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Effect of Food Quality and Nutritional Attributes on Consumer Choices during the COVID-19 Pandemic

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Abstract: (1) Background: During COVID-19, disruption in food demand and supply chain led to changes in food choices in response to consumer demand, frequency of delivered items, and production setup during a pandemic. The aim of the study was to evaluate the effect of quality and nutritional attributes on consumer food consumption behavior, attitude, and practices. (2) Methods: In this regard, cross-sectional survey research was conducted through a structured questionnaire. (3) Results: The results of the study showed that there was no difference in the receptiveness of COVID-19 infection between both genders. Quality perspective (p = 0.001) was deemed a significant positive predictor in the change of food consumption patterns during the COVID-19 pandemic. It also stated price (p = 0.045) and purity (p = 0.009) as a quality factor while sugar (p = 0.028) and fiber (p = 0.034) content, as nutritional attributes, influenced the consumption frequency of food groups. The overall experience of online shopping was in the neutral category. (4) Conclusions: It was concluded that food quality cues as well as nutritional attributes affected consumer food choices during the COVID-19 pandemic regardless of gender. Online shopping trends were influenced but overall experience remained neutral during the pandemic.

Keywords: COVID-19; quality; nutritional value; consumer perception; food supply

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1. Introduction

COVID-19 is a respiratory disease spread throughout the world, caused by a virus discovered in 2019 and named SARS-CoV-2 [1]. It is a contagious disease that spreads when an infected person spreads respiratory droplets in the air [2]. With the advancements of the new variations in the COVID-19 pandemic, a lot of attention has been given to the resilience of the food supply, in an urgency to address food supply and quality issues catastrophe. Food supply chains have had to plan for supply-side disruptions due to expected labor shortages and transportation and supply network disruptions in addition to responding to demand shocks such as panic purchasing and changes in food shopping behavior [3]. During COVID-19, changes in employment, income, and food availability are likely to have enhanced the frequency and scope of food consumption patterns, including previously unaffected demographic groups [4]. Consumers are recipients of various production, manufacturing, and marketing businesses, which has made them largely affected by this pandemic [5]. All these situations have not only affected the economic and environmental aspects of the food industry and consumers but also stoked the social value of food. COVID-19 has affected consumers who feel a change in behaviors and attitudes toward daily living activities.

Purchase of food products has been dependent on several factors likely including the price, choice, brand perception, economic status, cultural values, accessibility, and quality of the food. These factors have been determined as critical factors for purchasing food in recent years [6]. Consumer perception has been a lot under consideration with the awareness of the ethical consideration of the way foods are produced, the health impacts of

food products, and the rise in food scandals. Standards of quality and nutritious foods for the consumer have spiked despite busy lifestyles, as consumers are uninterested in paying high prices and are more interested in standardized foods in terms of quality, safety, and nutrient content [7].

The importance of food in everyday life has never been under observation to this extent but the COVID-19 pandemic has reshaped the relationship of food with society's behavioral acts. Food values are determined by combining a range of characteristics (food choice motives) depending on their significance or salience for a certain individual at the time of decision [8]. Eating a wholesome, safe, and nutritious diet has been supported by several experts, especially in the case of a pandemic [9]. Consumers' views of food security, financial risk, and health risk are all essential variables in determining their long-term purchase and consumption habits. Consumers' subjective and objective awareness levels about COVID-19 have an impact on how long the lockdown lasts [10]. While analyzing the purchasing behaviors of consumers during the COVID-19 pandemic, a number of questions arose that need to be addressed.

Studies have suggested that while purchasing consumers tend to use both explicit and subtle cues through packaging and labeling of the product at the point of purchase. COVID-19 isolation has been claimed to affect people's food shopping habits and dietary consumption patterns. To lower the risk of infection, people may limit the frequency of grocery shopping, stock up on non-perishable goods (such as processed, packaged, frozen, or canned foods), and/or engage more in in-home cooking activities. These changes eventually resulted in a variety of dietary habits including increased consumption of non-perishable sweets, salt, and fats, decreased intake of fresh foods (fruits, vegetables, shellfish, fishes, and animals), and greater dependence on healthy home-cooked meals [11]. Food quality serves as the major driver for purchasing and consumption behavior of consumers. Research has strengthened the claim that consumer perception of a product's quality is highly affected by information given by the company, either through advertisements or labels. Food quality is defined as a group of characteristics, i.e., physical or chemical properties, sensory attributes, shelf-life, packaging, and labeling of any food product, that dictates the overall performance on the market and determines its influence on consumer choice. Food quality is dependent on the measures taken to ensure safety, nutrition, and acceptability by consumers of a food product.

The nutritional status of an individual plays a vital role in indicating health status. Protein, lipids, and carbohydrates are typically connected with foods, as are a few significant elements (salt, vitamins, minerals such as sodium, calcium, and iron, and some additives) that appear on nutrition labels [12]. The importance of nutritional information on food labels in aiding customers in making more conscious food choices is developing. Major considerations include consumers' assessment of specific nutrients as a significant factor while making food choices, as well as whether their perceptions vary for accepting and/or rejecting nutrients. Nutritional labels are supposed to be used by consumers who place a high value on nutrition [9]. With the prevalence of the metabolic syndrome affecting overall human health, it has been reported that patients with underlying disease might have worsened effects of COVID-19 [13,14]. Similarly, another serious factor is the fat content in packaged food. Unsaturated fats have been considered healthy fats as they are associated with lower cardiovascular risks, however, trans fats (oleomargarine) and, to some extent, saturated fats have been linked to adverse health effects, including higher death risk [15].

Purchase intent has been greatly affected by crucial elements such as age and gender as personal characteristics of an individual and these characteristics can serve as a driving force that alters the connection between the desire to purchase and the decision to buy [16]. According to studies conducted in the restaurant industry, food and e-service quality have a significant impact on the customer experience. However, it has also been suggested that perceived value as well as satisfaction level of consumers have been associated with the mediation of the relation between the quality of food and e-commerce service of food on

consumer trust, particularly in the online food delivery service [17]. In addition, as the COVID-19 pandemic expanded, the way people purchase groceries altered. People changed their shopping patterns (and behavior) to reduce interaction, preferring to buy groceries online through internet orders, smartphones, delivery applications, and other methods. Thus, they were obliged to make fewer excursions to the food store. As a result, in contrast to pre-COVID-19 days, people have begun to live, shop, and think in new ways [18]. It is necessary to research shifts in consumer behavior during the COVID-19 pandemic in order to understand the unique traits of this behavior. Recent studies have also shown that trends of the COVID-19 pandemic have shifted consumer food preferences more towards sustainable food, green food purchase, and increased their food consumption at home. This study proposed to evaluate the changes in the perception of the consumer while buying food products during COVID-19. The results of the study illustrate how consumers' behaviors have changed towards food quality and nutrient content and how these perceptions act as the basis for their purchasing behavior.

The overall objective of this research was to evaluate the effect of food quality and nutritional attributes on consumer choices during the COVID-19 pandemic in different areas of Lahore, Pakistan. The significance of the study was to understand the change in consumer food behavior, attitude, and practices as well as the effect of the pandemic situation on consumer preference for food products. The study was also aimed at determining the factors associated with the variation in choices while selecting a food product and analyzing the relationship among food quality, nutritional value, and the COVID-19 pandemic.

2. Materials and Methods

2.1. Research Design

The research data were collected during the year 2021–2022 to evaluate and analyze the effect of food quality and nutritional attributes on consumer choices during the COVID-19 pandemic. The design of the research study was a cross-sectional, survey-based, observational study, with the use of a classic social sciences research tool—a questionnaire-based approach. The research design (Figure 1) was descriptive, determining the factors which influenced consumers' choices in buying food products during the pandemic situation. The connection among the studied phenomenon, i.e., food preference (consumer choice), determinants of socio-demographic characteristics (i.e., gender, age, and COVID-19 health status), lockdown restrictive measures (i.e., price, closed shops, fixed timings of shops, risk of contamination, and unavailability of food products), food quality factors (i.e., price, appearance, smell, taste, purity, and freshness), nutritional attributes (i.e., sugar content, salt content, fat content, calories, and fiber content), and shopping experience factors (i.e., type of market preferred, shopping frequency, and online shopping experience) was observed. A quantitative strategy was utilized to collect the information required for statistical analysis of the population sample.

2.2. Sampling Method

A probability strategy of simple random sampling was used. The findings of the sample were generalized based on the appropriate sample size. Every sample population had the same chance of being chosen as a subject. The simple random sampling technique was one of the methods used in this research to collect data to draw a link among food consumption patterns, food quality, and nutritional cues. Inclusion criteria included being located in Pakistan, being 20 to 50 years of age, and having experience buying food products from markets and shops physically or online. There was no restriction on gender or employment and male and female students, unemployed and employed, were included in this study. The inclusion criteria for sampling in the study focused on the age group of people in Pakistan that usually buys food products for themselves and their families. The main focus was to include people who made most of the choices for the food they consume. However, people above 50 years of age were not included in this research. In addition, people who did not shop for groceries were excluded from the scope

of the research. The sample size was 200 to represent such a large population and their food-buying behavior patterns. Participation in this study was voluntary and participants could refuse to participate at any time without any penalty. Other than those faced in everyday life, participants would have no direct advantages or problems associated with participating in this study. This study did not gather any personally identifiable information from any participant, such as their name or any contact information. Any publications or demonstrations based on the findings of this study have not included names or personal details, and the results of this survey have been treated with confidentiality.

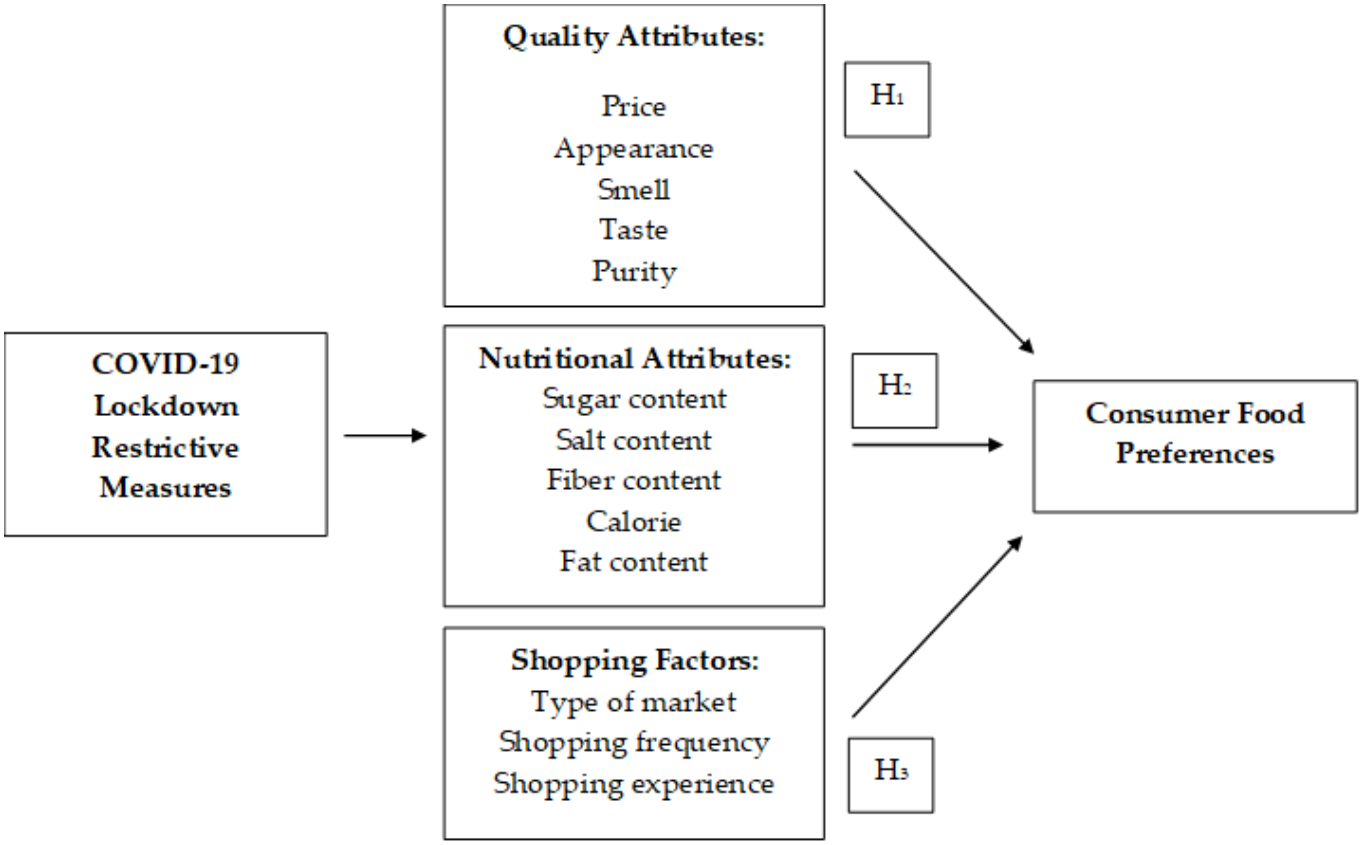

Figure 1. Research Model: H_1: Consumer choices have been positively influenced by quality attributes of food products during COVID-19. H_2: Nutritional value of a food product positively influenced consumer preference while shopping for a food product during COVID-19. H_3: COVID-19 has positively influenced the consumer preference for online shopping of food products.

2.3. Questionnaire Tool

The self-structured questionnaire utilized in the research comprised components from several studies that examined characteristics used by consumers to determine food quality, nutritional attributes, and additional items tailored to this study. The quality and nutritional cues contained in food evaluation models were retrieved and examined. Quality perception process, conceptual model, perceived quality, food choice questionnaire, food quality, and perceived nutritional properties were some of them. The questionnaire had four parts: demographic, food quality, nutritional attributes, and shopping. All of the variables used in the questionnaire were designed in such a way that their responses depended upon each other.

2.4. Data Collection and Analysis Approach

The questionnaire was tailored to the Pakistani context and distributed from 2021 to 2022, in the English language. Questionnaires were filled out by participants through an

online survey-based form due to the lockdown restrictions of COVID-19 that hindered face-to-face communication for a while. The poll was distributed by email and other communication methods. A total of 200 participants were included in this research study, of which 73 participants were diagnosed positive with COVID-19 and 127 participants had never been diagnosed positive with COVID-19. The dependent variable in the research study was food preference (consumer choice) determined by the type of food group, preferably purchased during COVID-19, while the independent variables were socio-demographic characteristics (i.e., gender, age, and COVID-19 health status), lockdown restrictive measures (i.e., price, closed shops, fixed timings of shops, risk of contamination, and unavailability of food products), food quality factors (i.e., price, appearance, smell, taste, purity, and freshness), nutritional attributes (i.e., sugar content, salt content, fat content, calories, and fiber content), and shopping experience factors (i.e., type of market preferred, shopping frequency, and online shopping experience).

The statistical analysis of the research included pretests and quantitative analysis of the data. A Shapiro-Wilk test ($p = 0.029$) was performed to determine the distribution of the data, assuming that the data were not normally distributed. The survey questionnaire was tested for its reliability and validity through a preliminary survey of Cronbach's alpha (0.80). Food quality and nutritional attributes were evaluated by several different statistical methods. These included descriptive statistics, chi-square, correlation, and regression analysis. Quantitative analysis was performed through regression and correlation to find out the significance of the relationship among different factors.

3. Results

3.1. Socio-Demographic Statistics

Age, gender, and education were chosen as demographic criteria since they have a significant impact on food consumption habits. Gender impacts purchasing decisions and various studies have effectively demonstrated gender differences in purchasing behavior and consumption patterns, with young males being more likely to make unhealthy food choices [19–21].

Table 1 shows the socio-demographic statistics of this study and the results showed that most of the participants were female (69%) as compared to males (31%). The participants' mean age was 25 years, indicating that the majority of the participants were above 20 and below 40 years of age (93%). Among the gender distribution, the most frequent male education level was graduate (74%), while for females it was relatively less (57.9% were graduates). However, more female participants were in the post-graduate education level (28.2%) as compared to males. During the pandemic, the method most suitable for data collection was online. The questionnaire was distributed by email or through social media; the young age group utilizes social media the most. Our target population was individuals who usually buy their food. As the sampling method for the study was simple random, no restriction was made for equal number of participants in any factor, i.e., gender, COVID-19 infection status, or education.

3.2. COVID-19 Infection and Gender

Table 2 shows the association of COVID-19 infection with gender. Data obtained from the survey showcased 36.5% of COVID-19 infection-positive status in both genders, while 63.5% of participants had never tested positive for COVID-19 infection. The descriptive statistics of COVID-19 infection concerning gender showed that 57% of males had never tested positive for COVID-19 infection, whereas the percentage is slightly higher in female participants as 65% of females had never tested positive for COVID-19 infection. The outcomes of the present study were in harmony with the Shreya Mukherjee & Kalipada Pahan study which investigated whether clinical characteristic of both genders, male and female, showed equal susceptibility to COVID-19 [22]. The results concluded that there is no difference in the receptiveness of COVID-19 infection between both genders.

However, measurement and comparison of intensity, immunological response, and severity of COVID-19 infection between both genders was not the scope of the current study.

Table 1. Socio-demographic information of respondents.

Variable	Description	Frequency	Mean
Gender	Men	62	
	Women	138	
Age			25
COVID-19 Infection Status	Positive	73	
	Negative	127	
Education	Secondary Level	1	
	Higher Secondary	31	
	Graduate	126	
	Post-Graduate	41	
	Post-Doctorate	1	

Table 2. Association of gender with COVID-19 infection status.

Gender × COVID-19				
		COVID-19 Infection		**Total**
		Negative	**Positive**	
Gender	Male	37	25	62
	Female	90	48	138
Total		**127**	**73**	**200**

3.3. Food Consumption Patterns Concerning COVID-19 Infection and Gender

The consumption patterns of food groups in participants with positive or negative COVID-19 infection showed no significant difference ($p = 0.848$), as illustrated in Table 2. When comparing the COVID-19 infection status of participants concerning consumed food, staple foods (grains, rice) were consumed relatively higher in both groups as compared to other food groups. However, the concentration of staple foods (wheat, rice) in participants having had a COVID-19 infection at any point in time was 48.8%, while only 38.3% in the negative COVID-19 infection status participants. However, slight significant differences were noted in Figure 2 among food consumption between males and females, as fruits and vegetables were consumed relatively higher by females as compared to males. Staple foods (wheat, rice, etc.) were the most consumed food group in both males and females, with frozen foods being least consumed (3%) in both genders.

Janus-faced effects were observed while determining the food consumption patterns between the two groups. Individuals either COVID-19 infection positive or negative had almost similar consumption patterns as the effect of COVID-19 might have indirectly negatively impacted food consumption behavior due to the experience of negative psychological or physical issues. COVID-19 also encouraged family members to encourage healthy eating during the pandemic. Several studies have supported the Janus-faced effects of COVID-19 perceptions on food consumption patterns, including the studies by Ali B. Mahmoud [23] and Laura Di Renzo, Paola Gualtieri, and Francesca Pivari [24].

3.4. Change in Food Consumption Parameters (Quality and Nutrition Attributes)

To understand the shift in food consumption patterns during the COVID-19 pandemic, a statistical survey has been performed. Model fitting information stated that the ordinal regression model fits the data very well. The Model Fitting Information section included the log of the likelihood for an intercept model and the full model (which includes all predictors), as well as a likelihood ratio value of the chi-square test that showed the final model is significantly better fitted than the intercept model [$x^2 = 30.966$, $p < 0.001$].

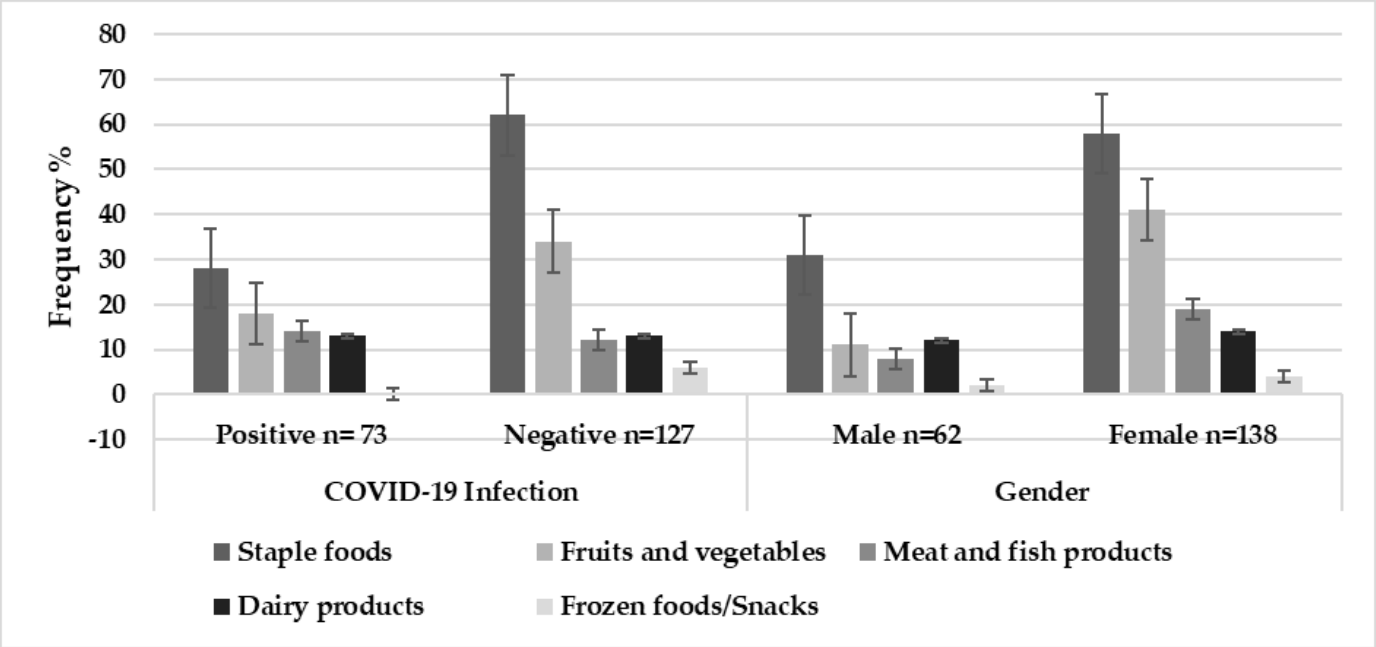

Figure 2. Food consumption patterns concerning COVID-19 infection and gender.

The estimated parameters for dependent variable (change in food consumption patterns) contained an analysis of the regression coefficients and significance for each of the independent variables (quality perspectives and nutritional attributes of food) in the model. The regression coefficients for quality cues (R^2 = 0.804) and nutritional attributes (R^2 = 0.124), shown in Table 3, were defined as the expected change in log probabilities of being in a higher group in the variable of change in food consumption patterns of participants, per unit increase of the independent variables.

Table 3. Effect of quality cues and nutritional attributes on food consumption behaviors.

Location	Estimate (b)	Std. Error	R^2	df	Sig.
Quality	0.986	0.175	0.804	1	0.001
Nutrition	−0.162	0.137	0.124	1	0.238

3.5. Food Quality Perspective

The indicators for determining the quality perspective of food in participants included price, appearance, smell, taste, purity, and freshness. The results, comparing the positive and negative COVID-19 participants, showed that 36% of participants with a positive COVID-19 infection status were likely to consider price as a quality factor while purchasing a food product, while 38% of participants with a negative COVID-19 infection status considered price as a quality factor. Similarly, purity was considered a quality factor by COVID-19 positive infection status participants (51%—most likely), as compared to COVID-19 negative infection status participants (19%—most likely). Price (p = 0.045) and purity (p = 0.009) showed a statistically significant difference between the two groups of participants through correlation analysis.

The results of Table 4 indicate the possible effect of different food quality cues on consumer purchasing and consumption behavior. In the review of different studies, it was implied that quality and prices were imperfectly correlated, and, from the psychological perspective of perceived food quality, price fairness and perceived value were positively correlated [25,26]. The current study noted the positive correlation between the price and quality of food. Health concerns increased during the COVID-19 pandemic, leading to healthier diets and lifestyles. A healthier diet is related to the purity of food, as a study by

Kia Ditlevsen described organic food as a healthier diet as it is in a pure form [27]. However, organic food is out of the scope of the current study. The literature shows consumption of healthy foods deemed to be pure is offered as a form of moral food consumption. Purity of food can be deemed as a product free from contamination or adulteration. Trust in perceived value and purity has a positive influence on the purchasing intention of consumer. The results in Table 4 elucidate the association of purity to quality as a factor in consumer perception.

Table 4. Food quality perspectives: comparison between COVID-19 infection status of participants (positive and negative).

Quality Perspectives	COVID-19 Infection Positive n = 73	COVID-19 Infection Negative n = 127	*p*-Value	Total
Price %			0.045	
Never	4	8		7
Unlikely	8	10		9
Maybe	45	27		34
Likely	36	38		37
Most likely	7	17		13
Appearance %			0.934	
Never	3	2		3
Unlikely	4	7		7
Maybe	26	22		24
Likely	49	51		50
Most likely	14	17		16
Smell %			0.128	
Never	5	2		4
Unlikely	9	5		6
Maybe	14	24		20
Likely	37	44		42
Most likely	34	25		28
Taste %			0.866	
Never	1	2		2
Unlikely	7	5		6
Maybe	11	9		9
Likely	31	38		36
Most likely	49	46		47
Purity %			0.009	
Never	4	14		4
Unlikely	4	20		3
Maybe	12	43		12
Likely	28	14		29
Most likely	51	9		52
Freshness %			0.091	
Never	2	4		3
Unlikely	5	16		4
Maybe	9	22		10
Likely	23	21		24
Most likely	60	37		59

3.6. Nutritional Attributes of Food

The correlation of nutritional attributes between positive and negative COVID-19 infection status participants describes the content of sugar ($p = 0.028$) as most likely to affect the consumer choice for a food product among positive COVID-19 infection status participants. However, a large percentage of participants from both the positive and negative groups considered sugar content to be an ambiguous attribute (maybe) with 37% and 28%, respectively. Participants indicated that variables like the content of salt (positive 42%

and negative 38%), the content of fat (positive 41% and negative 38%), and calorie content (positive 52% and negative 49%) were likely (likely and most likely—combined) to affect food consumption patterns during the COVID-19 pandemic. The results of the study were in harmony with the findings of the study that sugar content tends to affect the choices of consumers who wanted to lead a healthier lifestyle during the COVID-19 pandemic [28,29].

Nutritional attributes (Table 5) have been included in the scope of the current study as several studies have strongly supported the role of nutrients and nutrition claims on consumption patterns and purchasing behavior of individuals. The literature shows that nutrition claims and attributes in a food are impactful on food purchasing behavior, consumption frequency, and pattern. Another nutrition attribute under consideration in the study is the fiber content in the food product, which showed a significant difference ($p = 0.034$) between the positive and negative COVID-19 infection groups. Several studies have emphasized high intake of dietary fiber for anti-inflammatory effects. During COVID-19 infection, the optimal status of dietary fiber that has been incorporated into the diet is that it is fermented into short-chain fatty acids by the gut microbiota that reduce inflammation and oxidative stress, thereby strengthening the immune system [30]. However, there was no statistically significant difference between the two groups (positive and negative) for salt ($p = 0.863$), fat ($p = 0.191$), or calories ($p = 0.975$). During isolation, a diet lacking in fruits and vegetables was common, resulting in a low intake of antioxidants and vitamins, along with a decrease in physical activity and an increase in processed food [31,32]. As processed foods were more in demand because of their longer shelf life as compared to fresh fruits and vegetables, the overall consumption of salt, fat, and calories had no change during the coronavirus pandemic. The results showcased in the current study also support the above-mentioned affirmation that there is no significant difference in consumer perception for nutritional attributes (salt, fat, and calories) as a driving factor of consumption changes during the COVID-19 pandemic.

3.7. Lockdown Measures and Frequency of Food Consumed

To observe how well five independent variables performed, standard linear regression was used to predict the consumption frequency of food groups (dependent variable). Table 6 elucidates that the unavailability of food ($\beta = -2.41$) and closed stores ($\beta = -0.65$) impacted food consumption patterns as the increase in such variables tends to decrease the frequency of consumed food. The results concluded that the consumption pattern and frequency of consumed food were significantly ($p = 0.02$) affected by the lockdown measures during the COVID-19 pandemic through regression analysis. Restrictions imposed in response to the pandemic (such as the closure of physical workplaces, canteens, cafés and restaurants, schools, and childcare institutions) have changed households' grocery shopping frequency and individuals' perceptions of COVID-19 risk [33,34]. The percentages and values of standardized beta coefficients annotate the magnitude of the dependency of variables; these values are not high as such but are acceptable in the context of the study as it makes a prediction regarding which variables influence the consumption frequency of food.

3.8. Online Shopping Experience

During the COVID-19 pandemic, e-commerce was dominant, and companies and retailers devoted a lot of work to creating, upgrading, and advertising their online stores. Figure 3 indicates the satisfaction level of consumers with online shopping of grocery items (food products) according to their COVID-19 infection status. The overall experience of online shopping in positive (47%) and negative (46%) COVID-19 infection status participants was in the neutral category. Non-parametric analysis of the Likert scale shows there is an insignificant difference ($p = 0.26$) between the two groups. Previous studies on the factors that influence purchase intentions in online shopping have shown the relevance of both self-indulgent and functional motivations. Self-indulgent reasons reflect the amusement and pleasure derived from partaking in an action, whereas functional motives point to its utility [35]. However, during the COVID-19 pandemic factors other than self-indulgent

and functional motivations must be addressed. The current study addressed the experience on, preference for, purchasing patterns on, and utility of online shopping mediums during the coronavirus pandemic. Overall, there were some shortcomings in online shopping and delivery systems in Pakistan as the COVID-19 pandemic lockdown abruptly approached the market. Moreover, lack of technology and strict lockdown measures also affected the transportation and delivery of food products to consumers through online orders in Pakistan. This parameter concluded that consumer awareness and experience have not changed during COVID-19 for online shopping experiences. Online shopping trends have increased but it has not changed consumers' perceived purchasing patterns.

Table 5. Effect of nutritional attribute information on consumption behavior: comparison between COVID-19 infection status of participants (positive and negative).

Nutrition Attributes	COVID-19 Positive n = 73	COVID-19 Negative n =127	*p*-Value
Sugar %			0.028
Never	7	12	
Unlikely	10	19	
Maybe	37	28	
Likely	18	32	
Most likely	20	8	
Salt %			0.863
Never	5	8	
Unlikely	22	18	
Maybe	32	36	
Likely	32	28	
Most likely	10	10	
Fat %			0.191
Never	12	12	
Unlikely	15	21	
Maybe	32	28	
Likely	25	29	
Most likely	16	9	
Calorie %			0.975
Never	7	8	
Unlikely	10	18	
Maybe	23	25	
Likely	30	31	
Most likely	22	18	
Fiber %			0.034
Never	4	8	
Unlikely	19	15	
Maybe	21	24	
Likely	25	39	
Most likely	32	15	

Table 6. Food consumption patterns concerning price preference, unavailability, risk of contamination, closed stores, and fixed timings.

Independent Variable	Dependent Variable	Unstandardized Coefficients	Standardized Coefficients	Sig.	Independent Variable
		B	Std. Error	Beta	
Constant	Consumed food	2.019	0.350		0.000
Price preference		0.054	0.072	0.054	0.457
Unavailability		−0.255	0.087	−0.241	0.004
Risk of contamination		0.181	0.081	0.181	0.026
Closed stores		−0.065	0.087	−0.065	0.455
Fixed timings		0.084	0.072	0.093	0.248

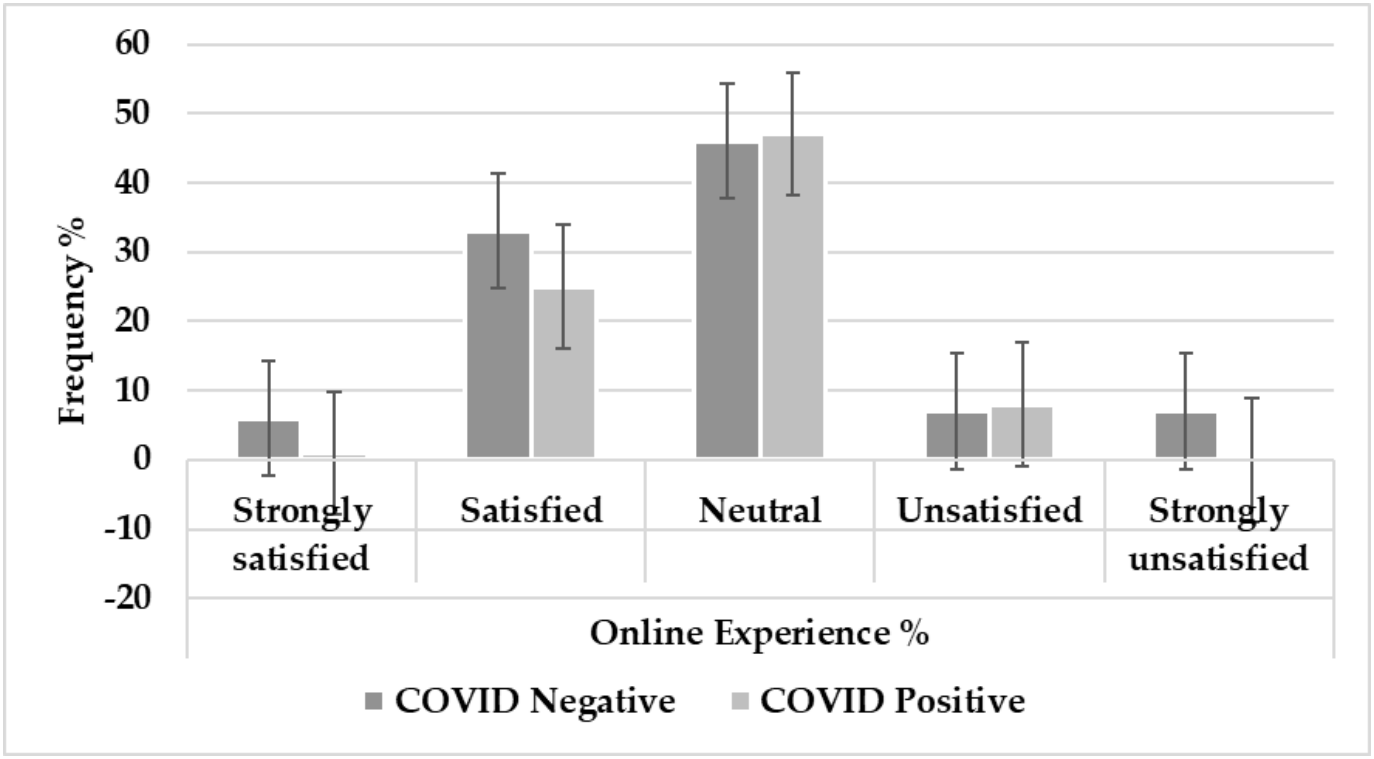

Figure 3. Effect of COVID-19 pandemic on consumer experience of online food shopping.

4. Conclusions and Future Implications

The change in consumer behavior during the pandemic has been investigated on many levels, including understanding it by principles of consumption patterns, quality cues, nutritional attributes, health concerns, and online purchasing experience. Outcomes of the present study show that there is no difference in the receptiveness of COVID-19 infection between both genders. The statistical survey observed Janus-faced effects while determining food consumption patterns in participants with positive or negative COVID-19 infection. The perception of quality was deemed a significant predictor in the change of food consumption patterns during the COVID-19 pandemic. Results of the current study note the positive correlation of price and purity with the quality of food. The unavailability of food and the risk of the contamination of food products strongly negatively influenced the consumption of food. Nutritional attributes such as the content of sugar and fiber were perceived as variables that improve consumer health by building up the immune system during the pandemic. The current study also addressed the experience of, preference for, and purchasing patterns on online shopping mediums during the COVID-19 pandemic. The overall experience of online shopping among positive and negative COVID-19 infection status participants was in the neutral category.

The current study was conducted to understand the change in the natural state of factors that determine consumer food preferences. These results can be used in future research to determine adequate measures of consumer perception of food products. Data of food consumption patterns and consumer preferences can be utilized as a baseline for nutrition intervention studies. Data from current study can also be utilized for novel food product development research in order to understand consumer attitude, preferences, and needs. In future, these data can be used as a baseline in order to identify the level of awareness of quality and nutritional attributes among consumers of food products. The study could be further extended in longitudinal survey research for a comparison of perception before and during the COVID-19 pandemic. Further research should emphasize the psychological and economic factors that might influence consumer perception.

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