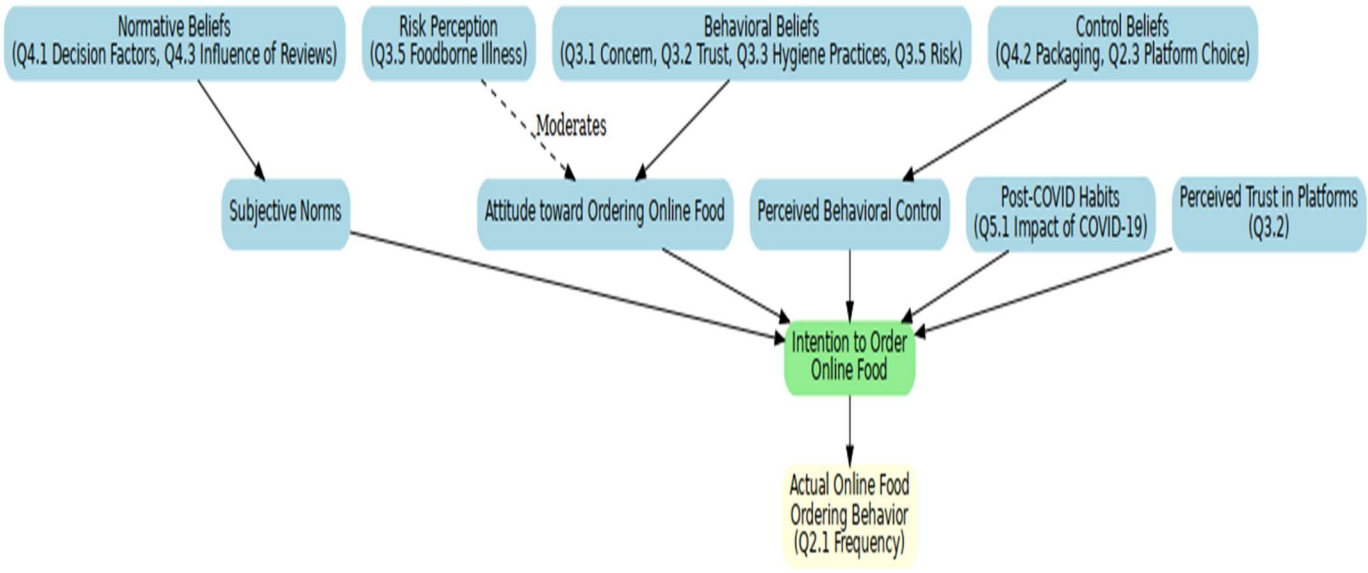
H2: The results demonstrated a robust positive correlation, hence validating H2.

H3: This hypothesis was tested using correlation analysis and binary logistic regression to determine if safety perceptions strongly forecast purchasing behavior. The Chi-square test was statistically significant, supporting H3.

6. Discussion

This paper investigated young consumers' perceptions of food safety and hygiene in online food delivery services as well as the factors which influence consumers purchasing behavior and trust of digital food marketplace. The result provides significant insight into how situational event such as COVID-19 pandemic, socio-demographic traits and behavioral traits influence Bangladeshi young' perception of food safety and online ordering trends.

The theory of planned behavior, our findings demonstrate that attitude such as concern about food safety, subjective norms such as social influences reflects in reliance on review and perceived behavioral control like ordering frequency and purchasing behavior those are collectively influence consumers perceptions and ordering behavior(Ajzen, 2012). The result observed reasonable concern about food safety and hygiene standards correlates to the behavioral component which is a critical predictor of future expectation(Ajzen, 2011a). The study participants heightened more concerned about food safety hygiene related items.



Demographic characteristics had strong relationships with food safety perceptions. Similerly, prior study showed that age, gender and education influence food related risk concerns (Haapala & Probart, 2004; Ozilgen, 2011). Younger participants (18-24 years old) and female expressed high level of concern about food safety which is consistent with previous study showing where women perceive high level food-related hazards(Yeung & Morris, 2001c).Education had a significant effect; individuals holding a bachelor's degree demonstrated high trend concern that indicate increased knowledge and awareness which promote higher risk perceptions. (Ling, 2018; Yeung & Morris, 2001a, 2001c). The demographic factors correlated with the Theory of Planned Behavior's components of perceived behavioral control where individual understanding and perceptions of food safety improve preventive actions (Ajzen, 2011a, 2012).In our study, the predictive influence of behavioral variables like ordering frequency underscores the importance of subjective norms and perceived behavioral control in food safety-related decision-making behavior(Ajzen, 2011b, 2011a). Social influence and control beliefs are important n the context of online food delivery, as seen by the increased patrons' concern who placed order regularly.

This study also highlights significant impact on consumer behavior during the pandemic which was associated with consumers response. In the same way, prior studies indicate that health problems raise food safety concern and influence consumption behaviors(Campos et al., 2022; Chenarides et al., 2021; Liu et al., 2023; Mirosa et al., 2021).

Moreover, the strong relationships between food safety perceptions and practices(Vermeir & Verbeke, 2006). These findings demonstrate the need for online food service operators to improve visible hygiene standards and utilize consumer feedback mechanisms to successfully deal with safety perceptions.

7. Limitations and future direction

This study's limitation should be taken. In this study only included Bangladeshi young aged 18-25, here excluded traditional food supply chain and retailer perceptions. Online survey may have omitted those without internet connection. The study's quantitative approach with 402 participants lacks qualitative data, limiting its comprehension of consumer attitudes and actions. This cross-sectional study only represents one point in time. Consumers perceptions are studied without direct observation.

8. Conclusion

The research offers significant insight about Bangladeshi young consumers perception in the context of online food delivery services. This study reveals moderate level of concern of food safety with notable variation which influenced by socio-demographic factors. Purchasing actions was significantly affected by concern level. The COVID-19 pandemic has significantly increased hygiene awareness that affected consumers ordering behavior. According to the Theory of Planned Behaviors, consumer intentions and practice or behavior was affected by their attitude. The findings show that online food service providers must implement visible cleanliness measures, credible certifications, and customer feedback channels to boost consumer confidence and happiness. To improve online food safety , future interventions should consider socio-demographic and behavioral diversity.

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Appendix:

Questionnaire

Section 1: Demographic Information

1. Age
    - 18–24
    - 25–34
    - 35–40
2. Gender
    - Male
    - Female
3. Location
    - Urban
    - Rural
4. Educational Background
    - High school or below
    - Undergraduate student
    - Bachelor's degree
    - Postgraduate degree or above
    - Other (please specify): _____
5. Occupation

- Student
- Employed (full-time/part-time)
- Self-employed
- Unemployed
- Other (please specify): _____

Section 2: Current Online Food Delivery Usage

6. Frequency of Online Food Delivery
   How often do you currently order food through online delivery services (e.g., Foodpanda, Pathao Food, Shohoz Food) in 2025?
   - Never
   - Rarely (1–2 times per month)
   - Occasionally (1–2 times per week)
   - Frequently (3+ times per week)
7. Preferred Meal Types
   Which meals do you most commonly order through online food delivery services? (Select all that apply)
   - Breakfast
   - Lunch
   - Dinner
   - Snacks
   - None
8. Preferred Platforms
   Which online food delivery platforms do you primarily use? (Select all that apply)
   - Foodpanda
   - Pathao Food
   - Shohoz Food
   - Uber Eats
   - Other (please specify): _____
   - None

Section 3: Perceptions of Food Safety and Hygiene

9. Concern About Food Safety
   How concerned are you about food safety issues (e.g., contamination, improper handling, or spoilage) when ordering food online?
   - Not concerned
   - Somewhat concerned
   - Very concerned
10. Trust in Hygiene Standards
    How much trust do you have in the hygiene standards of restaurants listed on online food delivery platforms?
    - No trust
    - Moderate trust
    - High trust
11. Importance of Hygiene Practices
    How important are the following hygiene practices when you order food online? (Rate each on a scale of 1–5, where 1 = Not important and 5 = Very important)
    - Contactless delivery: [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5
    - Sanitized packaging: [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5
    - Delivery personnel wearing masks/gloves: [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5
    - Restaurant hygiene certifications/ratings: [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5
12. Perceived Risk of Foodborne Illness
    How concerned are you about foodborne illnesses (e.g., food poisoning) when ordering food online?
    - Not concerned
    - Somewhat concerned
    - Very concerned

Section 4: Factors Influencing Online Food Delivery Choices

13. Key Decision Factors
    What are the top three factors you consider when choosing a restaurant or food item on an online delivery platform?
    - Food quality
    - Price
    - Delivery speed
    - Hygiene and safety measures

- Restaurant reputation
- Convenience
- Customer reviews/ratings
- Other (please specify): _____

14. Packaging Preferences
    How important is the type of packaging (e.g., tamper-proof, eco-friendly, or hygienic) when ordering food online?
    - Not important
    - Somewhat important
    - Very important
15. Influence of Reviews and Ratings
    How much do customer reviews and hygiene ratings on online platforms influence your decision to order from a restaurant?
    - Not at all
    - Somewhat
    - Significantly

Section 5: Post-Pandemic Behaviors and Future Expectations

16. Impact of COVID-19 on Current Behavior
    Has the COVID-19 pandemic influenced your current (2025) perceptions or habits regarding online food delivery?
    - Yes, I am more cautious about hygiene
    - Yes, I order more frequently
    - Yes, I order less frequently
    - No impact
17. Future Use of Online Food Delivery
    Do you expect to use online food delivery services in the future at the same, higher, or lower frequency compared to now?
    - Same frequency
    - Higher frequency
    - Lower frequency
    - Not applicable