

Article

Impact of COVID-19 on Food Behavior and Consumption in Qatar

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Received: 27 July 2020; Accepted: 23 August 2020; Published: 27 August 2020



Abstract: The government of Qatar took strong containment measures to prevent the spread of COVID-19 with restrictions on daily living such as social distancing and the closing of businesses and schools. While these measures are essential to stop the virus spreading, several voices came to warn of their potential disruptive impact on the agri-food system. Therefore, this paper investigates the immediate impacts of COVID-19 on Qatari consumer awareness, attitudes, and behaviors related to food consumption. The study is based on an online survey in Qatar using a structured questionnaire that was administered in the Arabic language through the Survey Monkey platform from 24 May until 14 June 2020. The results reveal clear changes in the way consumers are eating, shopping, and interacting with food. Indeed, the survey results suggested (i) a shift toward healthier diets; (ii) an increase in the consumption of domestic products due to food safety concerns; (iii) a change in the modality of acquiring food (with a surge in online grocery shopping); (iv) an increase in culinary capabilities; and (v) the absence of panic buying and food stockpiling in Qatar. The results are expected to inform current emergency plans as well as long-term food-related strategies in Qatar.

Keywords: COVID-19; SARS-CoV-2; food behavior; food consumption; food shopping; food waste; diets; panic buying; Qatar; Gulf Cooperation Council

1. Introduction

On 11 March 2020, the World Health Organization (WHO) declared the outbreak of the infectious disease COVID-19 (COroNaVirus Disease-2019) as a pandemic [1]. Initially identified in Wuhan (China), COVID-19, caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), has spread to 196 countries and territories, and as of 24 July 2020, 15,296,926 cases and 628,903 deaths have been confirmed [2]. In order to slow down the transmission of the virus, the majority of countries worldwide took strong containment measures with restrictions on daily living such as home confinement, social distancing, temporary closing of businesses, schools, and universities, and remote working [3]. While these measures are vital to stop the spreading of COVID-19, several voices came to warn of their disruptive impact on agri-food systems and food consumption [4–7]. While the direct impacts of the pandemic on primary agriculture should be limited, as the disease does not affect the natural resources upon which production is based [8], it is clear that COVID-19 has revealed the vulnerabilities of global food systems to shocks and crisis [9]. COVID-19 has already affected agro-food systems from producers to processors, and consumers, at different levels [5,10], causing an impending global food

emergency [11]. Nevertheless, it is likely that the effects of COVID-19 will differ from one country to another depending not only on the epidemiological situation but also, among others, on the level of socio-economic development. In this respect, the case of Qatar, one of the richest countries in the world, is particularly interesting.

Qatar, one of the Gulf Cooperation Council (GCC) countries, is a small country located in the Arabian Peninsula. It covers an area of just about 11,437 km² and has a population of 2.7 million. With 13.3% of proven world reserves, Qatar has the third-largest gas reserves in the world (behind Russia and Iran) and is the world's leading exporter of liquefied natural gas [12]. As a result, in 2018, with a gross domestic product (GDP) per capita (parity purchasing power (PPP) at constant prices) of USD 115,979, Qatar is considered one of the richest countries globally [13]. Qatar's economy is rapidly growing with ongoing population growth (mainly expatriates). From 1990 until 2018, the GDP increased from USD 7.36 billion to USD 192 billion and the population rose from 476,278 to 2,781,677 [13]. In 2020, hydrocarbon price volatility and COVID-19 disturbances may affect the economic growth in Qatar. Growth is expected to slow in 2020 even with increased government spending to ease the economic impact of COVID-19 [14].

Qatar recorded its first confirmed case of COVID-19 on 29 February 2020 [15]. On 28 March, Qatar reported its first death case from the novel coronavirus [16]. As of 24 July 2020, Qatar had the second highest number of confirmed cases in the Arab World and the GCC region after Saudi Arabia. Indeed, as of 24 July 2020, Qatar had 108,638 confirmed cases, 105,420 recoveries, and 164 total deaths [17]. Further, as of 24 July 2020, the total number of tests performed in Qatar stood at 464,674 [17]. The government of Qatar has taken several preventive measures to prevent the spread of COVID-19: closing of businesses, schools, and universities, social distancing, etc. (Table 1).

Table 1. Main measures to prevent the spread of COVID-19 in Qatar.

Date	Measures
9 March 2020	Closure of schools and universities. Travel ban on 15 countries: Bangladesh, China, Egypt, India, Iran, Iraq, Italy, Lebanon, Nepal, Pakistan, the Philippines, South Korea, Sri Lanka, Syria, and Thailand.
15 March 2020	Ban on serving food in restaurants and cafes, allowing only delivery services and takeaway, and halting all forms of public transport.
18 March 2020	Banning the entry of anyone except for Qatari nationals. Stopping of all incoming flights to Doha, except for air cargo and transit flights. People were asked to stay home except for when necessary, practice social distancing, avoid crowded places, and postpone holding social gatherings. Closing shops and all activities of barbershops, retail stores, and bank branches in commercial complexes and shopping centers, except for shops, food outlets, and pharmacies. Implementing a USD 23.35 billion stimulus package to shield the economy
20 March 2020	Closing of all parks and public beaches.
26 March 2020	Qatar signed agreements with 14 major companies specialized in the food sector to increase its stocks of strategic commodities, especially wheat, rice, cooking oils, sugar, frozen red meat, long-life milk, and powdered milk. Qatar has also launched an electronic system to manage and monitor the strategic stocks, and to activate the partnership between the government and private sectors.
12 May 2020	Restaurants and coffee shops have been allowed to resume the activity of delivering or handing over orders to customers outside the business place.

Sources: Authors' elaboration based on information from Aljazeera [18], Al Arabiya [19], The Peninsula [20], and Gulf Times [21].

With a relatively low mortality rate in comparison to other countries with similar rates of infection—the rate of infection in Qatar is similar to Germany and the UK—these rigorous measures seem successful to stop the spreading of COVID-19 and have, so far, helped to manage the spread and mitigate the impact. With these rigorous measures, a young population, and a capable healthcare system, Qatar seems to be weathering the storm [22]. However, these measures may have affected attitudes and behaviors related to food consumption in Qatar. Since the COVID-19 infection is new

and we do not know how long it will last, there is a need for data and information to assess its impacts on food consumption patterns. Therefore, the aim of this paper is to investigate the immediate impact of COVID-19 on Qatari consumer awareness, attitudes and behaviors related to food consumption. To the best of the authors' knowledge, this could be the first study of its kind in Qatar and the whole Gulf Cooperation Council (GCC) region. Before we expose the results, we present a literature review, and then our methodology.

2. Literature Review: COVID-19 and Food Behavior and Consumption

Several voices came to warn of the COVID-19 disruptive impact on agri-food systems and food consumption. On the supply side, firstly, limits on the mobility of people, border restrictions, employee absenteeism, and lockdowns are contributing to labor shortages for agricultural sectors in many countries, and, for example, slowing harvests in some parts of the world [8]. Secondly, logistics interruptions and disruptions in supply chains and limited access to markets for selling products, which created significant disruptions along the food supply chain [5], are resulting in unsold agricultural products and in significant increases in food loss and waste, especially of perishable products such as fruits and vegetables, fish, meat, and dairy products [23]. The outbreak of COVID-19 has certainly threatened the smooth functioning of food supply chains. In many countries, farmers have been burying perishable produce and dumping milk as a result of supply chain disruption and falling consumer demand [11]. As a result, the COVID-19 pandemic has underlined the relevance of short food supply chains and local production [24]. Moreover, short food supply chains and local production, in addition to ensuring the access to healthy food during COVID-19 pandemic, could have potential benefit for the environment, guaranteeing access to sustainable foods [25]. Thirdly, although international food markets are well supplied [26], protectionist measures such as food export restrictions during the pandemic could create food shortages around the world, increasing instability in global food markets, increase world food prices, and result in a global food crisis, such as the 2007–2008 one [8].

On the demand side, as the coronavirus pandemic has progressed, the way people purchase and consume food has changed. Firstly, at the beginning of the epidemic, when the understanding of the virus and comprehension of the potential severity was limited, consumers focused on panic buying to mitigate the risk of future shortages [27]. Multiple cases of panic buying of non-perishable food items (e.g., pasta, rice, canned goods, flour, frozen foods) have been observed throughout the world. Baker et al. [28] indicated that American consumers increased their spending during COVID-19 in an attempt to stockpile needed home goods such as food. Since food is obviously the most vital item, panic buying is a common human response to crisis, which is not caused by food shortage, but rather by a fear of simply running out of food [29]. This behavior is "transmissible", as highlighted by Grasso [29]: "The fear of scarcity is self-fulfilling, because the more people stockpile, the more others are infected by the panic and therefore the faster the food runs out". However, there is also evidence that this focus on buying food items is a behavioral reaction to feelings of stress and uncertainty. A perceived loss of control is a disagreeable state that leads consumers to restore control through product acquisition [30]. It is also possible that some consumers stockpile food to reduce the number of future shopping trips, buying more on each trip to minimize store visits, and consequently limiting their perceived risk of exposure to COVID-19 [10]. Panic buying has led to increased concerns about shortages of food products such as long-life milk, pasta, rice, and tinned vegetables [31]. Panic buying behavior may also break the supply chain and have negative consequences, such as an increase in food prices and food waste, stock-out [10], overconsumption, and unequal distribution of products [32]. The situation limits some vulnerable groups (e.g., elderly or poor) from accessing some products [33]. In addition, from the retail perspective, panic buying causes additional disorders to supply chains [34]. Consequently, this exacerbates stock-out situations and often leads to a price increase in consumer products [35]. Moreover, since the food distribution system is built on just-in-time, the rapid and unexpected spike in demand created short-run stock-outs [36].

COVID-19 could also change people's eating and dietary patterns, leading to a deterioration of nutritional and health status at both individual and country levels (e.g., all forms of malnutrition: undernutrition and over-nutrition are likely to increase) [37]; for instance, confinements and panic buying during the Ebola outbreak in Sierra Leone (2014–2016) led to a spike in hunger and malnutrition [38]. The crisis is also affecting the quality of diets. Consumers are shifting towards greater consumption of processed food, such as convenience foods, junk foods, snacks, and ready-to-eat cereals (as a result of panic buying for foods with longer shelf-life, and supply chain disruptions) [39]. There is also a possibility of a decrease in meat consumption (as a result of fears—not science-based—that animals might be hosts of the virus) and other higher-value products like fruits and vegetables (which are likely to cause price decreases) [38]. Besides, the fact that consumers are stocking up on nonperishable items means that they are likely substituting across food categories. Richards and Rickard [40] indicated that consumers in Canada and the USA have been storing frozen fruits and vegetables, which could potentially reduce current and future sales of fresh produce and influence dietary quality [40]. Any substitution patterns may unintentionally discourage consumers from eating the recommended portions of fruits and vegetables [41,42]. Further, COVID-19, via school closures, may aggravate childhood obesity and increase disparities in obesity risk. By staying at home, children would miss out school lunches and organized school activity. They could also be exposed to more shelf-stable food. Meanwhile, their physical activity decreased [43].

In addition, the drastic changes in lifestyles caused by the lockdown/quarantine and the overall crisis could result in negative emotions such as boredom, depression, stress, and fear of the disease. In China, during the initial stage of COVID-19, Wang et al. [44] reported several psychological impacts of COVID-19 such as high levels of depression, anxiety, and stress. These negative emotions could lead toward overeating, and “emotional eating” [45], especially of “comfort foods” which tend to be high in salt, fats, and sugars [46,47]. In their study on the effects of COVID-19 on food consumption in Italy, Scarmozzino and Visioli [48] highlighted that 46.1% of responders reported that they were eating more during the quarantine, and 19.5% gained weight. In particular, they reported an increase in “comfort food” consumption, particularly desserts, chocolate, and ice cream (42.5%), and salty snacks (23.5%). A total of 42.7% of this group linked this increase to higher anxiety levels. Moreover, in Italy, Di Renzo et al. [49] reported that during the COVID-19 lockdown, 34.4% of responders had more appetite and 48.6% thought they increased their weight. Based on an international research on the effects of the COVID-19 outbreak on lifestyle behaviors, Ammar et al. [50] highlighted that food consumption and meal patterns (viz. type of food, eating out of control, snacks between meals, number of main meals) were more unhealthy during the confinement. They concluded that the measures to contain the spread of COVID-19 might alter physical activity and eating behaviors in a health-compromising direction [50]. This could create vicious cycles: diabetes and other diet-related non-communicable diseases (NCDs) are risk factors for more severe complications and mortality of COVID-19 [39].

Furthermore, COVID-19 is far from being just a health crisis; it is expected to cause a severe global economic and financial recession for 2020, rising rates of unemployment and poverty on a global scale. According to the International Monetary fund [51], the global economy is projected to contract severely by 3% in 2020, which is much worse than during the 2008–2009 financial crisis. The economic recession is likely to severely reduce people's purchasing power, impacting food accessibility, which could easily affect the overall diet quality [52]. As a result, the continuance of income is important to understand how consumers respond to the COVID-19 crisis and how it impacts their demand for food [10]. Moreover, the social and economic crises and worries about the future might hypothetically lead some people to reduce their expenditures, including those for food [48]. The economic crisis is expected to impact the quantity of food consumed along with the type of goods purchased [53].

Besides, COVID-19 is affecting where and how consumers buy their food [10]. With the shutdown of restaurants and cafes, food purchases switched to grocery stores [54]. Further, since physically shopping in a grocery store has a perceived risk and induces fears of being in proximity to others,

consumer buying patterns have rapidly shifted to online shopping [55]. As the virus spread in the USA and more households stayed home, Grashuis et al. [56] noted that the trend in the number of new COVID-19 cases influences grocery shopping preferences. In milieus where COVID-19 is spreading at an increasing rate, consumers are generally less willing to shop inside the grocery store. However, in milieus where COVID-19 is spreading at a decreasing rate, consumer preferences for the home delivery method relative to the other methods are less strong. The change in consumer behavior is driven partly by feelings of fear toward the virus [57]. Moreover, in the USA, Baker et al. [28] noted a sharp drop in restaurants, retail, air travel, and public transport spending. Meanwhile, they highlighted a significant increase in food delivery spending, consistent with households substituting meals at restaurants with meals at home. During March 2020, according to the Brick Meets Click survey [58], 31% of U.S. households (about 39.5 million consumers) used an online grocery delivery or pickup service compared to 13% (16.1 million consumers) in August 2019. Online sales through pickup and delivery grew by 233% in the USA from 1.4 billion in August 2019 to USD 4.0 billion in March 2020. Overall, the monthly order volume has surged by 193% in the March 2020 versus August 2019 levels. As for grocery, online grocery sales increased by 37% during April 2020 over March sales. Moreover, the results showed that 26% of the households that had not bought groceries online during March or April, said they were extremely or very likely to try online shopping in the next three months [58]. It seems likely that e-shopping for food will continue to gain traction as store shutdowns and social-distancing rules push more digital shopping holdouts to online channels [55]. In fact, the COVID-19 crisis has accelerated the shift to digital services and digitization has become a basic need [59]. In the fight against the COVID-19 crisis, digital technologies play a crucial role in the maintenance of daily life and economic and social activities [60]. Therefore, the coronavirus pandemic could become a tipping point for digitization—a dawn of a new era—by accelerating the maturity of digital technology [59]. At the same time, the high demand for food products has also affected online food delivery. For example, in the UK, companies were struggling with excessive bookings, with deliveries arriving late or not at all [61].

Meanwhile, the COVID-19 crisis may have some positive effects. Jribi et al. [62] underlined that the COVID-19 lockdown improved food grocery shopping performances and pushed toward a positive behavioral change regarding food wastage in Tunisia. However, consumers' behavioral changes regarding food waste prevention might be probably driven more by the socio-economic context of the COVID-19 lockdown (i.e., food availability, restricted movements, loss of income), than by a pro-environmental concern [62]. In Spain, Aldaco et al. [63] revealed that during the first weeks of the COVID-19 lockdown, there was no significant adjustment in overall food loss and waste (FLW) generation, but a partial reallocation from extra-domestic consumption to households occurred (12% increase in household FLW). In Italy, according to Di Renzo et al. [49], during the COVID-19 lockdown, 54% of responders declared to use leftover food more than 30% of the time. Another potential change due to COVID-19 is the rise of home-prepared meals. Since restaurants and coffee shops are closed, consumers are cooking and baking more at home. With the confinement, it is much easier to find the time for these activities, usually undermined by the hectic pace of daily life. A food industry association survey, "U.S. Grocery Shopper Trends: The Impact of COVID-19", conducted in February–April 2020 in the USA revealed that 41% of Americans cook more, 27% plan more meals in advance, and 20% try new dishes more often since the start of the pandemic [64].

3. Data and Methods

The study was based on an online survey in Qatar using a structured questionnaire. The questionnaire was developed and adapted based on the West Michigan University-Food Consumption Changes 2020 survey [65] and the UNSCN COVID-19 survey [66]. The research was part of an international research project titled "Consumer Agency, Food Consumption Behavior, and the Novel Coronavirus (COVID-19) Outbreak", which was initiated by the Food Industry Research and Education (FIRE) Center of the Western Michigan University and included teams from the USA,

China, Germany, Netherlands, Turkey, the UK, and Qatar [65]. The questionnaire was adapted to the Qatari context and administered in the Arabic language (the official language in Qatar) from 24 May until 14 June 2020, through the Survey Monkey platform. The survey was disseminated through various communication channels, social media (Twitter and WhatsApp), and by email. Respondents were recruited on a voluntary basis. Before participating in the study, all participants were fully informed about the study requirements and gave their informed consent for data sharing and privacy policy. In the introductory part of the questionnaire, the objectives of the research were explained to inform the respondents.

The survey asks a number of questions related to how food consumption behaviors have been altered during the pandemic, including changes in food shopping, preparation, and consumption practices. The questionnaire consisted of 27 one-option, multiple-choice, and open questions and was structured into three sections: (1) socio-demographics (10 questions): citizenship, gender, household income, education level, etc.; (2) food purchase and consumption behavior (15 questions): food shopping behavior, food-related behaviors, food-related activities, extent of household food waste, etc.; and (3) emotions (2 questions). To assure the quality of the survey data, the questionnaire was pretested with 20 respondents. This step ensured that the questions were clear and comprehensible, and respondents can understand and answer them. Based on the feedback obtained from the pretests, the questionnaire was adjusted and administered. Internal consistency was demonstrated with the coefficient alpha of 0.705. A total of 579 answers were collected.

The data, collected through Survey Monkey, were downloaded into the Statistical Package for Social Sciences (SPSS) version 25.0 for analysis. Means, variation ratio, frequencies, and percentages were calculated for descriptive data. The variation ratio, or Freeman index (VR), is a simple measurement of statistical dispersion in qualitative variables, while standard deviation is used for continuous data. It is the simplest measure of qualitative variation [67]. It is defined as the proportion of cases, which are not in the mode category based on the following equation: $VR = 1 - f_{max}/N$, where f_{max} is the frequency (number of cases) of the mode and N is the total number of cases. VR reports the dispersion among cases; thus, the larger the variation ratio, the more differentiated or dispersed the data are. Wherever respondents were allowed to have more than one answer, multiple response analysis was ran and percent of responses and percent of cases were draw from it. Due to the measurement scale of variables, which were nominal and ordinal, non-parametric tests were applied. In particular, the Mann–Whitney U test was ran whenever we had dichotomous categorical variables as independent variables (e.g., stocking up food—Yes = 1 or No = 0; citizenship—Qatari or non-Qatari) and the Kruskal–Wallis test was used for multi-choice responses as independent variables (e.g., occupation). In addition, statistical significance was set a priori at a p -value of 0.05.

4. Results

4.1. Sociodemographic Characteristics of the Participants

Table 2 indicates that 62.91% of the respondents were Qatari, 61.32% were women, 50.36% were married with children, 60.03% were active professionally, and 83.7% were highly educated. Further, most of the respondents were middle aged (53.89% of them were 25 to 45 years old). This was related to the mode of administration bias as mainly young and educated people have access to the internet and social media, which were used for the dissemination of the survey. Moreover, 62.05% of the respondents' households earn the same income as most other households in Qatar.

4.2. Food Behavior and Consumption Habits During COVID-19 Pandemic

The results regarding food consumption during the COVID-19 pandemic in Qatar suggest clear changes in consumers' behavior related to food shopping. According to Table 3, 35.35% of the respondents (including "moderately more" and "much more") indicated that they ordered more groceries online. At the same time, 29.14% of the respondents indicated that they never ordered

groceries online. In addition, 29.30% of respondents indicated that they ordered much less food online from a full-service or fast food restaurant or by a delivery application. Further, 33.79% of the respondents (including “moderately more” and “much more”) indicated that they increased their purchase of local food products. Regarding eating and drinking habits during the COVID-19 pandemic (Table 4), interestingly, 32.4% of the respondents increased their consumption of fruits and vegetables, 32.3% ate much more healthy foods, and 44.6% drank more water (all by including “moderately more” and “much more”). Meanwhile, by including “slightly less” and “much less”, 44.5% of the respondents have decreased their consumption of unhealthy foods, such as fast food, 32.4% of respondents have decreased their consumption of unhealthy snacks, and 28.7% have eaten less candy, cookies, cakes, and pastries. Table 5 also highlights some changes in food-related activities. In particular, by including “moderately more” and “much more”, 42.90% of the cohort stated that they are eating more with family members, 49.20% are cooking and preparing food much more frequently, and 54.5% are spending a lot of time cooking.

Table 2. Sociodemographic characteristics of the participants ($n = 577$).

Variable		Frequency	Percent
Citizenship	Qatari	363	62.91
	Non-Qatari *	214	37.09
Gender	Male	222	38.61
	Female	353	61.39
Level of education	Primary school	1	0.17
	Preparatory school	7	1.21
	Secondary school	86	14.90
	University degree (Bachelor)	382	66.20
	Higher degree (MSc or PhD)	101	17.50
Income compared	Much lower than most other households	30	5.20
	Slightly lower than most other households	70	12.13
	About the same as most other households	358	62.05
	Slightly higher than other households	101	17.50
	Much higher than other households	18	3.12
Occupation	In paid work (full time or part time)	344	60.03
	Student	99	17.28
	Unemployed and looking for work	45	7.85
	Home duties	49	8.55
	Retired/Age pensioner	36	6.28
Household composition	Single person household	39	7.09
	Living with parents	108	19.64
	Married with children	277	50.36
	Married without children	25	4.55
	Extended family	95	17.27
	Shared household, non-related	6	1.09
Age (Mean = 35.73, S.D. = 11.47)	<25	130	24.67
	25–35	158	29.98
	35–45	126	23.91
	45–55	78	14.80
	>55	35	6.64

* Non-Qatari citizens who are residents in Qatar.

Table 3. Behavioral change during the COVID-19 pandemic.

Item	Percentage							Mean *	VR
	Never	First Time	Much Less	Slightly Less	About the Same	Moderately More	Much More		
Buying local food	7.07	1.03	1.21	1.38	55.52	15.86	17.93	4.17	0.44
Buying food in person from a large supermarket	6.55	0.52	13.62	9.66	48.10	11.21	10.34	3.67	0.52
Buying food in person from a small supermarket or grocery store	19.31	1.21	18.62	12.24	34.48	8.62	5.52	2.89	0.66
Ordering groceries online	29.14	5.17	11.55	5.00	13.79	21.21	14.14	2.89	0.71
Having meals delivered directly to my home from a full-service or fast food restaurant or by a delivery application	21.20	1.20	29.30	11.60	13.10	11.70	11.90	2.77	0.71

* Scale: never = 0; first time = 1; much less = 2; slightly less = 3; about the same = 4; moderately more = 5; much more = 6.

Table 4. Change of eating or drinking habits during the COVID-19 pandemic.

Item	Percentage							Mean *	VR
	Never	First Time	Much Less	Slightly Less	About the Same	Moderately More	Much More		
Fruits/Vegetables	1.70	0.20	1.60	4.20	60	19.50	12.90	4.30	0.40
Meat	3.50	0.20	5.20	7.30	72.60	7.20	4	3.83	0.27
Healthy foods	4.40	0.20	2.80	6.30	54.10	15.70	16.60	4.19	0.46
Unhealthy foods (e.g., fast food)	22.20	1.00	33.50	11	22.50	6.30	3.50	2.43	0.66
Water	0.50	0.40	1.10	3.30	50.10	20	24.60	4.61	0.50
Candy, cookies, cakes, and pastries	3	0.50	13.30	15.40	43.30	17.10	7.50	3.77	0.57
Healthy snacks	8.50	0.20	4.70	8	57.70	14.10	6.80	3.76	0.42
Unhealthy snacks	13.60	0.30	19.80	12.60	41.40	9.40	2.80	3.07	0.59
Packaged frozen foods	15	0.70	12.20	9.60	47.80	10.60	4.20	3.23	0.52
Canned food	20.50	0.90	15	9.80	44.20	7.70	1.90	2.87	0.56

* Scale: never = 0; first time = 1; much less = 2; slightly less = 3; about the same = 4; moderately more = 5; much more = 6.

Table 5. Change of food-related activities during the COVID-19 pandemic.

Item	Percentage							Mean *	VR
	Never	First Time	Much Less	Slightly Less	About the Same	Moderately More	Much More		
Cooking and preparing food	4.40	0.70	1.00	1.40	26.50	16.80	49.20	4.92	0.51
Eating with family members	3.70	0.20	2.80	3.10	37.30	9.90	42.90	4.72	0.57
Spending a lot of time cooking	10.30	0.70	2.60	5.20	26.80	27.00	27.50	4.28	0.73
Eating between meals (e.g., snacks)	4.70	0.50	6.80	7.30	45.50	23.30	12.00	4.06	0.55
Making easy meals (e.g., instant foods, frozen foods, etc.)	16.90	0.30	8.90	8.00	36.50	18.60	10.80	3.46	0.63
Eating at home alone	22.50	1.20	15.30	7.10	29.40	8.20	16.20	3.09	0.71
Ordering take-away or fast food meals with deliveries	27.00	1.60	28.60	8.70	17.20	8.70	8.20	2.47	0.71
Eating at someone else's place (e.g., family, friends)	47.90	1.70	28.00	6.90	10.40	2.80	2.30	1.48	0.52
Eating out (e.g., restaurants/cafeteria/fast food)	53.60	1.00	31.60	4.40	6.80	1.60	1.00	1.19	0.46

* Scale: never = 0; first time = 1; much less = 2; slightly less = 3; about the same = 4; moderately more = 5; much more = 6.

Regarding the effects of sociodemographic variables on food behavior and consumption during the COVID-19 pandemic in Qatar, Mann–Whitney U test results revealed that some variables such as citizenship, age, and gender had a significant effect on some behaviors and habits (Table 6). For example, there is a very significant difference between Qatari and non-Qatari respondents in terms of ordering groceries online ($U = 26,094.5$, $p < 0.01$). Qatari respondents had more willingness to order groceries online than non-Qataris. Further, young respondents ordered more groceries online than older ones. Regarding change of eating or drinking habits during the COVID-19 pandemic, Qatari respondents have eaten more unhealthy snacks than non-Qatari citizens. In addition, gender had a very significant effect (p -value < 0.01) on some behaviors and habits such as using delivery applications, ordering take-away or fast food meals with deliveries, cooking and preparing food, spending a lot of time cooking, and eating between meals. The level of education also affected some behaviors and habits. Respondents with higher education (viz. university degree) had ordered more groceries online and ate more frequently with family members than the other respondents.

Additionally, we observed a low spread of negative emotions such as worriedness, nervousness, depression, and scariness. As shown in Table 7, during the COVID-19 pandemic, 38.94% of the respondents indicated that they did not feel nervous at all, 34.62% did not feel depressed at all, and 43.27% did not feel scared at all. Likewise, only 13.94% of the respondents indicated that they felt worried very much and only 13.94% felt very much sad.

Another interesting result regarding food consumption during the COVID-19 pandemic in Qatar is the absence of panic buying. As shown in Table 8, 73.34% of the respondents indicated that they did not stock up food since COVID-19 became serious in Qatar.

However, significant associations were found between respondent's citizenship and food stocking up (chi-square test $p < 0.05$). Indeed, 78.12% of the Qatari respondents and 65.09% of the non-Qatari indicated that they did not stock up food. As a result, we noticed a drop in food waste (Figure 1); 44.81% of the respondents indicated that they waste less food since the COVID-19 outbreak (including "less" and "much less") and 41.61% indicated that their food wastage did not change.

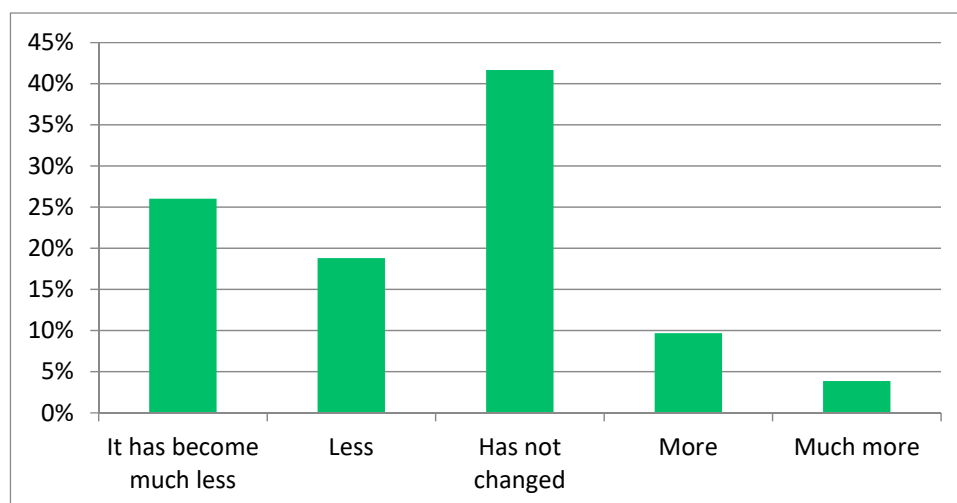


Figure 1. Food waste change during the COVID-19 pandemic in Qatar.

Table 6. Sociodemographic effects on food behavior and consumption during the COVID-19 pandemic in Qatar.

Household Behavior during the COVID-19 Pandemic	Citizenship	Gender	Level of Education	Household Income	Occupation	Household Composition	Age
	Mann–Whitney U	Mann–Whitney U			Kruskal–Wallis		
Buying local food (produced in Qatar)	37,674.5	38,124.0	4.635	5.884	5.208	5.345	2.553
Ordering groceries online	26,094.5 **	37,305.5	19.293 **	18.088 **	51.176 **	18.268 **	53.978 **
Buying food in person from a large supermarket	38,145.5	37,008.0	5.289	4.189	9.733	4.831	5.828
Buying food in person from a small supermarket or grocery store	34,727.5 *	38,396.0	13.332*	4.004	4.828	13.132*	16.960 **
Having meals delivered directly to my home from a full-service or fast food restaurant or by a delivery application like Talabat	34,676.5 *	33,228.0 **	8.052	15.989 **	21.554 **	3.860	23.904 **
Change of eating or drinking habits during the COVID-19 pandemic							
Fruits/Vegetables	36,655.0	36,828.5	2.224	0.257	1.566	2.366	2.583
Meat	37,788.0	38,021.0	1.352	1.046	2.162	5.190	1.894
Healthy foods	38,048.5	37,869.5	4.884	5.690	0.254	9.445	5.162
Unhealthy foods (fast food)	35,255.0	36,241.5	8.001	4.098	17.283 **	3.474	18.576 **
Water	36,835.0	36,004.0	2.603	2.544	2.945	5.332	4.902
Candy, cookies, cakes, and pastries	37,420.0	36,252.5	4.507	1.124	6.085	6.729	2.529
Healthy snacks	36,862.5	35,593.0	4.094	4.570	1.969	4.737	1.061
Unhealthy snacks	31,618.0 **	36,672.5	6.472	12.708 *	8.494	7.052	29.002 **
Packaged frozen foods	36,578.0	37,393.0	3.674	3.866	1.339	11.991 *	8.100
Canned food	36,842.0	34,705.5 *	2.211	1.987	7.140	1.821	16.551 **
Change of food-related activities during the COVID-19 pandemic							
Eating at home alone	36,482.5	34,503.0 *	2.220	3.638	10.282 *	34.979 **	7.432
Eating with family members	33,983.0 *	34,714.5 *	15.519 **	3.403	2.935	65.526 **	11.991 *
Eating out (e.g., restaurants/cafeteria/fast food)	33,222.5 **	35,619.0	7.047	10.846 *	33.273 **	10.671	24.188 **
Eating at someone else's place (e.g., family, friends)	37,710.5	36,935.0	2.749	4.993	15.800 **	7.348	5.425
Ordering take-away or fast food meals with deliveries	36,365.0	32,773.0 **	3.303	13.155*	20.200 **	2.321	24.808 **
Cooking and preparing food	38,059.5	30,897.0 **	2.569	8.203	4.095	3.444	3.158
Spending a lot of time cooking	34,256.0 *	28,689.0 **	3.817	2.209	14.230 **	6.999	8.427
Making easy meals (e.g., instant foods, frozen foods, etc.)	36,684.5	35,926.5	2.198	5.700	2.884	7.293	4.727
Eating between meals (e.g., snacks)	37,524.5	33,230.5 **	5.745	5.452	4.583	4.425	11.066 *

* p -value < 0.05, ** p -value < 0.01.

Table 7. Negative feelings during the COVID-19 pandemic.

	Percentage				
	1 (Not at All)	2	3	4	5 (Very Much)
Nervous	38.94	16.35	27.88	7.69	9.13
Worried	22.60	22.12	28.85	12.50	13.94
Depressed	34.62	18.27	22.12	12.50	12.50
Sad	35.58	15.38	27.88	7.21	13.94
Scared	43.27	19.23	22.12	7.21	8.17
Bored	11.48	14.35	22.49	16.75	34.93

Table 8. Stocking up food behavior during the COVID-19 pandemic.

	Frequency	Valid Percent	Qatari	Non-Qatari
Yes	153	26.66	21.88%	34.91%
No	421	73.34	78.12%	65.09%

5. Discussion and Conclusions

In this paper, we investigated the immediate impact of COVID-19 on Qatari consumer awareness, attitudes, and behaviors related to food consumption. With people spending more time at home and dining out becoming less accessible, we noticed a major shift in people's attitudes and behaviors concerning food and health. Indeed, there have been clear changes in the way consumers are eating, shopping, and interacting around food. The research highlighted several key consumer trends that are currently shaping food and health habits in Qatar.

First, the results indicated a shift toward a healthier diet during the COVID-19 pandemic. Consumers reduced their consumption of unhealthy foods such as fast food, unhealthy snacks, candy, cookies, cakes, and pastries. At the same time, they are eating healthier, including more fresh fruits and vegetables and healthy snacks and drinking more water. Since unhealthy diets increase the risk for diabetes, cardiovascular diseases, and cancer [68], this constitutes a positive change toward a healthy diet compared to the pre-COVID-19 situation. Therefore, the COVID-19 pandemic could shift consumers' behavior toward a more sustainable diet and to follow the Qatar dietary guidelines [69]. According to Al Thani et al. [70], in Qatar, more than 83% of adults did not meet the recommendations for vegetables, fruits, whole grains, legumes, and high-fiber intakes, 70% were overweight or obese, 50–72% reported frequent consumption of sweetened beverages and sweets, and 47% reported frequent consumption of fast foods. At the same time, the prevalence of obesity in the adult population in Qatar has increased since 2000 [70]. Further, prioritizing their health, people are also limiting the amount that they order from restaurants for fear of unnecessary exposure. This could be a result of fears—not science-based—that food containers and packaging might be hosts of the virus. Consequently, in Qatar, the food and beverages sector is expected to lose 50% of its pre-COVID-19 revenue [71].

This tendency is different from what was observed in other countries (USA, Canada, Italy, etc.) where consumers shifted towards greater consumption of unhealthy food, as a result of panic buying and negative emotions such as boredom, depression, anxiety, and fear of the disease and death [39,40,48]. This finding could be explained by several factors. First, the absence of panic buying due to the numerous policies and strategies implemented by the Qatari government to mitigate the effects of the COVID-19 pandemic on food supply, as explained below. Second, the quick and rigorous approach adopted by the Qatari government has helped to manage the spread of the virus and keep the mortality rates relatively low in comparison to other countries with similar rates of infection (e.g., the UK and Germany). Moreover, the government's measures were supported by favorable demographics (only 1% of the Qatari population is aged 65 or more) and a capable healthcare system. With 324 respirators per million people, Qatar benefits from a well-supported healthcare system in comparison to other affected countries, such as the USA, the UK, and Italy [22]. These factors helped to

reduce the spread of negative emotions such as worriedness, depression, and fear of the disease and death, thus, eventually, resulting in less consumption of unhealthy and “comfort” foods.

Second, the consumption of local Qatari food products increased due to food safety concerns. With the COVID-19 pandemic, uncertainty around the spread of the virus remains and consumers increasingly want to know where the food they buy comes from. Consumers’ unfounded perceptions, that imported food products could pose a safety risk, involved a preference for locally produced items.

Third, with barrier gestures, and social distancing becoming the norm, the coronavirus pandemic has transformed how consumers in Qatar get their food with a surge in online grocery shopping. This is due to lockdowns as well as to a general hesitation to visit large and often busy hypermarkets, a precautionary measure to prevent contracting the virus. To cater to the increasing number of daily online orders, most of the hypermarkets (e.g., Lulu, Carrefour, etc.) and other stores in Qatar increased their delivery capacity, with more delivery vehicles and crew to further improve the service [72]. As a general observation, the threat of the pandemic combined with social distancing measures has transformed consumer demand and business–customer interactions in Qatar and accelerated an ongoing process of digitalization. As more and more businesses are coping with the challenges of the COVID-19 pandemic, Qatar has witnessed a growing use of digital technologies in various sectors such as health, finance, education, and retail [73]. This transformation was facilitated by several governmental policies and decisions, the generalization of online payment and online medical consultation, etc. Additionally, leading Telecom companies (e.g., Ooredoo, Vodafone) improved the capacity of the existing infrastructure to ensure a better connection by doubling the internet speed without any extra charges [74]. The pandemic has also highlighted the importance of digital innovation as part of building resilience [22]. In this respect, the COVID-19 pandemic has undoubtedly been the biggest test of Qatar’s digital infrastructure to date, but Qatar and the whole GCC region have proved to have formidable digital resilience [75]. At the same time, some consumers have resisted online grocery shopping because they like to inspect the quality and freshness of meats and vegetables, and that cannot be done online. In addition, with most of the entertainment activities shut down (cinemas, theaters, shopping malls, etc.), grocery shopping became the only available outdoor activity. Moreover, we noticed some difference related to some sociodemographic factors, which revealed inequality in internet usage. Some demographic groups, such as young and educated adults, use the internet more frequently and used more frequently services such as online grocery shopping and meals delivery during the pandemic.

Forth, the COVID-19 pandemic unleashed culinary capabilities. With the restaurants and coffee shops closed, entertainment options became limited and eating with family and cooking turned into new entertaining activities. In fact, eating outside is an intrinsic part of the culture in Qatar and is a major form of entertainment. High disposable income and limited entertainment options due to high-temperature weather for large parts of the year largely limit entertainment options to eating out and shopping indoors [76].

Five, we noticed the absence of panic buying in Qatar, since the majority of the participants did not stockpile food. This could be explicated by the numerous policies and strategies implemented by the Qatari government to mitigate the effects of the COVID-19 pandemic on food supply. Despite the high reliance of Qatar on food imports, where 90% of the food is imported [77], COVID-19 did not affect food supply or prices. Prices had remained stable with no impact on the abundance of goods, food, and consumer products. Several times, the government insisted that “despite the disruption caused by the outbreak of Coronavirus (COVID-19), the flow of goods, services, food and medical supplies to the local market will remain uninterrupted in Qatar. These supplies are closely monitored to ensure quality and guard against price inflation or monopolistic practices.” [78]. Between April and May 2020, the consumer price index decreased by 2.37%, and increased by only 0.01% in May 2020 compared to May 2019 [79]. Furthermore, hypermarkets reported no major hindrance to the supply chain of food items. Indeed, they reported to have at least three months of buffer stock, therefore, any significant increase in demand due to stockpiling was met conveniently [71]. In fact, on 5 June 2017, Saudi Arabia,

the United Arab Emirates, Bahrain, and Egypt cut diplomatic and trade ties, and imposed a sea, land, and air blockade on Qatar [80]. Following the blockade, the Qatari government has taken numerous actions to counteract the blockade effects on food security: diversifying its global supply chains, improving its ports and rail infrastructures as well as increasing the local production [81]. Although the 2017 blockade and the current COVID-19 situation have very different contexts, it seems that the policies and strategies adopted by Qatar in response to the 2017 rift prepared the country particularly well for the COVID-19 outbreak [82,83]. As highlighted by KPMG [22] “Qatar has successfully overcome similar challenges during the blockade and had already established a strong supply chain network. This preparation has allowed food retailers to effectively manage supply chain challenges during the current pandemic” (p. 17). Further, in the past, such as during the 2007–2008 food crisis, based on its robust fiscal position resulting in high buying power, Qatar, like the other GCC countries, has been less vulnerable to price risk than other food importers and able to bridge the shortfall in domestic production [84]. Further, Qatar has also taken measures to secure its economy. The Qatar Central Bank declared a QAR 75 billion (USD 20.5 billion) stimulus package to the private sector, which will provide much-needed relief to various sectors that underpin the economy. With the absence of panic buying and food stockpiling, food waste dropped. Normally, many consumers consume at least one meal on average outside their home. The waste is significantly greater when we eat outside. With COVID-19, most of the meals are prepared and eaten at home, and less leftover is thrown away. Knowing that food waste is a serious issue in Qatar and the GCC region in general [85], this indicates an interesting shift toward a more sustainable food consumption pattern. As observed in Tunisia [62], the COVID-19 pandemic pushed toward a positive behavioral change regarding food waste in Qatar.

Six, regarding stocking up food, we noticed some differences between Qatari and non-Qatari respondents. Non-Qatari respondents stocked up more food than Qataris. This could be explained by the socio-economic characteristics of Qatar. Qatar is fiscally stable and a hydrocarbon-dependent economy, which has arguably shaped state-building development programs and produced a rentier state [86]. The “social contract” in Qatar, such as in the other GCC countries, is based on the rentier state model [87]. The Qatari government is highly allocative, by providing generous benefits to its citizens in different forms: land allotment, housing, public sector employment, free education, healthcare, and food subsidies [88]. In addition, this social contract guarantees a job in the public sector. These jobs for life provide salaries several times higher than those of private sector ones [89]. Although 79% of labor force work in the private sector, the percentage of Qataris working there did not exceed 10 percent of the total Qatari labor force in 2018, declining from 12 percent in 2015. The Qataris employed by the public sector attained 81 percent of the total Qatari labor force [90]. Accordingly, non-Qatari are more anxious to lose their job or to have a decrease in their wages because of the COVID-19 pandemic.

Author Contributions: Conceptualization, T.B.-H. and H.E.-B.; methodology, T.B.-H., H.E.-B. and M.S.A.; software, M.S.A.; validation, M.S.A.; formal analysis, T.B.-H., H.E.-B. and M.S.A.; investigation, T.B.-H. and H.E.-B.; data curation, M.S.A.; writing—original draft preparation, T.B.-H. and H.E.-B.; writing—review and editing, T.B.-H., H.E.-B. and M.S.A.; project administration, T.B.-H. and H.E.-B.; funding acquisition, T.B.-H. All authors have read and agreed to the published version of the manuscript.

Funding: The publication of this article was funded by the Qatar National Library.

Conflicts of Interest: The authors declare no conflict of interest.

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