



IMPACT OF COVID-19 ON FOOD CONSUMPTION

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Abstract

In this paper we provide a literature review on the impact of Covid-19 on food consumption. Our study includes 12 papers, 8 quantitative and 4 qualitative, based in different countries which include the United States, Taiwan, Canada, Qatar, Italy, and Saudi Arabia. As the topic is a very recent, most of the papers included are working papers. Furthermore, for the same reason, results in our literature review are limited to short run impacts. The main results found in most of the countries in our analysis includes an increase in the consumption of grains such as pasta, rice, cereals, baked goods, and bread. A significant increase in online grocery shopping was also recorded and such is linked with the lockdowns that occurred from the virus outbreaks. Although this literature review is crucial to assess the implications of the Covid-19 pandemic on food consumption in the short run, we hope that future studies might bring more evidence on this topic.

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1. Introduction

The coronavirus pandemic has forced us to change many aspects of our lives. With the intention of preserving public health, the connections between countries, cities and even neighborhoods needed to be suspended.

Furthermore, to reduce the number of contagions and deaths, and essentially, the sustainable continuity of health systems, the lockdowns turn into a habit that the population is now used to.

This unexpected event can have unforeseen implications in various societal dimensions, including the way consumers have shaped their consumption profile during this period.

The change in food consumption habits can possibly impact the incidence of diseases such as cardiovascular. Therefore, it becomes important to assess how the Covid-19 pandemic affected consumers' food pattern to understand the extent of this change in food consumption more realistically and for policymakers to appropriately define measures that safeguard the health of citizens.

This literature review has the aim of analyzing how these lifestyle changes impacted the food consumption of households. Nevertheless, these lifestyle changes might have had different directions, for instance, there might have been a change in the type of foodstuff goods consumption to a healthier level or, contrariwise, towards unhealthy behaviors.

Since the Covid situation and its implications are recent, there are a limited number of papers with relevant content to our literature review. Yet, our work is relevant because even though this is still a recent transformation, this literature review by analyzing various papers and converging all the conclusions into a single paper allows to draw some conclusions that might be quite useful to provide guidance future research in this area.

As it was mentioned before, this literature review covers a relevant aspect since our diet influences future diseases and prevents future expenses and charges of the health system.

2. Methodology

In order to collect articles for this literature review, the search was conducted mainly in two databases: Econlit and Econpapers. The choice of these databases relied on the selection of economic literature for this review given our preference to restrict to economic articles over multidisciplinary articles. Also, considering that this topic is relatively recent, there are still many working papers that have not been published yet and hence we chose the database Econpapers to search for unpublished literature.

The search was based on specific keywords, which are summarized in Figure 1 – Defined Keywords. These keywords were allocated in two groups: the first related to the desired timespan (regarding the pandemic situation) and the second group associated with health outcome of interest.

Keywords from the same group were combined with the string “OR” while keywords from different groups were always combined with the string “AND”.

The selection of articles started with all the identified articles after removing the duplicates. Afterwards, all articles were grouped in three categories: “eligible”, “potentially eligible” and “excluded”. This classification process was based on the abstract of each article and on the inclusion criteria: (i) focus on high-income countries, (ii) being published since 2020 and (iii) focus on the change in consumption pattern during Covid-19.

The exclusion of articles was supported by the non-verification of the previous inclusion criteria since many articles fell out of the scope of this literature review in what concerns to criterion (iii), which was possible to assess by analyzing the abstract of each article.

Regarding potentially eligible articles, these verify the inclusion criteria, which required us to read more extensively each article. From a more in-dept analysis, it was possible to conclude that there were also studies focused on other issues that go beyond the purpose of this literature review, which led to some discussion, but such debates were solved by consensus. All this process of selection and classification is more clearly

presented in the Figure 2 - Flow Diagram for Search and Selection Processes which follows PRISMA-guidelines (Moher et al 2009).

3. Results

3.1. Study Selection

The search carried out resulted in 1110 screened articles, from which 771 articles were excluded due to its duplication. Then, it was removed 715 articles given their non-verification of the aforementioned inclusion criteria, remaining 56 articles. Later, the remaining articles were classified as “eligible” and “potentially eligible”, leading to 12 eligible articles, 8 quantitative and 4 qualitative, for this search and 44 articles that were excluded. Thus, 12 articles were included in this literature review.

3.2. Description of Selected Studies

The main details of the chosen studies are summarized in Figure 3 - Main Details of the Studies. Concerning the quantitative studies, a total of six articles has a similar methodology, having carried out surveys answered by households and the remaining two studies were more focused on aggregate data.

Considering all included articles, five of them are focused on the US, two studies are internationally broad, and the remaining studies are targeted in Taiwan, Canada, Qatar, Italy and Saudi Arabia. The papers study the period during or right after the first major lockdown in the respective country.

3.3. Key Points of the Studies

Firstly, we start by analyzing the effects of the COVID-19 pandemic on food consumption on the citizens of the US. The conclusion is simple, Americans have changed their behavior quickly and dramatically in the beginning of this period. (Baker, Farrokhnia, Meyer, Pagel, & Yannelis, 2020) reported an increase in spending of around 40% in the beginning of March but a drop of around 25-30% by the end of March. The increase in

spending as a response to the outbreak is the result of stockpiling behavior stated by various authors. Early evidence from US food retail markets, between March and July 2020, shows that sales for most food categories have increased (Ellison, McFadden, Rickard, & Wilson, 2020).

Having in consideration Figure 4 - Change in Food Purchasing Behavior, we can see the major changes in the consumption of the American citizens. Major increase has been seen in dry, canned and snack foods and major decrease in pre-prepared foods, meat, fresh fruit, and vegetables. The increase is the result of the changes of the priorities in consumption within the households, which according to (Ellison, McFadden, Rickard, & Wilson, 2020), were taste, nutrition, storability, price, and ease of preparation. Other papers and studies followed this conclusion.

(Ellison, McFadden, Rickard, & Wilson, 2020) also reported a significant increase of grocery purchases in dry staples. Also, in the beginning of the outbreak the authors stated that the largest change in consumers' purchasing behavior was the increase in purchases of shelf-stable milk, which has stabilized over time. The increase in grocery purchases especially of storable food reflected the stocking-up behavior due to the uncertainty. Aligned with these results, the authors also stated that as the shelter-in-place restrictions took place expenditures on FAFH (food away from home) sharply declined whereas expenditures on FAH (food at home) increased.

It is important to mention that studies focused on the change in consumer pattern in the US also took into consideration the economic stimulus payment also known as EIP. Hence, (Lai, Morgan, Kassas, Kropp, & Gao, 2020) estimated that households spent the largest share of their stimulus payment on non-durable goods, namely, food in such a way that 98% of those who had already received the EIP or had it anticipated would spend it on grocery shopping. Also, about 21% would purchase food locally, benefiting grocery retailers. Alongside the confinement restrictions, households increased by 46% their spending on shelf-stable items such as canned food and dry food, in agreement with the previously mentioned paper. Also, 40% of the households increased their purchase of snack foods. In fact, from the end of January to the end of March 2020, pasta sales increased by 199% and lasagna and pizza by 126%. On the other side, households reduced by 31% their spending on pre-prepared meals. In fact, the authors expect that

the recipients of EIP will continue to allocate a large share of the payment to non-durable goods such as food as well as to spend more at grocery stores.

According to (Lai, Morgan, Kassas, Kropp, & Gao, 2020), freshness and cost were the main characteristics that American households had in consideration. However, the same also referred other important variables and influences, following a convergency pattern to the previous study, namely, nutrition, non-perishable/shelf stable, and convenience. This likely resulted from a large portion of consumers preparing to shelter at home for an unknown amount of time. The increase in snack consumption is indicated as the result that people were working more from home (Chenarides, Grebitus, Lusk, & Printezis, 2020).

The decrease in the other components is probably the result of the fact that Americans were less focused on production-oriented attributes—including organic, sustainable, and locally produced—or the brand name of products. Furthermore, as stated in (Litton & Beavers, 2021), there were more reasons for the decline of certain foods. In the case of fresh fruit and vegetable, the poor quality, poor availability, high price (shortages and disruptions in the food supply chain), reduced store trips, and concerns of contamination were also reasons considered relevant for the decrease of the consumption of the same. According (Lai, Morgan, Kassas, Kropp, & Gao, 2020), 52% of consumers experienced shortages of meat, 40% experienced shortages of dry goods, 30% experienced shortages of produce and 30% experienced shortages of fruit and vegetables.

Overall, the change in preferences towards budget-friendly foods, long-life products and larger portions occurred during the spread of coronavirus has strong similarities with previous recessionary economic behavior. According to (Borselliano, Kaliji, & Schimmenti, 2020) and following a study in the US in the beginning of the pandemic, around 69% of people preferred to cook at home and 54% did not prefer to eat at sit-down restaurants, which reflects a greater preference in engaging in households' activities such as cooking.

Moreover, (Borselliano, Kaliji, & Schimmenti, 2020) and considering a survey carried out in the United Kingdom, consumers have effectively changed their cooking and eating habits with the imposition of lockdown when it comes to spending more time cooking with family and enjoying cooking at home. Regarding eating habits, consumers have

improved their meal planning by freezing meals and eating more leftovers, which represent habits consumers plan to continue as restrictions lift.

In addition to the general information regarding the US, there are two more papers. One regarding the behavior of Detroit and Phoenix, and the other about Michigan. Both papers used online surveys to gather information for their studies and, even in different states, online surveys were conducted in similar periods. The first paper (Detroit and Phoenix) has a time-period from March until May 2020, with 861 respondents, and the second one (Michigan) refers to June of the same year, with 484 survey respondents.

Regarding the paper-based of Detroit and Phoenix, according to (Chenarides, Grebitus, Lusk, & Printezis, 2020), empirical studies have shown that a perceived lack of control contributes to predictable shopping patterns, such as compulsive buying or purchasing. As stated, 47% of the American households bought more food than usual and 33% stockpiled food. This is the result from the uncertain period that people were living and of the fear of leaving the houses to buy more food. This was also a major factor for the increase in online grocery shopping and the utilization of pick-up services. Before the pandemic, 9% participated in grocery delivery and 15% in grocery pick-up, which diverges with the pandemic values, namely, the rise to 15% and 25%, respectively (Chenarides, Grebitus, Lusk, & Printezis, 2020).

To understand if these changes provided a healthier consumption or not additional data was collected that reached the following conclusions: regarding the question: "How much has your diet changed since COVID-19 started?" more than half, about 60%, stated that they ate remained about the same amount of food as before, 13% said they ate less, and 21% said they ate more. Respecting the quality that provides the healthier of the food, about 9% stated they eat better, and 12% thought they eat not as healthier as before.

Across most food groups, the conclusions were that most of the respondents stated that their consumption choices remained the same. However, some products like snacks, fresh produce, dairy, grains, frozen food, canned food, and bottled water suffer an increase in consumption, because of the changes in routines of the population. Furthermore, an additional conclusion was that respondents with children in the

household were more likely to consume more fresh produce (19.1%), dairy (8.3%), and grains (11.0%), which points to a healthier diet than before.

Regarding the paper based in Taiwan, (Chang & Meyerhoefer, 2020) conducted a study using transactions from one large online food shopping platform in Taiwan. He found that grain products experienced the largest increase in demand, which could be the result of its easy storable nature, as well as a surge in home cooked meals of grain-based foods like breads and bakery items. What Chang finds to be interesting is that fresh fruits and vegetables were also high in demand despite not having such a large shelf life as the grains. Additionally, as expected, frozen foods demand also increased probably because they are easier to consume in the sense that the food is already made, and consumers do not need to spend time cooking it from scratch.

Chang also states that a clear increase in demand for online food shopping in Taiwan was recorded through Ubox, an online trading platform. In specific, the study states that online sales increased by 5.7% per additional Covid-19 case. Overall, there was an 18% increase in sales during the first week after Covid-19 arrived in Taiwan. Since this study focuses solely on Taiwan and the shift of food consumption patterns in that country, it's important to note that these results are not generalizable to online platforms in other countries where there are different consumer characteristics.

Another study which also found an increase in demand for grains was conducted by (Zinola, 2020) regarding Italy. She found an increase in long life food products such as pasta and rice, as well as raw materials like sugar, eggs, and flour. Likewise, Anna explains that there has been a boom in online shopping. Agreeing with other authors, she states that the pandemic has changed purchasing and consumption attitudes and behaviors.

In Canada, (Cranfield, 2020) studied the structure of preferences, household budgets, price effects, socioeconomic factors, and consumer behavior during the Covid-19 pandemic. As stated, the paper contains no literature review, no conceptual or empirical model, nor any empirical analysis- its objective is to offer ideas, stimulating discussion and research. We decided to include this paper because it allows a better understanding of how consumer preferences changed due to Covid-19. All in all, the structure of consumer preferences as John states, is an important issue in understanding how consumers respond to Covid-19. In his paper, he points to three immediate areas where

the structure of the utility function reflects the direct impact of the pandemic. The first concerns what is in a consumer's utility function (what the consumer enjoys and what brings him the most satisfaction), second is the temporal nature of choice (considering the current pandemic situation what is the consumer's priorities) and the third is the structure of preference issue, namely uncertainty (not knowing what will happen in the near future). As John explains, it is important to emphasize that the impact of COVID-19 on consumer food demand (and shopping behaviors) will differ across the intersection of individual and household experiences, characteristics, and context.

A study (Fazel, Harizi, & Nasr, 2021) carried out on a sample of 100 consumers of healthy foods in Saudi Arabia found that when the risks of consumption are high for consumers, they have a lower intention to purchase and may no longer risk making a purchase. The large risk in this case being the Covid-19 virus. Moreover, if the consumer is experienced with shopping in department stores, purchasing healthy foods during the COVID-19 pandemic will be faster and more intensive. This is because consumers of healthy foods are quick to obtain and consume these desirable goods as their intention to purchase positively influences their purchasing decisions. The main results found was that the intention to buy increased among consumers of healthy foods.

4. Discussion

Without a doubt, the Covid-19 pandemic changed consumer's usual habits. After all the normal we were all used to before, where a mask and disinfectant were something quite unknown, is no longer a reality. The objective of this paper is to further understand how consumption has indeed changed due to the virus. As previously mentioned, our literature review includes papers from all various countries including the United States, Italy, United Kingdom, Canada, Saudi Arabia, and Taiwan.

In the US, it is possible to see a change in the households' food pattern. Although 50% to 70% of the households stated that their consumption remained approximately the same (Chenarides, Grebitus, Lusk, & Printezis, 2020), in Figure 4 - Change in Food Purchasing Behavior, we can see major differences in the composition of families' food

basket. Despite the tendency to keep the same food behaviors, there was a slight increase in unhealthy diets in comparison to healthy ones. This can be seen specially in the increase of consumption of snack foods. The same has increase almost 40%, the third biggest increase. However, if we look closely, the biggest increase in dry and canned foods. Their ability to resist and its easy conservation made these foods really demanded in the pandemic. According to Figure 4 - Change in Food Purchasing Behavior, the demand for these products almost increased by 46% which can be translated in a big necessity of American households to find foods that could last, avoiding leaving their houses.

Looking at the other countries besides the United States, most of the consumer habits changed for the better. For instance, (Borselliano, Kaliji, & Schimmenti, 2020) explains that in the United Kingdom consumers waste less food by saving leftovers or freezing food at home. This habit started during the pandemic perhaps due to the fear of running out of food, especially during the first lockdown. In Taiwan, the demand for frozen foods also increased during the beginning of the pandemic and such could be due to similar reasons.

A food category whose demand increased greatly was grains such as pasta, rice, cereals, baked goods, and bread. This phenomenon was seen in a couple countries in our study. One of them being Italy, where (Zinola, 2020) conducted a study and found an increase in pasta and rice specifically because of their long shelf-life. The same paper also states that raw materials like sugar, eggs, and flour were also consumed more frequently. Additionally, Taiwan also experienced the same surge in meals of grain-based foods like breads and bakery items. This observation can be explained by the fact that since people were forced to stay home during lockdown, they had to cook their own meals. Moreover, during lockdown many people also went to the kitchen to bake and try out new recipes which also helps explain the increase in the consumption of bakery items.

Interestingly, as consumers were not able to eat out, many had to learn how to cook at home. Since the number of home cooked meals increased drastically per household, the consumption of vegetables and healthier foods also increased. The study in Saudi Arabia (Fazel, Harizi, & Nasr, 2021) confirms that a greater quantity of healthy foods was consumed both by people who already consumed healthy foods and people who usually

did not consume such foods. In the study from Taiwan ((Chang & Meyerhoefer, 2020) also explains a high demand for fresh fruits and vegetables which he finds interesting because such foods do not have such a long life as the grains.

Moreover, an interesting find that was shared among the papers was the fact that online sales increased dramatically. This is likely a direct result from the containment and lockdown measures in various countries. As people were forced to stay home, they were probably unable to go to the grocery store as often as they wished, and hence online shopping became an easy solution. The fear of contagion also contributed to the increased online sales as the study by (Chang & Meyerhoefer, 2020) explains that sales increased by 5.7% per additional Covid-19 case. Indeed, being able to shop from home and have your purchases delivered right to your doorstep is something that is very convenient and efficient. As such, it is likely that that online grocery store shopping will continue to take place even long after the pandemic is over.

An important point we must make includes the limitations in our study. Since our literature review is based on an extremely recent topic, a lot of the papers are still currently being written and studied. With this, there is still a lot of information that is left unknown by the fact that most of the papers in our study are not yet complete. We are still living the Covid-19 pandemic hence it is a topic that is being continuously studied as we speak. In this way, we cannot tell how long these consumption alterations will last or even quantify how much they will affect each socioeconomic group. Additionally, most of the papers present an analysis on grocery store data and not include the consumption from restaurants or takeaway meals. Finally, as the papers study a selected sample of people it is crucial to note that the sample might not be an accurate representation of the entire population in general.

5. Conclusions

Unquestionably, food consumption has altered due to the impact of the Covid-19 pandemic. Across all countries included in this study, consumers have changed their consumption pattern either by increasing their expenditures on food purchasing at the

beginning of the outbreak or by changing their eating habits. Consequently, this literature review becomes useful by conveniently gathering the effect of the pandemic on the consumption of very different countries.

Also, it is relevant to consider whether the impact of Covid-19 on food consumption is permanent or temporary because if facing a permanent transformation of consumption pattern policymakers may desire to adapt their policies to this new reality. For instance, it may be appropriate for the public health authority to reinforce health promotion campaigns targeted at those working remotely, considering the new trend of increasing consumption of snacks and fast food in some countries such as the US.

Although this literature review is pertinent to assess the short-run implications of the Covid-19 pandemic on food consumption, it is not sufficient to measure the long-run impact of such unforeseen event. That's why it is still difficult to extract major shifts in food consumption because of the pandemic.

Therefore, future studies regarding the long-term implications of Covid-19 on consumers' food pattern might bring even more evidence for the intervention of policymakers, even though this literature review represents already a starting point for the study of the modifications in eating habits and consumers' preferences because of the Covid-19 pandemic.

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7. Appendix

Figure 1 – Defined Keywords

Key Words	
Pandemic Situation	Health Outcome
Pandemic	Consumption
Covid-19	Healthy eating
Epidemic	Foods
Sars-Cov-2	Fruit
	Snacks
	Snacking
	Fast Food
	Cooked meals
	Home Cooking
	Vegetables
	Alcohol
	Fruit consumption
	Food
	Households
	Beverages
	Drinks
	Junk food
	Unhealthy food
	Convenience food

Figure 2 - Flow Diagram for Search and Selection Processes

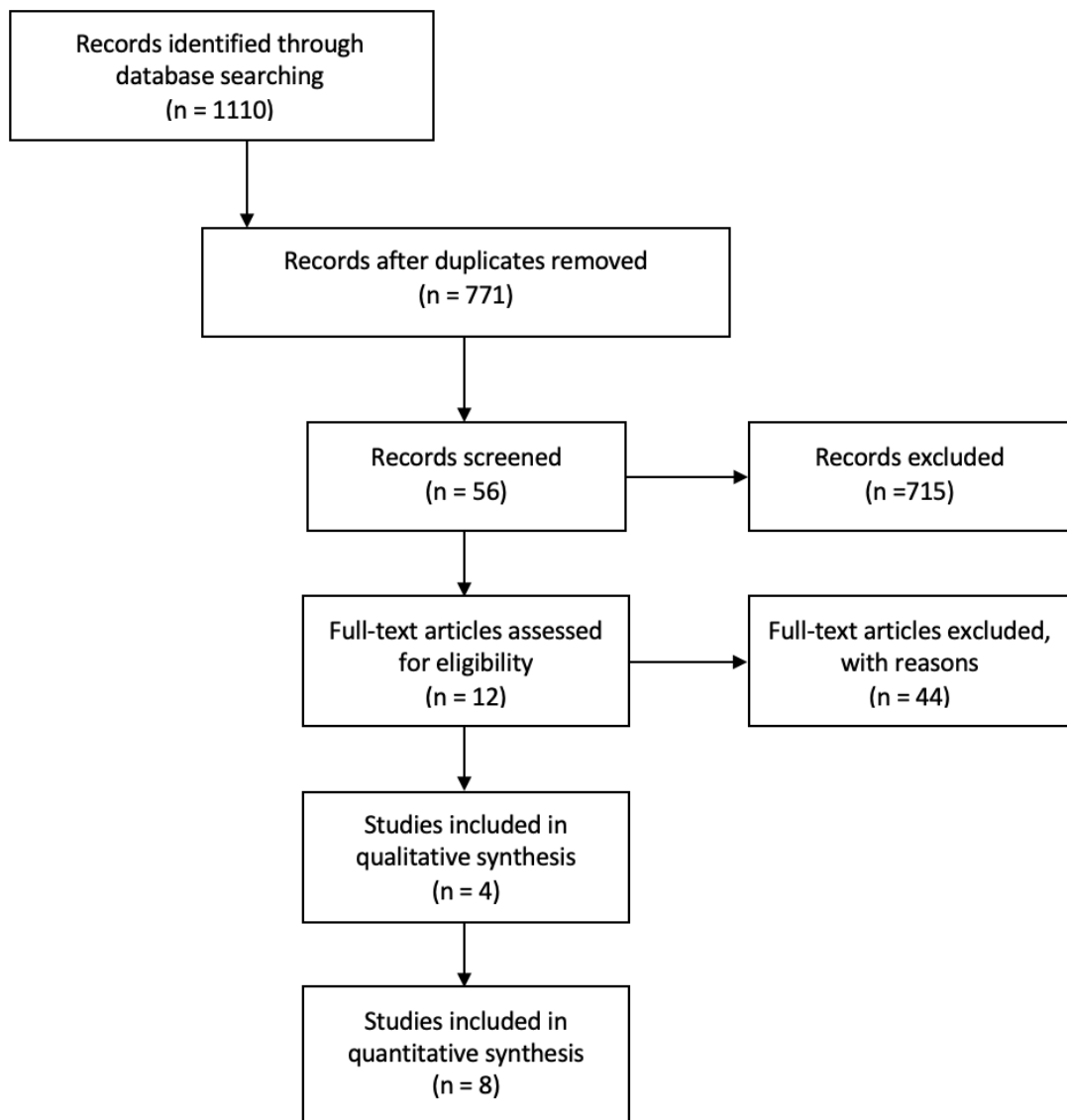


Figure 3 - Main Details of the Studies

Countries	Title	Abstract	Data Methodology
Taiwan	COVID-19 and the Demand for Online Food Shopping Services: Empirical Evidence from Taiwan	We investigate how the coronavirus pandemic affected the demand for online food shopping services using data from the largest agri-food e-commerce platform in Taiwan. We find that an additional confirmed case of COVID-19 increased sales by 5.7% and the number of customers by 4.9%. The demand for grains, fresh fruit and vegetables, and frozen foods increased the most, which benefited small farms over agribusinesses. Online food shopping was highly responsive to COVID-19 media coverage and online content. Because Taiwan did not impose a stay-at-home order, the demand for online food shopping may be similar in other countries after they lift mobility restrictions.	"Used data from several sources to conduct our analysis, including administrative sales records from a large agri-food e-commerce platform, information about coronavirus cases in Taiwan, search data from Google, and data on COVID-19 news articles from Taiwan's largest newspaper"
Canada	Framing consumer food demand responses in a viral pandemic	In this paper I explore several issues related to how the COVID-19 pandemic might impact consumer demand for food. These impacts relate to the structure of preferences in the context of a pandemic, income and time constraints, and price effects. Discussion includes accounting for differential impacts of COVID-19 on demand for food across sociodemographic characteristics, and several high-level issues and observations related to where and how consumers shop and what they buy. My own thinking leads me to conclude that demand-side factors will account for most of the changes we see in retail food market. These demand-side effects will be dominated by income effects, the opportunity cost of time, and longer planning horizons on the part of consumers.	The paper contains no literature review, no conceptual or empirical model, nor any empirical analysis. It offers some thoughts intended to stimulate discussion (and research). The paper is structured around five areas: the structure of preferences, household budgets, price effects, socioeconomic factors, and consumer behavior. It is important to emphasize that the impact of COVID-19 on consumer food demand (and shopping behaviors) will differ across the intersection of individual and household experiences, characteristics, and context.
Italy	The Consumer Behaviour in a Post Pandemic World	The pandemic has changed purchasing and consumption attitudes and behaviours. Both the product – first of all fast moving consumer goods – and retail have changed. Regarding products, there has been an increase of some categories: long-life food products (as pasta and rice), raw materials (sugar, eggs, flour etc.), household disinfectants. Although, the end of the lockdown marked the decrease of the consumption of these items. Regarding the retail, there has been a boom in ecommerce. Italian consumers recovered the digital gap of years in a few months. Will this trend last? It is too early to say. However, the persistence of the virus and the convenience of the ecommerce suggest that some of the new users will be loyal.	N/A
Saudi Arabia	What Have We Learned about the Effects of the COVID-19 Pandemic on Consumer Behavior?	Background: This study aims to examine how behavioral variables interact with and stimulate purchasing decisions and influence the process of purchasing healthy foods during the COVID-19 pandemic. Method: Principal component analysis was carried out on a sample of 100 consumers of healthy foods in Saudi Arabia, and this made	Principal component analysis was carried out on a sample of 100 consumers of healthy foods in Saudi Arabia, and this made it possible to adapt the items to the context of

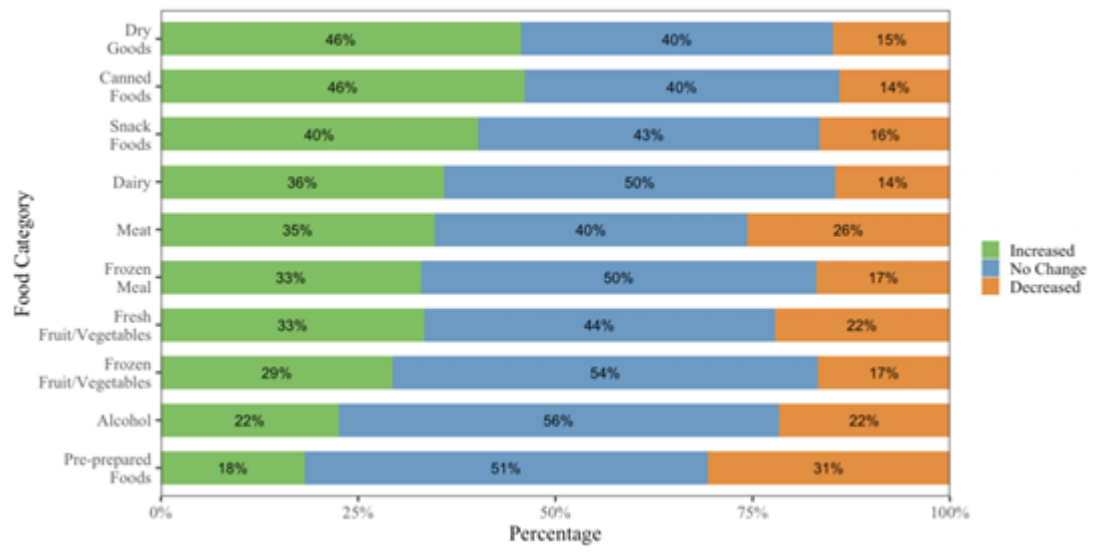
		<p>it possible to adapt the items to the context of the study. Exploratory and confirmatory analysis with 360 people was carried out. Confirmatory factor analysis provided reliable and valid scales, and multivariate analysis using structural equations and binary logistic regressions made it possible to validate the hypotheses. Results: The intention to buy increased among consumers of healthy foods. Women were more anxious about the COVID-19 pandemic than men, and they took considerable precautions to avoid contamination. The fear of COVID-19 was also more intense among the elderly population than younger people. The respondents indicated reduced visits to shops, restaurants, and markets. Gender and age moderated the relationship between the fear of COVID-19 and purchasing intention. Consumption risk also negatively affected purchasing intention. However, buying experiences and intention to buy led to increased purchases of healthy foods compared to other goods.</p>	<p>the study. Exploratory and confirmatory analysis with 360 people was carried out. Confirmatory factor analysis provided reliable and valid scales, and multivariate analysis using structural equations and binary logistic regressions made it possible to validate the hypotheses.</p>
US	Examining Food Purchase Behavior and Food Values During the COVID-19 Pandemic	<p>The COVID-19 pandemic has altered conceptions of "normal" globally, including food purchasing and acquisition decisions. In this paper, we surveyed a panel of 1,370 U.S. households four times during the COVID-19 pandemic from mid-March to late April 2020. With this unique panel, we observe changes in food expenditures, shopping behaviors, and food values as the pandemic evolved. Our results reveal reductions in food-away-from-home expenditures and increases in online grocery shopping. Food values appear to be fairly stable in the early stages of the pandemic; however, decreases in the importance of price and nutrition reveal tradeoffs households make during the pandemic.</p>	<p>"Our research uses data from a longitudinal survey with a panel of consumers collected during the pandemic. Beginning March 13, 2020, and then biweekly over six weeks, we asked panelists questions about their purchases in specific food categories, in specific types of food retailers, and for specific purchase attributes or characteristics across all food purchases." / "This study uses a unique panel dataset with 1,370 respondents who completed four rounds of data collection. The start of each data collection round was approximately two weeks apart."</p>
US - Detroit and Phoenix	Food consumption behavior during the COVID-19 pandemic	<p>We conducted an online consumer survey in May 2020 in two major metropolitan areas in the United States to investigate food shopping behaviors and consumption during the pandemic lockdown caused by COVID-19. The results of this study parallel many of the headlines in the popular press at the time. We found that about three-quarters of respondents were simply buying the food they could get due to out of stock situations and about half the participants bought more food than usual. As a result of foodservice closures, consumers indicated purchasing more groceries than normal. Consumers attempted to avoid shopping in stores, relying heavily on grocery delivery and pick-up services during the beginning of the pandemic when no clear rules were in place. Results show a 255% increase in the number of households that use grocery pickup as a shopping method and a 158% increase in households that utilize grocery delivery services. The spike in pickup and delivery program participation can be explained by consumers fearing COVID-19 and feeling unsafe. Food consumption patterns for major food groups seemed to stay the same for the majority of participants, but</p>	<p>"This study, which solicited responses from 861 respondents, was designed to examine trends around individuals' shopping habits and changes in consumption patterns during the novel Coronavirus pandemic. It focuses on two metropolitan areas in the United States to elicit key insights about food shopping patterns, purchasing behaviors, and consumption. We carried out this survey during the end of April 2020"</p>

		a large share indicated that they had been snacking more since the beginning of the pandemic which was offset by a sharp decline in fast food consumption.	
Worldwide	COVID-19 Drives Consumer Behaviour and Agro-Food Markets towards Healthier and More Sustainable Patterns	This study examines the extant state of research into our understanding of the impact of the coronavirus pandemic in its early stages on food-purchasing behaviour. As such, it includes a summary and categorisation of the findings, extending to consumption preferences worldwide. After the indiscriminate stockpiling of food, which was witnessed in many countries following the implementation of the lockdown, the impact of COVID-19 (COronaVirus Disease-2019) on consumer habits has inversely varied in function of personal attitudes, individual and household experiences, and characteristics. Specific contexts, and the financial, economic, and logistic nature of these contexts, have also been found to be of relevance in examining the research relating to the coronavirus pandemic and food-purchasing behaviour. Concurrent with the pandemic, some worldwide trends have emerged—home cooking has been rediscovered, leading to an increase in the demand for staple foodstuffs, and purchases from small, local retailers and online food shopping have been accorded preferential treatment. Despite price volatility and concern about future household incomes, a significant proportion of consumers have shifted to buying healthier, more sustainable food. Moreover, food wastage has seen a notable decrease in volume. Such an occasion should be strategically exploited by manufacturers and retailers in satisfying this consumer demand. Finally, the COVID-19 crisis would seem to offer an unparalleled opportunity to re-engineer the agri-food market by driving the transition toward more sustainable supply and production patterns. Thus, stronger and more equitable partnerships between farmers, manufacturers, retailers, and citizens may be in the process of being forged.	This study is a literature review of about 128 papers.
US	How Does Household Spending Respond to an Epidemic? Consumption during the 2020	Utilizing transaction-level financial data, we explore how household consumption responded to the onset of the COVID-19 pandemic. As case numbers grew and cities and states enacted shelter-in-place orders, Americans began to radically alter their typical spending across a number of major categories. In the first half of March 2020, individuals increased total spending by over 40% across a wide range of categories. This was followed by a decrease in overall spending of 25%-30% during the second half of March coinciding with the disease spreading, with only food delivery and grocery spending as major exceptions to the decline. Spending responded most strongly in states with active shelter-in-place orders, though individuals in all states had sizable responses. We find few differences across individuals with differing political beliefs, but households with children or low levels of liquidity saw the largest declines in spending during the latter part of March.	"Utilizing transaction-level financial data, we explore how household consumption responded to the onset of the COVID-19 pandemic."
Worldwide	Effects of COVID-19 Home Confinement on Eating Behaviour and Physical Activity: Results of the ECLB-	Background: Public health recommendations and governmental measures during the COVID-19 pandemic have resulted in numerous restrictions on daily living including social distancing, isolation and home confinement. While these measures are imperative to abate the spreading of COVID-19, the impact of these restrictions on health behaviours and lifestyles at home is undefined.	"This report presents the results from the first thousand responders on physical activity (PA) and nutrition behaviours. Methods: Following a structured review of the

	<p>COVID19 International Online Survey</p>	<p>Therefore, an international online survey was launched in April 2020, in seven languages, to elucidate the behavioural and lifestyle consequences of COVID-19 restrictions. This report presents the results from the first thousand responders on physical activity (PA) and nutrition behaviours. Methods: Following a structured review of the literature, the "Effects of home Confinement on multiple Lifestyle Behaviours during the COVID-19 outbreak (ECLB-COVID19)" Electronic survey was designed by a steering group of multidisciplinary scientists and academics. The survey was uploaded and shared on the Google online survey platform. Thirty-five research organisations from Europe, North-Africa, Western Asia and the Americas promoted the survey in English, German, French, Arabic, Spanish, Portuguese and Slovenian languages. Questions were presented in a differential format, with questions related to responses "before" and "during" confinement conditions. Results: 1047 replies (54% women) from Asia (36%), Africa (40%), Europe (21%) and other (3%) were included in the analysis. The COVID-19 home confinement had a negative effect on all PA intensity levels (vigorous, moderate, walking and overall). Additionally, daily sitting time increased from 5 to 8 h per day. Food consumption and meal patterns (the type of food, eating out of control, snacks between meals, number of main meals) were more unhealthy during confinement, with only alcohol binge drinking decreasing significantly. Conclusion: While isolation is a necessary measure to protect public health, results indicate that it alters physical activity and eating behaviours in a health compromising direction. A more detailed analysis of survey data will allow for a segregation of these responses in different age groups, countries and other subgroups, which will help develop interventions to mitigate the negative lifestyle behaviours that have manifested during the COVID-19 confinement.</p>	<p>literature, the "Effects of home Confinement on multiple Lifestyle Behaviours during the COVID-19 outbreak (ECLB-COVID19)" Electronic survey was designed by a steering group of multidisciplinary scientists and academics. The survey was uploaded and shared on the Google online survey platform. Thirty-five research organisations from Europe, North-Africa, Western Asia and the Americas promoted the survey in English, German, French, Arabic, Spanish, Portuguese and Slovenian languages."</p>
<p>US - Michigan</p>	<p>The Relationship between Food Security Status and Fruit and Vegetable Intake during the COVID-19 Pandemic</p>	<p>The coronavirus disease 2019 (COVID-19) pandemic has drastically altered food shopping behaviors, and the resulting economic recession has caused a spike in food insecurity. Since food insecurity is associated with poor diet, especially low intake of fruits and vegetables, food-insecure individuals may disproportionately experience negative health impacts related to poor diet during the pandemic. To assess the relationship between food security status and fruit and vegetable intake during the COVID-19 pandemic, we conducted an online survey of adult residents of the US state of Michigan in June of 2020. Among the 484 survey respondents, 36.2% were classified as food-insecure. Food-insecure respondents consumed fruits and vegetables fewer times per day than food-secure respondents and were more likely to report decreasing their consumption of any type of fruits and vegetables (total, fresh, frozen, and canned) since the pandemic started. For those who reduced their purchase of fresh fruit and vegetable, reasons included poor quality, poor availability, high price, reduced store trips, and concerns of contamination. These findings highlight the need for adequate food assistance during the COVID-19 pandemic and in future pandemics, as well as public health messages that promote healthy eating.</p>	<p>"To assess the relationship between food security status and fruit and vegetable intake during the COVID-19 pandemic, we conducted an online survey of adult residents of the US state of Michigan in June of 2020. Among the 484 survey respondents"</p>

US	<p style="text-align: center;">Spending of Economic Stimulus Payments and Changes in Food Purchasing during the COVID-19 Pandemic</p>	<p>Using a nationwide survey, we characterize the ways in which U.S. households spent their economic impact payments (EIPs) and investigate changes in household food purchasing in response to COVID-19. Most consumers allocated a significant fraction of their EIPs to food, with an increase in spending on canned food, dry goods, and snacks.</p>	<p>“To examine these issues, we conducted a nationwide survey in May 2020, which was administered online through a survey management company that ensured proportional representativeness of the sample across gender, age, and income using the 2018 American Community Survey 1-Year Estimates. The questions in the survey spanned respondent and household demographics, issues surrounding COVID-19, receipt of an EIP, and food shopping and consumption behaviors.</p> <p>A total of 972 respondents, 18 years or older, completed the survey. At the time of the survey, about 46% of respondents were employed full-time, nearly 42% were employed part-time, and nearly 12% were unemployed.”</p>
Qatar	<p style="text-align: center;">Impact of COVID-19 on Food Behavior and Consumption in Qatar</p>	<p>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.</p>	<p>“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”</p>

Figure 4 - Change in Food Purchasing Behavior



Sources: (Lai, Morgan, Kassas, Kropp, & Gao, 2020)

