

Household Food Dynamics during COVID-19

Subjects: **Others**

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Home confinement during the COVID-19 pandemic has been accompanied by dramatic changes in household food dynamics that can significantly influence health. Overall, families enjoyed more time together around food, including planning meals, cooking, and eating together. Eating more diverse foods and balanced home-cooked meals (e.g., fresh fruit and vegetables) was combined with overeating and increased snacking (e.g., high-calorie snacks, desserts, and sweets), as parents became more permissive towards food; however, food insecurity increased among families with the lowest income. Adoption of meal planning skills and online shopping behavior emerged alongside behaviors aimed at self-sufficiency, such as bulk purchasing and stockpiling of non-perishable processed foods. These results are an important first step in recognizing how this pandemic may be affecting the family food environment, including low-income families.

[food](#)[feeding style](#)[eating trends](#)[food interactions](#)[food intake](#)

1. Introduction

The outbreak of coronavirus disease (COVID-19) in late December 2019 in China, which later developed into a long-enduring pandemic, resulted in unprecedented changes to civil and social activity on a global scale, causing not only a health crisis, but also a series of issues pertaining to social, economic, and food security aspects ^[1]. To contain the spread of the disease, governments' responses around the world included strict lockdowns or curfews, reliance on quarantine, and adherence to social distancing. Large-scale social restrictions included schools switching to distance learning, work from home, keeping at least one meter from each other, places of entertainment being closed, cancelation of public events, and closing of international borders and airports, to name a few ^[2]. This changed routine activities around the globe, such as those relating to daily shopping or within the transportation sector; as a result, the deficit in the retail system in the first wave of COVID-19 took place alongside consumers making the rapid shift to online services. Many other social, psychological, and economic challenges followed, including all aspects of food-related decisions and behaviors ^[3].

As a result of quarantine and social isolation, access to fresh food has been limited, mainly due to difficulties in transportation, distribution, and delivery ^[4]. Moreover, quarantine and social distancing may encourage consumers to favor ultra-processed food that have longer shelf life ^{[5][6]}, or they may stimulate unhealthy eating through inducing emotional disturbance, boredom, stress, and anxiety ^{[7][8][9]}. The impact of the pandemic and containment measures also led to a severe contraction in economic activity and resulting loss of disposable income, having a devastating impact on food poverty levels and inequality; as a result, "the proportion of people who could not afford even half the cost of a healthy diet increased from 43% pre-COVID-19 (2020) to 50%" during the lockdown ^[10]. On

the other hand, the pandemic has the potential to encourage positive changes in eating behavior, such as spending more time with family around food or eating together more home-cooked meals as opposed to eating out; additionally, people may also engage in health-seeking behaviors, including healthy eating, to seek protection from COVID-19 [11]. Interestingly, one study has shown that changes due to the pandemic were in line with pre-pandemic goals, such as favoring more local production, choosing unpacked or recyclable/biodegradable packed foods, or paying attention to one's weight; therefore, the pandemic may have been a catalyst for behavioral change [12].

2. More Time Allows Family to Enjoy Food and Moments Together, but Also Leads to Boredom

Time was cited as a factor that gave families the opportunity to plan meals and moments together [13][14], to prepare diverse and well-balanced meals [13][15], and to eat at a calm pace [13], the latter having positive consequences for the meal atmosphere at home and on children's eating behaviors [13]. On the other hand, increases in food responsiveness and emotional overeating were significantly correlated with an increase in child boredom at home [15][16].

Family interactions and engagement are crucial for the family to eat healthily, as eating practices are intricately tied to family life, and people tend to eat healthier when eating together with their family [17]. Specifically, family awareness has been found to help plan meals and facilitate social comparison [17]; this includes snacking awareness prompting caregivers to prepare snacks ahead of time for their children and purchase healthier foods for the home [17]. Before the lockdown, time was an important barrier for most parents, especially those working full time [18]. Indeed, time can be thought of as a health resource, as, for example, lack of time is the main reason people give for not taking exercise or eating healthy food [19]; time pressure is also negatively and consistently associated with mental health over time [20]. Moreover, the evidence suggests that time pressures contribute to socially patterned health inequalities among people caring for others [19]; for example, single mothers who are both time- and income-deprived may face compounding barriers to good diet and health [19]. To face time pressures, parents often resort to meal simplification or taking out, losing sight of what is nutritionally beneficial [21]; in order to balance healthy meals with time constraints, meal planning [22] and time management [23] have been recommended as suitable strategies. On the one hand, strategies to manage time scarcity are needed to further promote and facilitate family engagement around food after the lockdown, including home-based food preparation; on the other hand, social policies and planning and health interventions should continue involving the time dimension to minimize time–income–space trade-offs faced by individuals [19].

On the other hand, given the recent lockdown, a new phenomenon of time abundance appears to be as damaging to healthy eating as time pressures, as children who are bored at home resort to emotional eating (EE) [16]. Individuals with EE use eating to reduce the intensity of negative emotions [24]; this provides instant gratification [9], but is a poor coping strategy leading to more eating [25]. It is also possible that difficulties in emotion regulation may be one possible mechanism underlying EE [26]. Since eating in response to negative emotions involves consumption of palatable foods to lift the mood [9], EE may predict weight gain in adults [27]. Moreover, the

clustering of health behaviors in children [28][29] raises the question of whether EE is also related to physical activity (PA), sedentary behavior (SB), and/or sleep duration [25]. Previous results suggest that boredom is an important construct that should be considered a separate dimension of emotional eating [30]. Moreover, short-term effects of the COVID-19 pandemic on PA and SB in children have been observed, which may become permanently entrenched if proper measures are not taken into account [31]. Evidence shows that positive family environments could help children cope with unexpected disturbances in their daily life under lockdown; however, the emerging weariness and boredom reported by some children in the second wave of the lockdown strained family relationships [32]. Moving forward, in addition to promoting PA and reducing SB in children, programmatic and policy strategies should focus on time management skills, including educating parents and children on how to manage free time to continue having positive family interactions and combat excessive boredom in children.

3. Health and Immunity Determined the Food Preparation and Intake

Some parents mentioned that, because of the lockdown, they became interested in the nutrition and motivated to provide a diversity of foods and balanced meals [13]. For some, fruit and vegetables became an important component of a healthy diet, and thus always featured in food shopping lists [33], as opposed to basing food choice around food preferences and taste. Others wanted to buy fresh produce, but worried about shelf life as they would prefer to shop less frequent [33]. This desire to eat more healthily during the pandemic was stimulated by either altered perceptions of health and immunity [34], or more choices of fresh, seasonal, and local foods on the market [13].

Experiences from previous outbreaks have shown that during the “life” course of an epidemic, people’s concerns about health and immunity grow stronger for self-protective motives [11]. Most of the nutrition and dietary recommendations to combat viral infections, including COVID-19, revolve around maintaining a balanced diet [8], as existing evidence highlights that nutrients play an essential role in immune cell triggering, interaction, differentiation, or functional expression [35][36][37], thus having a profound effect on people’s immune system and disease susceptibility. Research conducted during the COVID-19 outbreak alerted people to the importance of nutrition in protecting people’s health in times of pandemic [38], reporting the link between the levels of various nutrients and the severity of symptoms in COVID-19 [39][40][41], or relating diet-related ill-health (e.g., obesity) to a worse prognosis for the disease [42]. Studies that examined the relationship between COVID-19 fear during lockdown and family food habits have identified increasing needs to provide an all-inclusive balanced diet for growth and health [16], including an increased choice of fruits and vegetables [13][43]; however, despite the best intentions to eat more healthily in times of the pandemic, some parents described issues of grocery shortages, leading to the making of different food than was originally intended (e.g., whole green gram pulse instead of buying vegetables) [34], whereas others turned to stockpiling shelf stable foods [15], the latter being also driven by concerns about fresh food preservation [33]. On the other hand, for low-income families, it was the reliance on supermarket home deliveries that compromised home food availability in fresh food products [43].

In addition, a related line of research has examined pandemic-induced stress and food-related mental health [44][45][46][47]. Previous research has revealed a wide range of psychosocial impacts of infectious disease that may produce fear in the community or individuals in relation to getting sick or dying, or feeling helpless or stigmatised [48]. As a result, the pandemic may lead to fear-induced eating disorders [48], and recent evidence attributes increased fear and worries caused by the pandemic to eating pathologies in children [49] and caregivers [45]. Additional efforts are needed to maintain this level of public focus on diet-related health and immunity after the lockdown; in addition, education about preserving the shelf life of fresh produce could prepare the public for better managing food in future outbreaks.

4. Frequent Consumption of Homemade Meals, but Also Increased Unhealthy Snacking

Most parents observed an increase in the overall food intake of their children during the remote learning period [50], who also ate more home-cooked and hot meals [50][51]; additionally, as a result of cooking more meals at home, food quality also improved [51], as meals became more varied and healthier [16][51]. On the other hand, the increased amount of food in the household had negative impacts on food consumption patterns in children, such as overeating or increased eating frequency and snacking [14][34], which led some parents to express concerns about their children weight [13][52].

Evidence shows that cooking dinner frequently at home is associated with consumption of a healthier diet [53]; as a result, meal preparation at home is increasingly being promoted as an obesity reduction measure [54][55]. On the other hand, the consumption of food prepared away from home is associated with a lower quality diet and a higher body mass index (BMI) [56][57]. Still, healthy cooking depends on an individual's ability to use healthy ingredients and techniques (e.g., grilling or steaming vs. deep frying or sautéing) [53]. As degradation of traditional cooking skills progresses [58], meals at home often include processed foods with 36% of dishes being purchased in their finished form or finished entirely to package directions [59]. The exceptional circumstances of the lockdown provided a positive opportunity for more cooking among the general population [60], including cooking from raw ingredients [43], which, overall, was associated with eating more fresh products, including fruits and vegetables [60], and thus better diet quality and health status. Others, however, reported a decline in their diet quality due to consumption of comfort food and snacking [60][61][62], or food supply issues [60]. Research conducted during the COVID-19 pandemic supports previous evidence linking mood states with eating behaviors [63][64]. For example, a French study showed that mood was associated with the increased intake of processed meat and sweet-tasting and alcoholic beverages during the pandemic [63], whereas in Italy, comfort eating and overall increase in food intake was observed to improve the sense of wellbeing [64].

These negative trends in eating behavior during the lockdown may be particularly problematic because the increased consumption of "comfort" foods was combined with the dramatic reduction in energy expenditure, leading to energy imbalance and thus to weight gain [65]. Indeed, evidence shows that a significant proportion of the population gained weight during the lockdown [66]. Changes in cooking frequency also varied among population subgroups, as individuals in financial difficulty tended to cook less [60]; in this sense, the lockdown increased social

health inequalities. Previous research suggests that healthier dietary alternatives are available even in low resource areas [67][68]; however, social support is necessary to help people integrate those healthier foods into their diet [69]. Adequate strategies are needed to address poorer dietary choices of individuals by educating about healthy cooking and snacking in general, and to further support nutritionally vulnerable populations in particular.

5. Parents Interacting More with Their Children, but Also Being More Lenient

Parents interacting more with their children around food, including cooking, conversations, menu planning, gardening, and eating [50][51], was one of the most favorable outcomes of the pandemic crisis. Families enjoyed spending time together [13][50], and some parents also described that these moments became an opportunity for transmitting food-related knowledge [13]. Knowledge about food has been shown to influence food decisions [70][71] and inform meal planning [72], the latter being linked with an improved diet quality and less obesity [73]. Moreover, the importance of maternal nutrition knowledge on the diet quality of children/adolescents has been reported in several studies [74][75], including considerations for the mediating effect of the home environment [76]. Although people may use nutrition knowledge to change their eating behavior, this knowledge alone is unlikely to be effective [77], unless combined with the ability to apply it and motivation to change behavior [78]. For example, skills and knowledge on cooking may influence balanced food choices [79], whereas individuals with lower cooking skills are more likely to consume food away from home [80], which is often rich in energy, fat, and sugar, and lacks vegetables [56][57][80].

Parental food involvement is one of many different factors that shape the development of children's food preferences and eating behaviors during the first years of life [81]; this is because caregivers act as powerful socialization agents in terms of both food providers and food models [82][83][84]. For example, evidence shows that parental food involvement predicts child preference or intake of fruits and vegetables [85][86], and may influence consumption of 'healthy' foods more than 'unhealthy' foods [85]; on the other hand, low food involvement has been associated with poor diet quality (low intakes of fruits and vegetables) in women [87], and lack of parental time has been attributed to one of the risk factors which can cumulatively lead to excess childhood weight gain [88]. Similarly, in one systematic research of parenting styles, feeding styles, feeding practices, and weight status in 4–12-year-old children, uninvolved, indulgent, or highly protective parenting has been associated with higher BMI, whereas authoritative parenting has been associated with a healthy BMI [89]. Moreover, involving children in food preparation had a positive effect on their eating behavior, as children would have more interest in and accepted certain foods more easily when they had helped to prepare them [13]. This included involving children in gardening [50][51], which may encourage taste testing and an increased fruit and vegetable intake in children [90]. Additionally, several experimental studies have shown that gardening is linked to lower obesity levels in adults [91][92], improves lifestyle sustainability [93][94], and may become a solution to address global warming [94]. Previously identified barriers to parent involvement include time poverty, lack of access, lack of financial resources, and lack of awareness [95]. Greater family interactions facilitated by the social lockdown should be preserved and further promoted by addressing barriers to parent involvement outside times of pandemic.

On the other hand, parents became more permissive when they changed their feeding practices during the COVID-19 pandemic. An indulgent feeding style, being characteristic of parents who encourage eating with few requests [96], has been associated with higher child BMI [89]. Permissive feeding style is one example of the specific parental feeding styles that may be affected by parent emotional distress [97], including parental stress during the lockdown [98]; for example, stress associated with the lockdown may be linked to child snack intake with potential impacts on child obesity risk [98]. Parents may also experience higher levels of stress and depressed mood as a result of food insecurity exacerbated by the COVID-19 crisis [99][100], which has been linked to parents who put pressure on their child to eat more to avoid wasting food that has been prepared [53]. Parental stress has been previously shown to result in poorer feeding practices [101], including differences between food secure and food insecure families [102]; for example, food insecurity has been associated with an increased use of restrictive feeding practices and pre-prepared foods, whereas parents who were food secure tended to respond with pressure-to-eat feeding practices and offer their children more fast-food [102]. Greater use of non-nutritive feeding during the lockdown was also related to soothing, especially with younger children [98]. Younger children require more guidance, including providing more structure around meals and restricting snacks [98], but instead are more often subjected to instrumental feeding and emotion-based snack feeding by their parents [98]. Mindful parenting can lower levels of parenting stress, leading to less frequent use of food as a reward, and therefore helping children break habits relating to disordered eating [101]. Stress management and educating parents about mindful child-feeding practices may encourage healthier eating behaviors among children/adolescents during future lockdowns, as well becoming a part of ongoing efforts to address dysfunctional parental practices around food.

6. New Trends in Food Shopping and Meal Planning

Some families experienced practical inconveniences with grocery shopping [13], including food shortages and increased prices [33][43]; others had concerns about social exposure, resulting in food stockpiling [52] or reduced travel frequency to shops [43][103]. In response to these new challenges in food shopping, other coping behaviors and behavioral adjustments included bulk buying [34] and “panic shopping” [43], as well as the adoption of meal planning skills [13][34] and online grocery shopping behaviors [34][103].

The pandemic poses major threats to global food security, including breaks in the food supply chain, food shortages and choice limitation, and food price spikes and volatility [104][105]. The resulting bulk purchasing and stockpiling were significantly correlated with increased food purchase, which in turn led to increased food waste [106]. Observed or perceived lack of resources due to COVID-19 also led to panic shopping, which, for some, has been viewed in positive terms as preparedness behaviors (e.g., to reduce future trips to shops) [107], but overall is a dangerous phenomenon given its effects on price increase, supply disruption, or store congestion [108][109]. Panic buying is mostly caused by consumers’ heightened anxiety and fear [109], which, during the pandemic, has been further reinforced by scarcity messages with limited quantity and time [110]. On the positive side, panic buying is a rare phenomenon [111], and when panic occurs, it only influences a small group of people for a short period of time [112]. More importantly, problems with food availability and increased prices were not universally experienced due to differences in market resilience [14]. For example, Chinese food availability scored higher than the U.S. because of

the more versatile and diverse food retail sector in China, combined with proactive and progressive food security policies in urban planning implemented across the country [14]; on the other hand, food prices held steady in the U.S. as opposed to price volatility in China for reasons yet to be examined [14].

During the pandemic, many people also resorted to online shopping [113][114], which surged during the pandemic and eventually became unreliable [43], as retailers failed to keep pace with high continuous demand. For example, in India, the 'stay at home' regulation augmented the number of first-time users, who earlier were inhibited to shop online [115]. Common barriers to buying online include the security of transaction, the difficulty in using IT tools, and the quality of the delivery service, also linked to the characteristics of the product [116], whereas perceived the sustainability in purchasing online has been found to increase customer engagement [117]. During the pandemic, the shift to online shopping was caused by the closure of stationary retail stores [118] or concerns over COVID-19 (e.g., shopping inside grocery stores, avoiding public crowded gatherings) [119]. Despite many benefits of online shopping [120][121], experiences during the lockdown were mixed due to difficulty in finding delivery slots and incomplete food deliveries [43]. The long-term effects of the pandemic on online grocery shopping will require further analysis. It is possible that the digital-online shopping adoption becomes permanent [122], which, however, would have to be accompanied by grocers and retailers reidentifying their marketing strategies and enhancing their online shopping service to better serve online grocery shoppers; on the other hand, many online shoppers may choose to return to brick-and-mortar shopping when pandemic conditions subside, depending on customers' intention and motivation for continuance usage of online shopping [119][123]. Nevertheless, online shopping seems to be the way forward in terms of promoting sustainability paths by decreasing the quantity of shopping trips [124], and thus achieving an ecological long-term stability in line with the 2030 Agenda's sustainable development goals (SDGs) [125].

Finally, because of environmental effects of the COVID-19 pandemic on food security and food consumption, meal planning significantly improved. Benefits of meal planning for diet and health are multiple, including links with food consumption, diet quality, and weight status [73][126][127][128]. Specifically, planning meals in advance has been associated with increased frequencies of home meal preparation [126], having more family meals [129], a healthier diet and less obesity [73], and greater fruit and vegetable intakes [127], including the presence of fruits for dinner [128]. Moreover, meal planning has also helped successful weight losers to maintain their new weight [130], and could be a potential tool to offset time scarcity and reduce barriers of adherence to healthy eating [22]. During the pandemic, an increase in meal planning led to reduced household food waste [106][131], which was also correlated with behaviors focused on preserving foods, and using leftovers and shelf-stable items [106]. Private households have been identified as key actors in food waste generation [132], which has been attributed to resource depletion and greenhouse gas emissions [132]. It is therefore encouraging that efficient food use behaviors started during the pandemic may be continued, as shown by intentional declarations [106]. Moreover, it was also shown that even in times of pandemic characterized by food scarcity constraints, a palatable and diversified diet can be purchased very inexpensively from supermarkets, and visits to the supermarket can also be limited to one per month to reduce dangerous exposure, given effective meal planning is put in place [133]. These findings may inform future strategies relating to meal planning and waste management.

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7. Uneven Burden of COVID-19 on Families

The impacts of COVID-19 on diet have not been felt uniformly across society. For poor families, the family's food needs increased during the pandemic, and food-related support was critical, especially among single parents [43]. Changes in families' home food environment and parent feeding practices, from before to during the pandemic, differed by food security status [134]. A greater increase of pressure to eat was found for parents with insecurity, who also reported more concerns about children being overweight due to increased food intake of high-calorie snack foods and desserts and sweets [134]. Deals and reduced-to-clear items remained an important part of families' diet; however, infrequent shopping trips and reliance on unreliable supermarket home deliveries further compromised home food availability in fresh food products [43]. Moreover, single-parent families may have found it more challenging to adopt a healthy diet during the COVID-19 lockdown/s compared to parents living with partner [43]; for example, one study found that single parents had less time for meal provisioning at home because they had to entertain their children who otherwise would be at school [43]. One rapid research of qualitative evidence on parental perceptions of the food environment and their influence on food decisions among low-income families confirms that social support from families or government sources was an important first step in addressing health and nutritional inequities; however, long-term solutions are needed to tackle barriers to healthy eating, including child preferences, financial and time constraints, and location and access to food outlets [135].

People who are socioeconomically disadvantaged tend to have decreased access to healthy food retail outlets [136], such as supermarkets and grocery stores, and increased access to fast-food outlets where cheaper unhealthy food is readily available [137]. This has been known as a paradox of the obesity and poverty relationship that stems from both the easy availability and low cost of highly processed foods, in addition to unemployment and affordability constraints, lower education levels, and irregular meals in the population of poor people [138]. As affordability constraints remain an important determinant that relates to differences in obesity prevalence across geographical areas, it has been recommended that improving physical access to supermarkets and improving economic access to healthy foods are two valid strategies to deal with the obesity epidemic [139]. Recently, COVID-19 introduced new drivers of food insecurity, in addition to financial hardship faced by low-income households, by making access to food harder in terms of lack of food in the shops and through isolation [140]. As a result, in the UK, 'a newly vulnerable group who were financially stable pre-COVID emerged, making reliance on overstretched food banks and food aid charities no longer a sustainable solution to food insecurity' [140]. On the other hand, even in times of pandemic, a healthy diet can be maintained inexpensively through infrequent visits to the supermarket [133]. Nevertheless, for low-income families, making their eating habits more sustainable would require policy responses to low income, food access, and to the high cost of healthy foods [135].

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