A study on COVID-19 pandemic impact on Food and restaurants priorities utilizing social media

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Abstract: **The influence of the COVID-19 health crisis on people's food interests, opinions, and behaviour is described in this preliminary study. The evolution of people's online searches, the characteristics of the most watched YouTube videos, and Tweeted messages in relation to COVID-19 and food were all investigated in this study. In addition, an online survey looked into changes in food purchasing habits during the lockdown, the reasons for the adjustments, and the perceived dependability of media reporting. The most popular searches and YouTube videos were about knowing what COVID-19 is and how the sickness can progress and spread, according to the results. When the official declaration of a pandemic was made, trending searches for food and shopping spiked. Data gathered from Twitter also revealed a progression from shopping worries to apprehension about the impending disaster. The results of the online survey revealed a decrease in shopping frequency but no shift in shopping location. Pasta and vegetables were the most frequently purchased products (for health reasons), while others were purchased to boost their mood (nuts, cheese, and chocolates). Reduced purchase was linked to products with a short shelf life (fish, seafood) or those that were harmful and contributed to weight gain (sugary bakery goods) or poor mood (sugary bakery goods) (desserts). Consumers regarded statements provided by specialists or scientists as the most trustworthy.**

Keywords: **COVID-19, Food, Shopping, Consumers, Social media, Internet**

1. Introduction

A series of pneumonia cases developed in China in December 2019, which were later identified as the novel corona virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (also known as COVID-19) (Tan et al., 2020). The virus has been spreading worldwide since December 2019, and the World Health Organization declared a pandemic on March 11th, 2020.

The research world was set in motion as the pandemic progressed, resulting in a large number of studies. According to the Web of Knowledge, there were 7496 publications in April 2020 while searching for "COVID/coronavirus," all of which were relevant to health (infectious diseases, respiratory system, public health, internal medicine, research medicine, health care, microbiology, virology, and molecularbiology). When the term "food" was added to the search, 4382 studies pertaining to the virus's likely sources, genotype, and molecular characterization appeared. Only two studies have not dealt with virology to date: one advocated Vitamin D supplementation for COVID-19 prophylaxis (Grant et al., 2020), while the other looked at loss of smell as a biomarker for COVID-19 infection (Moein et al., 2020).

The main research reaction to COVID-19 has been focused on gaining a better understanding of the virus, its propagation, and health repercussions; nevertheless, the virus has an impact on more than just health. Consumers' fears about government-mandated lockdowns, social isolation, and displacement limits, as well as their confusion about the pandemic's scope, are evolving in tandem with their lifestyles.

Previous research (outside of pandemic times) has suggested that Google searches reflect people's interest and concerns about various diets (Kamiski, Skonieczna-ydecka, Nowak, & Stachowska, 2020). Similarly, YouTube videos are frequently used to seek advice and ideas on various diets and health conditions (Aydin & Aydin, 2020; Basch, Hillyer, Garcia, & Basch, 2019). People use social media (such as Facebook, Instagram, and Twitter) in addition to online searches. Furthermore, specific surveys are required when attempting to answer particular questions concerning a customer's motivation and impression under unusual conditions.

The first impact of a health crisis on consumers' diet and shopping behaviour is the focus of this exploratory study. During the virus spread, information was obtained from a variety of sources, including internet searches, most-watched movies, and social media.

In addition, during a rigorous lockdown time, an online questionnaire was created to investigate customers' motives for altering (or not changing) their shopping patterns, as well as their perceptions of the reliability of information sources in relation to COVID-19. Only after a state of emergency was declared was this component of the study conducted. Citizens could only leave the house if they were working in important services (health, security, social, and economic well-being of citizens) or if they needed to purchase necessary goods (groceries and medicines) within their town during this time.

Table 1
List of motivations that participants received when selecting each food, perceived as buyingmore or less of.

Category	Motivations for "buying more"	Motivations for "buying less"
Limitations	• I fear that it will be no left • I do not have anything else • I cannot buy it daily	• I could not buy it • I need to ration it • I cannot go where I usually buy it
Acceptability	• I feel for eating it more • I like it more • I am eating it more	• I do not feel for it • I do not like it anymore • I am tired of eating it
Mood	• It cheers me up if I am sad • It makes feel better if I am frustrated • It helps me to fight stress	• It does not cheer me up if sad • It does not make me feel good if I amfrustrated • It does not help me to fight stress
Price	• It is cheap	• It is expensive
Health and weight control	• It is going to protect me against coronavirus • It is what I have when I am sick • It is healthy • It is going to help to keep shape	• I do not think that it will help againstcoronavirus • I do not have it if I am sick • It is not healthy • It is going to make me put on weight
Received information	• It is said to be good in this moment • Everyone is buying it	• The experts said that is good in this moment • No one is buying it
Shelf-life	• It is long-lasting	• It has short shelf-life

2.   Material and methods

Food-related changes in internet search patterns

The Google trends tool was used to get relative popularity data for online searches from January 1st to April 15th. This tool displays the number of searches (given as a percentage) in proportion tothe maximum number of searches for the term in each period (for a term and day). It provides for acomparison of searches, specifically the values of the number of searches for each term (given as a percentage) in proportion to the maximum number of searches for each phrase in the selected period.
One questioner relating to food, virus, or lifestyle (food, shopping, shopping covid, food covid, on-line shop, recipes, cereals, flour, meals covid, stock up shopping, hoarding shopping, yeast, vegetables, toilet paper, fruit; virus: flu virus covid, flu symptoms, coronavirus symptoms, coronavirus transmission; lifestyle: sport videos, sport videos covid, fitness covid, yoga and covid,leaving home covid) was proposed as a preliminary study to The most frequently searched terms were analysed further based on these first searches.
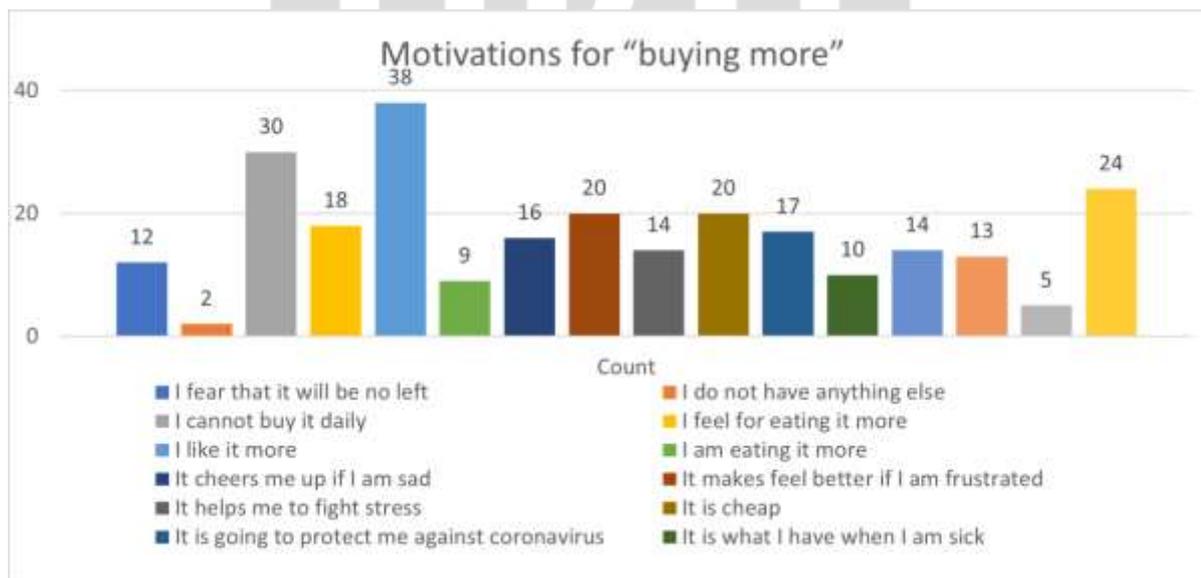
A preliminary comparison was made between searches for the term Food and searches for the terms(related to the coronavirus) Symptoms, Spread, and Lockdown. A second comparison of searches for the phrases Food and other food-related terms (Restaurant, recipe, and delivery) was also done.Finally, the popularity of searches for various particular food products was determined, and those that showed significant changes during the time period studied were kept. The searches were carriedout in English.

Most watched YouTube videos for food and shopping searches

Between the 30th of March and the 13th of April 2020, the 50 most watched videos on YouTube while searching for "coronavirus + food" and "coronavirus + shopping" in English were acquired. For each of the 275 videos, the title, number of views, upload date, and number of likes and dislikeswere noted.

Five researchers watched the videos independently and agreed to categorise the information into three content categories: health advise (recommendations for COVID-19 prevention or treatment), news (novel or true information), and documentary (non-fiction film that captured in images or interviews of different facts of COVID-19).

Journalists (people who work for newspapers, news websites, or information news), YouTubers (people who provided videos but not under news or TV channels), Health science experts (main or invited speakers who claimed to have health studies backgrounds such as physicians, virologists, andnutritionists), and social media influencers were all classified into three categories using the same protocol. There were a few mixed spontaneous videos that didn't fit into any of the categories. The frequency of the most frequently used words in the 275 video titles was also determined.

Data retrieved from Twitter regarding food and shopping

Tweets (the individual message posted on the Twitter platform), containing the terms Food and Coronavirus, sent between March 24th and May 31st, 2020, were retrieved to 1,694,723,134 tweets.Re-tweets and repeated tweets were not considered. Active keywords and hashtags were examined and cleaned.

Word Popularity Several words within the generated corpus have been found at different times in different positions of the tweets. Here we have counted the recurrence of each word and presented the top 50 popular words along with their popularity in Fig. 3. After finding the word popularity, wehave calculated the probability of repetition for each word on the basis of total 3,53,704 words fromthe corpus.

Table 1 represents the popularity and probability scores of some most frequent words

$$P(W_i) = \frac{count(W_i)}{\sum_{i=0}^{n} count(W_{i=0}^{n})}$$

	Words	Popularity	Probability
		Table 1. Popularity & probability of most frequent words.	
0	Covid19	91794	0.259522
1	Test	11663	0.032974
2	New	11305	0.031962
3	People	10834	0.03063
4	Death	10783	0.030486

Table 3
Frequency of mention of words in Twitter when talking about Coronavirus and Food in English.
Period at which the term showed maximum frequency is indicated as T1 (19/03/2020 to 27/03/2020), T2 (28/03/2020 to 03/03/2020), and T3 (04/04/2020 to 13/04/2020) or as constant when it did not change

Term	Frequency of mention (%)	Period with maximum % of mentions
People	14.5	T3
Help	12.7	T2
Need	12.0	T2,T3
Delivery	10.0	T1
Get	9.2	T1
Pandemic	8.7	T2
Supply	8.2	Constant
Work	7.2	T1
Lockdown	7.1	T3
Home	6.6	T1
Crisis	6.6	T3
Shop	6.5	T1
Family	6.2	T3
Donation	5.7	T12
Distribution	5.7	T3
Bank	5.6	T2
Worker	5.5	T2, T3
Support	5.5	T2, T3
Provide	5.3	T3
Medical	5.0	T1
Essential	4.5	Constant
Grocery	4.4	T1
Stay	4.4	T1
Eat	4.2	T3
Health	4.2	T2
Community	4.0	T2
Thank	3.9	T2, T3
Social distance	3.7	T1
Govern	3.6	T3
Store	3.6	T1
Spread	3.6	Constant

- Fig. 1. Relative popularity of worldwide Google searches including the term food compared to searches of terms related to the coronavirus situation: symptoms, spread, and lockdown in English (a); compared to searches of specific terms related to food: restaurant, home delivery, and recipe in English (b).
- Values are the number of searches of each term in a day in relation to the maximum number of searches in a day found in the period for any of the included terms.

2.4 Questionnaire on consumers' behaviour regarding food choice

A database of 800 consumers was used to send an online questionnaire. It was completed by 362 consumers at the end of the rigorous lockdown (March 14th-May 31st) (30 percent men, 70 percentwomen from 20 to 76 years old, average age 38.8).
The product list was based on a Spanish food frequency questionnaire, and consumers were asked tospecify which food products from a list they believed they bought more of during the lockdown thanduring regular times (Martin-moreno et al., 1993). Consumers were asked to do the same with food they thought they were buying less of than usual.

what did you prefer the most
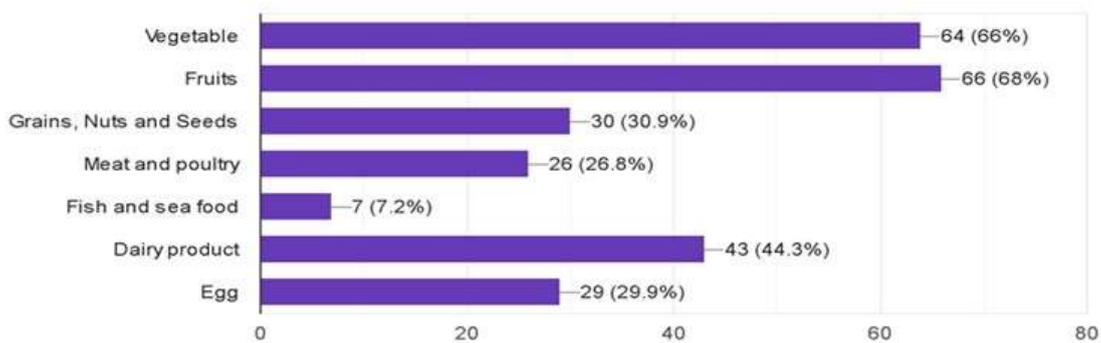
When a participant indicated that they would buy a product for a higher or lower price, they were asked to choose from a list of 17 motivations (Table 1). The two lists (motivations for purchasing more and less) were based on Phan & Chambers' Eating Motivation Survey from 2016, with a few additions from a recent study on food insecurity (Puddephatt et al., 2020). Limitations, acceptance, mood, pricing, health/weight control, information obtained, and shelf-life are all factors to consider.Consumers were also given the option of providing other justifications that were not specified.
Consumers were asked where they usually shop (small/local shop, supermarket, online, or other) andhow often they shop (every day, two/three times per week, once a week, and once a month) before and during the lockdown.

what immediate Impact of Covid-19 on Consumption Behavior did you see on yourself
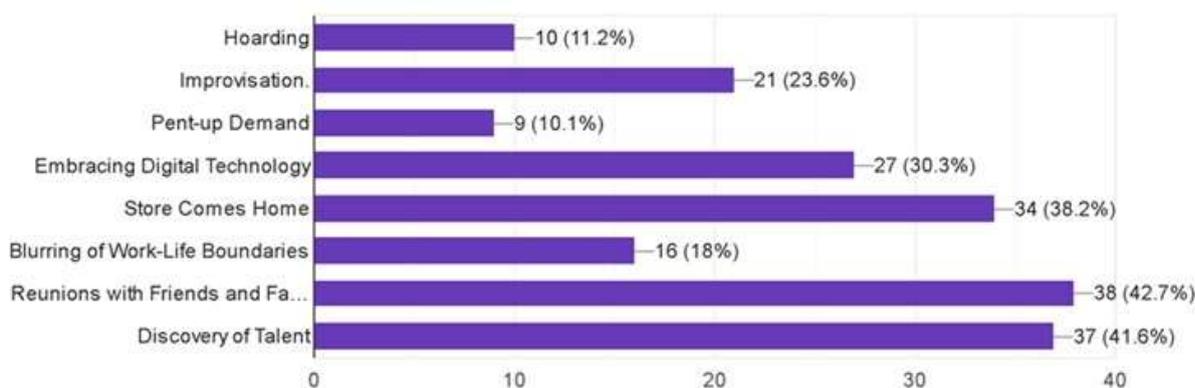
On a five-point dependability scale from not reliable to highly reliable, consumers rated 10 assertions about COVID-19 measures (given by the WHO (2020) and non-scientific sources derived from YouTube video analysis) as reliable. Wash your hands with soap and water, do not go out unless absolutely necessary, avoid contacting your eyes, nose, and mouth, wear a face mask, and disinfect any outside products, according to WHO. Take vitamin D supplements, eat more citrus fruit, drink plenty of hot beverages, eat more garlic and ginger, gargle with warm water and lemon, and eat more bananas, according to YouTube videos. Health experts, researchers, family, politicians, friends, co-workers, and journalists were all regarded by consumers as trustworthy sources of preventive measures information.

A multiple-choice question was used to ask consumers about their information source, which included terms like TV, WhatsApp, Radio, Journals, Social media, and Telephone lines for COVID-19, and Employees/Unions.

3.   Data analysis

Two Correspondence Analyses (CA), one for purchasing more food products and another for purchasing less, were performed using the food product purchasing data and its corresponding motivations. Chi-squared test was used to analyse the influence of COVID-19 lockdown in the shopping place and frequency before and after the lockdown, at the alpha level of $p < 0.05$.

Researchers and Scientists were the most trusted resource for the majority of participants (95 percent). TV was the most commonly used source of information (72 percent), followed by journals(48 percent), and social media (14 percent) (37 percent). Other sources of information, such as employers/unions and WhatsApp, were accessed by roughly 27% of respondents, with the COVID-19 information telephone lines being the least utilised.

4.   Discussion

This study provided the first (preliminary) insight into how the COVID-19 pandemic notice affected consumers' dietary priorities. During the lockdown, there were changes in the popularity of searches connected to food. People's interest in restaurants has waned, while interest in Recipes and Delivery has skyrocketed, rivalling or surpassing searches relating to health (Symptoms and Spread). People's diet concerns dropped, but their interest in food goods such as flour, bread, fruits, milk, and chicken(which are associated to cooking, baking, and storage conditions) increased.

The most popular YouTube videos revealed the public's desire to learn more about the pandemic's origins and how it may be combated with "at-home" or culinary cures. This finding suggests that people watch videos for reasons other than those found in Google searches; whereas films ostensibly satisfied a demand for instructive, didactic knowledge, Google searches provided more spontaneous and rapid information. Unfortunately, the majority of videos were uploaded during the start of the epidemic without up-to-date information and were not created by specialists, putting viewers at risk if they followed the ineffective advise.

The information gleaned from Twitter backed up people's fears about grocery shopping, health care, and the economy. The time analysis of these results, in particular, showed the evolution of population worries, from shopping and caution (for the most vulnerable), to the uncertainty of what will happen in the end, and how the resulting health and economic problem would be resolved. Because there is a perpetual shift in what governs their setting and practises, this constant evolution of the circumstance may represent further changes in consumer behaviour and logic (De Krom, 2009).

A change in buying behaviour during the lockdown was detected based on consumer responses at the time of the online questionnaire. These volunteers were already two weeks into a rigorous lockdown, and the initial stockpile and fear stage had past them by. Despite the fact that Spanish customers have had to deal with food-related issues,

5.   Conclusions

The current exploratory study adds to our understanding of how people behave in a pandemic crisis, which has never happened before in the age of social media. Although people consider scientists and experts to be one of the most dependable sources of information, it is beneficial to the scientific community to realise that. Scientists are not the most popular source when searching for and watching videos, so efforts should be made to build more effective information communication channels to avoid the people following non-scientific (hoax/fake-news) recommendations.

Consumers have changed their habits and motivations as a result of the mandated lifestyle shift. Moreresearch is needed to look into the long-term impacts and adaptation of food intake behaviour to the"new normal."

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