



Challenges in Feeding Children Posed by the COVID-19 Pandemic: a Systematic Review of Changes in Dietary Intake Combined with a Dietitian's Perspective

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Abstract

Purpose of Review To examine the evidence that the dietary quality of children changed between the period preceding the COVID-19 pandemic and the first year during the pandemic.

Recent Findings A systematic review of the evidence for dietary changes occurring as a result of the pandemic-related restrictions, in Part I of this article, yielded 38 original research articles. These articles had conflicting results, some describing improvements in overall quality and some describing deteriorations. As a whole the studies were characterized by a low study quality, and children were poorly represented. Taken together, these studies do not provide enough evidence to draw conclusions about whether dietary habits changed or not as a result of the pandemic. However, in a wider, narrative review of the psychosocial changes occurring as a result of the COVID-19 pandemic, and the known associations of these factors with a dietary intake in Part II, we conclude that there is a reason to expect that the dietary quality of children might have been adversely affected by the COVID-19 pandemic.

Summary One the one hand, the literature fails to provide conclusive evidence on changes in the dietary quality of children resulting from the COVID-19 pandemic. On the other hand, the broader literature supports the hypothesis that children's dietary quality will have declined during the pandemic. Taken together, we urgently need more high-quality research on children's changes in dietary intake occurring over the pandemic. This will provide important information on whether any potential long-term consequences of such changes, if they exist, need to be examined and ameliorated.

Keywords COVID-19 · Diet quality · Systematic review · Disparities

Introduction

Context

In December 2019, the deep sequencing of samples from the lower respiratory tract of a cluster of patients presenting with viral pneumonia of no known cause in Wuhan, China, revealed the existence of a novel pathogen, named severe acute

respiratory syndrome coronavirus 2 (SARS-CoV-2). SARS-CoV-2 causes the disease initially named as “2019 novel coronavirus” (2019-nCoV), more commonly now known as COVID-19 [1]. COVID-19 spread rapidly throughout the globe, leading the World Health Organization (WHO) to declare COVID-19 a global pandemic in March 2020 [2]. At the time of writing (February 2021), Worldometer reported the cumulative global number of cases to be 107,639,508, resulting in 2,358,130 deaths [3,4], while in the United States (US) The Centers for Disease Control (CDC) reported over 26,000 cumulative US cases resulting in 463,659 deaths [5]. The efforts of the public health community to understand and stem the spread of COVID-19 have been described as “unprecedented” [6]. As well as encouraging individual-level behaviors such as mask wearing, hand washing, and the use of hand sanitizer [7], there has been the widespread implementation of broader “lockdown” mandates which can include everything from relatively short periods of self-isolation/quarantine for those

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exposed to SARS-COV-19 or testing positive for COVID-19, to local, regional, and national restrictions on business openings, the opening of schools and places of worship, and restrictions on personal non-essential travel to distances as short as a one-mile radius from home. Since the declaration of COVID-19 as a pandemic, almost 4 billion people, that is, nearly half the world's population, have been asked to participate in some form of confinement, be it a mandatory or recommended curfew, isolation, or quarantine, or some other forms of restriction on social contact (report cited in [8]). Based on this universal and sometimes extended restriction, the adverse effects of COVID-19 are not expected to be limited to symptoms and outcomes of COVID-19 alone, but are anticipated to include multiple other mental, physical, and psychosocial sequelae arising from the pandemic environment.

Rationale

Health pandemics have been noted to increase population-level mental distress, and the COVID-19 pandemic is no exception as starkly illustrated by observed and projected increases in the rates of dying by suicide [9–11]. Layered on top of this, data from previous disease outbreaks show that the effects of lockdowns, in all their forms, can have a dramatic impact on health behaviors. In addition to reports of reductions in physical activity [12–14] and increases in sedentary time [12, 13] (although we note some reports to the contrary [15]), the separation from loved ones, the loss of freedom, and the uncertainty and boredom have also been associated with declines in those mental health factors which, in turn, influence health behaviors. A recent, scoping review found that a substantial number of studies before the current pandemic associated lockdowns with generally high psychological distress, high depressive symptoms, emotional exhaustion, detachment from others, irritability, insomnia, poor concentration, indecisiveness, fear, nervousness, sadness, deteriorating work performance, and reluctance to work/consideration of resignation, with those symptoms related to low mood and/or irritability “standing out” as having a particularly high prevalence [16]. Data from around the globe suggest that the current COVID-19 pandemic is having similar adverse effects [17]. In addition, although data are scarce, it has been noted that women, especially those who are caregivers to young children, may be disproportionately affected by the psychosocial/psychological effects of the pandemic. Early reports suggest that violence against women is increasing [8]. Women may have more severe and more prevalent disturbances in sleep and psychological functioning [18] and a higher prevalence of mental distress [19, 20], as well as increased symptoms of anxiety [21], stress [21], and depression [21]. Even though not all data are consistent in reporting stronger effects on the mental health of women than men [22], it is clear that in most nations, women are bearing the majority of

financial impacts resulting from the pandemic, such as increased job losses [23]. Globally, women still carry the greatest burden in child rearing [24], a disparity which may have increased further during the COVID-19 pandemic [25]. Therefore the adverse effects of the pandemic which are disproportionately affecting women—plus the effects of school closures and reduced social contacts—gives rise to the expectation of similar negative sequelae on children. Given that strong associations of dietary quality with factors such as good mental health [26, 27] and economic security [28] have been well established across women, children, and adolescents, it may be expected that one health behavior which will be adversely affected by the current pandemic will be maternal and child dietary quality.

Objectives

The purpose of this review is to combine the current evidence in the published literature on how the COVID-19 pandemic may have affected the dietary quality of families with the personal experience of one registered dietitian working with families during this period. In Part I, we conduct a systematic review of dietary changes during the COVID-19 pandemic and summarize the key findings of this body of literature. The inconsistent findings and the methodological limitations in this literature serve to highlight that we know very little about how diets have changed over the COVID-19 pandemic, particularly in the case of children. In Part II, we share the observations and experiences one of the co-authors has gained through her work as a registered dietitian, practicing through this pandemic, and provide evidence-based hypotheses on the effects these will have on the dietary quality of families. This protocol was reviewed by the Institutional Review Board at Baylor College of Medicine (protocol number:H-49021), which determined that this activity does not constitute human subject research and so does not fall under the regulations for IRB review of human subject research.

Part 1: Summary of the Literature

Methods

Initial Search

The senior author extracted all manuscripts in MEDLINE resulting from the search terms “[COVID-19 OR SARS-COV-2] AND [Diet]” on February 10, 2021 ($N = 508$; Fig. 1). Articles were selected for inclusion (Table 1) using pre-defined data fields representing each eligibility/exclusion criterion. The overall protocol was registered using the International Prospective Register of Systematic Reviews (PROSPERO [29]; registration number CRD42021160754)

Table 1 Summary of included studies

First author.	Country	Population	Ages (y)	N	Study quality/risk of bias	Dietary intake measure
					Design	
Di Renzo [45]	Italy	General population	≥ 12	3533	Retrospective	Study-specific questionnaire
Pietrobelli [58]	USA	Children and adolescents with obesity	6–18	41	Longitudinal	Study-specific questionnaire
Romero-Blanco [107]	Spain	University students	20.5 (4.56) ³	213	Pre/post	Validated study-specific questionnaire
Rodríguez-Pérez [43]	Spain	General population	≥ 18	5417	Pre/post	Validated study-specific questionnaire
Ghosh [60]	North India	Patients with Type 2 diabetes	≥ 18	150	Retrospective	Study-specific questionnaire
Górnicka [33]	Poland	General population	≥ 18	2381	Retrospective	Study-specific questionnaire
Scarmozzino [51]	Italy	General population	NR	NR	Retrospective	Study-specific questionnaire
Rolland [38]	France	General population	> 16	11,391	Retrospective	Study-specific questionnaire
Grabia [61]	Poland	Patients with T1DM and T2DM	17–28	124	Retrospective	Study-specific questionnaire
Sánchez-Sánchez [44]	Spain	General population	≥ 16	385	Retrospective	Validated study-specific questionnaire
Błaszczyk-Bebenek [50]	Poland	General population	> 18	312	Retrospective	Validated questionnaire
Cheikh Ismail [32]	UAE	General population	≥ 18	1012	Longitudinal	Study-specific questionnaire
Robinson [31]	UK	General population	≥ 18	2364	Retrospective	Study-specific questionnaire
Zhang [64]	China	Pregnant females	18–45	640	Retrospective	Study-specific questionnaire
Marty [36]	France	General population	≥ 18	1353	Retrospective	Validated FFQ
Poelman [37]	The Netherlands	General population	18–87	1030	Retrospective	Study-specific questionnaire
Canello [39]	Italy	General population	≥ 18	490	Retrospective	Study-specific questionnaire
Sankar [62]	South India	Adults with T2DM	≥ 18	110	Retrospective	Study-specific questionnaire
Biviá-Roig [65]	Spain	Pregnant females in second or third trimester	≥ 18	90	Retrospective	Study-specific questionnaire
Kriaucioniene [52]	Lithuania	General population	≥ 18	2447	Retrospective	Validated questionnaire
Zhang [108]	China	General population	18–80	1994	Retrospective	Validated questionnaire
Ferrante [46]	Italy	General population		7847	Retrospective	Study-specific questionnaire
Lamarche [42]	Canada	General population	≥ 18	853	Prospective	Study-specific questionnaire
Jia [35]	China	General population	15–28	10,082	Retrospective	Study-specific questionnaire
Alhusseini [40]	Saudi Arabia	General population	≥ 18	2706	Retrospective	Study-specific questionnaire
Steele [41]	Brazil	General population	≥ 18	10,116	Longitudinal	Validated questionnaire
Dragun [48]	Croatia	Students from the general population	18.0 (6.0) ⁴	531	Retrospective, with pre-/post-subsample	Validated questionnaire
Buckland [49]	Worldwide [5]	General population	≥ 18	588	Retrospective	Study-specific questionnaire
Matsungo [54]	Zimbabwe	General population	≥ 18	507	Retrospective	Study-specific online questionnaire
Ruiz-Ruso [63]	Spain	Patients with T2DM	40–80	72	Retrospective	Validated FFQ
Ruiz-Ruso [56]	Spain, Italy, Brazil, Columbia, Chile	General population	10–19	820	Retrospective	Study-specific questionnaire

Table 1 (continued)

First author.	Country	Population	Ages (y)	N	Study quality/risk of bias	
					Design	Dietary intake measure
Bin Zarah [109]	The USA	General population	≥ 18	37	Retrospective	Study-specific questionnaire
Giacalone [34]	Denmark	General population	≥ 18	2426	Retrospective	Study-specific questionnaire
Cicero [47]	Italy	General population, of Caucasian ancestry	≥ 18	359	Prospective	Validated FFQ (DQI)
Murphy [53]	The UK, the USA, and New Zealand	General population	≥ 18	2360	Retrospective	Study-specific questionnaire
Sharma [55]	The USA	Low-income population	N/A	1048	Retrospective	Study-specific single-item question
Munasinghe [57••]	Australia	General population	13–19	301	Prospective	Validated questionnaire
Jansen [59]	The USA	General population	2–12	318	Retrospective	Validated FFQ (adapted)

Abbreviations: *DQI* diet quality index, *FFQ* food frequency questionnaire, *NR* not reported, *T1DM* Type 1 diabetes mellitus, *T2DM* Type 2 diabetes mellitus, *UAE* United Arab Emirates, *UK* United Kingdom, *USA* United States of America

and reported according to the guidance in the statement on preferred reporting items for systematic reviews and meta-analyses (PRISMA [30]).

Eligibility Criteria

Manuscripts were included which were available in English, contained primary data analysis, and reported on differences in the intake of specific foods before and after March 2020 (i.e., before and during the COVID-19 pandemic, in broad terms).

Exclusion Criteria

After excluding duplicates ($N = 2$), studies were sequentially excluded which did not have the full text available in English ($N = 15$), did not describe dietary changes occurring from before to during the COVID-19 pandemic ($N = 383$), did not include primary data ($N = 36$), did not report on changes in specific food groups but related behaviors (e.g., reported on eating habits, types of food, and/or appetitive traits; $N = 29$), conducted data reduction efforts such that changes in individual foods or food groups could not be described (e.g., used principle component analysis; $N = 2$), or reported only on the associations of individual characteristics with dietary changes and did not include an analysis of population-based change ($N = 3$) were excluded. This process yielded a final sample of 38 studies (Table 1).

Data Extraction

Information was extracted from each included study on (1) study characteristics (sample size, country of origin for participants), (2) study design, (3) ascertainment of sample, and (4) method of obtaining dietary intake and (5) results of analysis.

Risk of Bias

Study quality was assessed via (1) study design and (2) the method of measuring dietary intake (Table 2) and scored within a range of 10–8. The majority of studies took a retrospective approach.

Results

Description of Studies

Study quality is generally low, ranging from zero to five out of a possible maximum score of seven, with a mean of study quality score of 2.11 (Fig. 2). The low assessment of study quality is driven by the use of cross-sectional designs which relied on retrospective reports of pre-pandemic dietary intake (79% of studies) and by assessments of dietary intake prone to

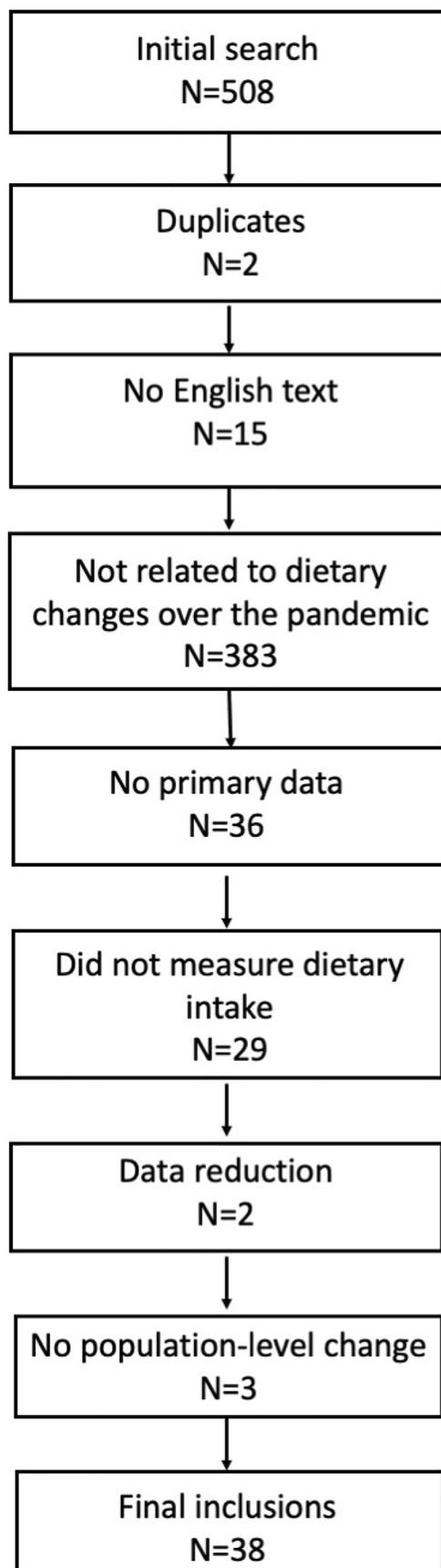


Fig. 1 Study selection

bias: no studies used objective data or multiple 24-h recalls of intake (the gold standard self-report methodology). Only 13 studies (34%) reported that their measure of dietary intake had been validated in previous analyses (Table 1).

A strength of the overall literature is the representation of a broad range of countries and cultures. However, within the impressive geographical breadth, the specific populations studied are limited. The majority of studies (74%) reported on dietary changes in adults from the general population, with only six studies (16%) in clinical populations, with four including patients with diabetes and two including pregnant females. A similarly small number of studies presented data on children or adolescents (11%), although one additional study included children over the age of twelve in the overall analysis (Table 1).

Dietary Patterns

Overall, it is not clear whether people perceive their dietary quality to have changed, and if so in which direction, over the pandemic. Reports of a decline in overall dietary quality were available from studies based in the United Kingdom (UK) [31], United Arab Emirates (UAE) [32], Poland [33], Denmark [34], Japan [35], France [36], of no change in the Netherlands [37], and Italy [38]. Mixed results within a study were also available from Italy where one study reported both perceived improvements (34%) and declines (19%) [9]. Improvements in overall dietary quality were available from Saudi Arabia [40], Brazil [41], Canada [42], and Spain (via a closer adherence to a Mediterranean-style diet [43, 44]).

Specific Foods

When looking at data from adults, a consistent pattern of changes in the intake of individual foods, or food groups, could not be isolated from the literature. Changes suggesting an improvement in dietary quality are indicated by reports of increases in the intake of cereals [45] and whole grains [33, 42, 46], nuts [47], pulses, beans and/or legumes [33, 36, 41, 42, 44–46, 48, 49], white meat [45], eggs [33, 47, 50], potatoes [50], fish and/or seafood [34, 36, 42, 44, 48], milk/other dairy [33, 42, 47], fruits, and/or vegetables [33, 36, 41–43, 46–48, 51–53]. Similar positive changes are also suggested by reports of decreases in refined grains [42], sugar sweetened beverages (SSBs) [32, 33, 43, 44], sweets [48], and red meat [52]. Yet some studies disputed these positive findings, reporting perceived increases in carbonated and SSBs [34, 36], and processed/red meats [33, 36, 43, 47] and decreases in the intakes of fish [33, 45, 47, 52], cereals/whole grains [33, 48, 54], dairy [35, 48, 54], nuts [48, 54], legumes [34, 47], and fruits and/or vegetables [33–35, 54, 55]. Other changes associated with a decrease in dietary quality during the pandemic include reported increases in butter and margarine [44],

Table 2 Criteria for assessing study quality

Points awarded.	Method	Description
<i>Study design</i>		
3	Prospective	Each participants is surveyed before the pandemic and during the pandemic and their dietary intake compared between time points
2	Pre/post	Separate groups of participants are surveyed either before or during the pandemic, and differences in the intake are based on group comparisons
1	Retrospective	Cross-sectional design in which participants surveyed during the pandemic are asked to recall their diet before the pandemic and/or comment on changes
<i>Dietary assessment method</i>		
7	Objective assessment	Dietary intake is either observed by trained study staff or ascertained by a blood-based nutritional marker
6	Multiple 24-h recall	Participants are asked to recall their dietary intake for 24 h, in the presence of trained study staff, for at least one weekend day and one weekday
5	Single 24-h recall/validated FFQ	Participants are asked to recall their dietary intake for 24 h, for a single 24-h period, or participants complete a validated FFQ
4	Validated study-specific questionnaire	Participants complete a questionnaire developed for the study under question, which asks about the intake of several foods and has been validated in previous analyses
3	FFQ	Participants complete an FFQ which has not been previously validated
2	Study-specific questionnaire	Participants complete a questionnaire developed for the study under question, which asks about the intake of several foods which has not been validated in previous analyses
1	Study-specific single-item question	Participants are asked a single question about their intake (usually relating to a single food item)

Abbreviations: *FFQ* food frequency questionnaire

chocolate [38], ice-cream [33, 38], calorically dense low-nutrient snacks [49], desserts (including pastries) [33, 34, 38, 43, 47, 50], saturated fats [53], and salty snacks [33, 38]. Yet, these findings were also not reported consistently (e.g., there are reports of no change in intake of salty and/or highly caloric snack foods [38], red meat [54], and egg consumption [54]). Changes which were harder to categorize as positive or negative included increases in pasta [47], bread [47], bread-like products [47], and coffee [47].

Alcohol

Whether alcohol intake increased or decreased was similarly hard to categorize. Several studies, even those that may have minimized the tendency to give socially desirable answers by collecting anonymous surveys online, reported a decrease in alcohol consumption [36, 45, 51]. Yet, others report no overall change [52] and some an overall increase [33, 34, 36, 46, 47]. One study found that an overall increase was attributable to male participants only [46].

Children and Adolescents

It was also difficult to discern a consistent pattern of findings in younger populations. Adolescents were reported to consume more fruit [56], vegetables [56], legumes [56], fried [56], and sweet [56] foods during the pandemic, but these findings in fruit [57••] and vegetables [57••] are disputed. A decrease in meat [56] and SSBs [56] was reported by one study but lacks support from similar findings in other studies. Younger children were reported to consume more potato chips [58], red meat [58], and more sweet, highly caloric snack foods [59], with one study suggesting this latter arose from changes in food parenting practices [59], suggesting their dietary quality may have decreased during the pandemic.

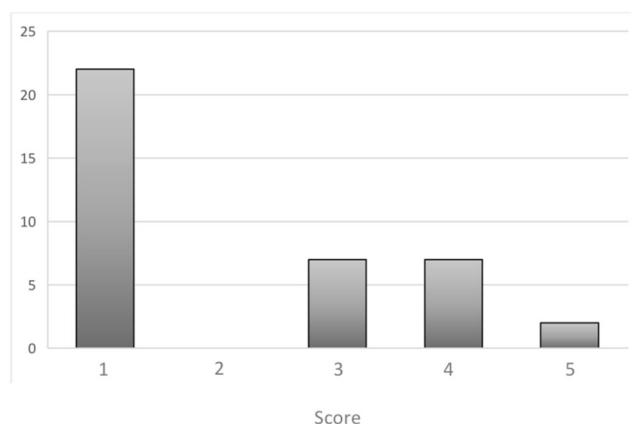


Fig. 2 Distribution of study quality scores

However, there was also a report of no changes in vegetable intake [58], alongside an increase in fruit intake [58].

Findings in Clinical Populations

Adults with diabetes represented the majority of clinical samples and reported consuming more carbohydrates [60], fat [60], water [61], fresh fruits and/or vegetables [61–63], dairy [63], and whole grains [61], with notable decreases in salty [61] and sweet [61] snacks in one study, but not in another [63], and decreases in red meat [61]. One study reported that patients with diabetes perceived that their intake of nuts [63], cereal [63], legumes [63], fruit [63], and meat [63], to increase. Pregnant women often reported their overall diet quality did not change [64, 65]. Although one study supported this notion, reporting no changes in the consumption of individual foods [65], others reported changes indicative of a change in dietary quality. Decreased fish and seafood [64], sugar, and honey [64]; oils and fats [64]; meat [64], poultry [64], offal [64], legumes [64], and of fried food [62] intake; and increased fruits and/or vegetables [64], eggs [64], dairy [64], and cereal [64] intake were reported. However, the extent to which any changes can be attributed to the pandemic environment versus expected changes during pregnancy is not clear.

Synthesis

Overall, the data do not provide a persuasive picture of whether individuals' dietary intake changed over the course of the pandemic. Perhaps expectedly, it is also impossible to isolate changes in the intake of individual foods which could give clues into changes in overall dietary quality. While the body of literature is impressive for the recency of the pandemic, with the 38 included studies being published within 11 months of the WHO declaration, we found that the studies suffered from an overall low study quality. In addition, children and adolescents are not well represented in the literature.

Part II: An Expert Opinion on how the Pandemic Has Altered the Family Feeding Situation

Context

Part I reviewed the existing studies seeking to examine changes in dietary quality occurring over the COVID-19 pandemic. The conflicting results, generally low methodological quality of studies, and paucity of data on children and adolescents precluded conclusions on whether such changes occurred, and if so, what the nature and extent of these were. In the first author's experience as a registered dietitian, who continued to work with families during this time, clients described a clear

shift in the psychosocial environment, including shifts in factors which prior research has shown to influence dietary quality and feeding decisions. In Part II of this manuscript, we provide a narrative review in support of the notion that such changes occurred and infer what the effect these may have had on children's dietary quality based the first author's observations and the existing literature.

Historical Context

As the incidence of two income families continues to grow in the USA, rising from approximately 25% of the US population in 1960 to approximately 60% at the turn of the century and subsequently plateauing [66], the likelihood of traditional meals together as a family seems to lessen—an observation tentatively supported by early research [67–74]. Further, the time spent cooking at home is lessened in dual-income families [70, 73]. What the first author has seen is that between exhausted parents, busy schedules, and isolated family members, a sit-down meal, at home, cooked by one of the parents, is an increasing rarity in this century. Many families are now in their second or third generation of two working parents which, following the Becker/Grossman framework for understanding how increased maternal employment might affect the family as a function of trade-offs in parental time and resources to invest in children [75–79], means many of the current parents who are struggling to provide realistic family meals were also not raised with an expectation of family meals by their own dual working parents. In addition, this shift has coincided with the growth of the wellness industry [80,81] which is recognized as heavily devoted to fad diets [81], supplements [80], and food products that the first author's clients feel offer a “fountain of youth,” or “magic lamp,” if you will. It seems many marketing schemes promise to make health and wellness easy as long as you use this supplement/ food/ program/new idea to fix all of your wellness problems. The propensity to rely on diet culture and the supplement industry for our wellness information further confuses adults and children alike, therefore perpetuating the problem of discovering balance and pursuing wellness. As we are bombarded with all of this information, it creates nearly impossible decision-making for the uneducated consumer. As women have continued to gain traction in the workplace over nearly the last century, they have struggled for equality in benefits, pay, and authority. One area that has consistently lagged behind in women's equality is the responsibility of managing a household and children [82, 83]. As women have continued to work longer hours for (typically) less pay, they are often expected to manage the social calendar, domestic economy, family medical needs, and educational progress of the entire family. It is no secret that this expectation to be sacrificially committed at work and also sacrificially committed to their homes have left many women, mothers in particular, feeling overwhelmed,

exhausted, and inadequate for decades. In Spring of 2020, a new burden arrived to rest on the shoulders of the overworked mother: COVID-19.

The Psychosocial Environment of the COVID-19 Pandemic

As the virus has expanded its grasp on our society, the economic effects of COVID-19 have been overwhelming for parents. Parents took on even more responsibilities in the home, like schooling and daily child supervision, in addition to their now remote work. Among the first author's clients, these economic effects have been disproportionately felt more by women than men, especially when children are in the family. And their experience reflects the emerging global data: for example, the productivity of academics dropped more when children were in the home [84–87], with female academics disproportionately affected [84, 86, 88, 89, 90, 91].

Many families entered some kind of quarantine and/or isolation in Spring of 2020 that then continued into 2021. During this quarantine, parents were now performing traditional jobs in a remote work setting and learning while they go. While balancing this unexpected and drastic shift in work that requires multitasking child supervision and adult workload, parents were also expected to learn to facilitate distance education with their children, oftentimes requiring hours on end of screen time in the name of “learning.” With work and schooling also came the constant presence of the family in the home, leading to more laundry, more opportunities for food consumption in the home, and more opportunity for conflict with one another. In addition to all of the stressors at home comes a constant barrage of information that parents must filter through to glean the most important and pertinent information for their family and information about the virus, the vaccine, safety protocols, quarantine requirements, political and racial unrest, and an unknown timeline of return to “normalcy.”

Anticipated Effects of the Pandemic on Family Dietary Quality

Even before the pandemic, environmental, financial, and time-related stressors—particularly as perceived by the mother—adversely affected the diet quality of children [92, 93, 94]. The mental load of COVID isolation has been described in many anecdotal pieces; however, the facts to support the potential unforeseen side effect of these stresses on family dietary intake are only now emerging in recent research. Yet, this mental load of working, parenting, supervising, entertaining, distancing, protecting, and housekeeping fits within popular frameworks regarding the development of decision fatigue [95, 96]—and even before the pandemic were considered factors which negatively impacted how parents decided to feed themselves and their families [97–100], termed a “spillover effect” [100]. At the end of a hard day of thinking about all

of these things, the idea of making another decision, albeit about the family meal, is exhausting—enough for many of the first-author's clients to give up. In the first author's experience, many families have resorted to take-out meals to not only lessen the decision fatigue but also in an effort to find a reason to leave their house and move about their local area, not to mention support local businesses.

Low-income families, in particular, may find their environment adversely affected by the pandemic. Low-income families often rely on free and reduced school breakfasts and lunches to meet the food needs of their children. However, when schools moved to a virtual and distance learning mode, many families (half of pre-pandemic recipients in one analysis [101]) were robbed of this opportunity to regularly feed their children adequate meals [101–105]. School districts across the country have offered free and reduced school lunches to every student, regardless of income, for the 2020–2021 school year, but these can be difficult to receive for children who are not learning in person.

Conclusions

The current evidence does not provide evidence, from which persuasive conclusions about any changes in dietary quality over the pandemic can be inferred. It is not yet clear whether the dietary quality of children and adolescents changes, and if this occurred, what the specific foods are where changes in intake might account for changes. Yet, economic, financial, and time-related stressors have increased during the pandemic, and a strong body of literature supports that these stressors negatively impacted the dietary quality of families before the pandemic. This supports the notion that the change in dietary quality of families with young children is distinct from and may show steeper declines when compared with the change in dietary quality socioeconomic, racial, and geographical counterparts without children. Some supportive data are emerging. One study reported an overall decline in alcohol intake during the pandemic, with the exception of families with young children whose home were significantly more likely to report drinking a lot more during the pandemic (10 vs. 5.8%), while the opposite was true of households without children at home (12 vs. 16.2%) [106]. Yet, much more high-quality evidence is needed.

Given the pervasive methodological limitations noted in this literature, and the observations of the first-author, it is imperative that the potential impact of the COVID-19 pandemic on the dietary quality of families is not forgotten, nor neglected, but prioritized in research. While the effects of isolation and quarantine from COVID 19 are still being studied, one thing remains certain: feeding families healthy and balanced meals that do not feel like a burden is more difficult than ever before. Studies must examine the extent to which families' dietary quality has been an unanticipated casualty of

the pandemic and continue to identify strategies to mitigate these effects.

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- Of importance
- Of major importance

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