

# Food Values, Food Purchasing, and Eating-Related Outcomes Among a Sample of Quebec Adults During the COVID-19 Pandemic

DAIVA E. NIELSEN, PhD<sup>a</sup>; IREM KARAMANOGLU, RD, MSc<sup>a</sup>; HANNAH YANG HAN, MSc<sup>a</sup>; KATHERINE LABONTÉ, PhD<sup>a</sup>; CATHERINE PAQUET, PhD<sup>b</sup>

<sup>a</sup>School of Human Nutrition, McGill University, Montreal, QC; <sup>b</sup>Faculté des sciences de l'administration, Laval University, Quebec, QC

## ABSTRACT

**Purpose:** This investigation evaluated food values, food purchasing, and other food and eating-related outcomes during the COVID-19 pandemic in Quebec, Canada. The role of stress in eating outcomes was also examined.

**Methods:** An online household survey was conducted among Quebec adults aged ≥18 years (n = 658). Changes in outcomes during, as compared to before, the pandemic were evaluated using descriptive statistics and thematic analysis of free text responses. Eating outcomes by daily stress level (low, some, high) were assessed using Cochran–Armitage test for trend.

**Results:** Most respondents reported increased importance and purchasing of local food products (77% and 68%, respectively) and 60% reported increased grocery spending (mean ± standard deviation: 28% ± 23%). Respondents with a higher daily stress level had a higher frequency of reporting eating more than usual compared to before the pandemic (low stress 21%, some stress 34%, high stress 39%, *p*-trend <0.0001). Free text responses described more time spent at home as a reason for eating more than usual.

**Conclusions:** To support healthy eating during and post-pandemic, dietitians should consider patients' mental/emotional well-being and time spent at home. Moreover, support of local food products may provide opportunities to promote healthy eating, sustainability, and post-pandemic resiliency of food systems.

**Key words:** food values, food purchasing, food skills, COVID-19 pandemic.

(Can J Diet Pract Res. 2023;84:69–76)

(DOI: 10.3148/cjdr-2022-030)

Published at [dcjournal.ca](https://dcjournal.ca) on 22 November 2022

## RÉSUMÉ

**Objectif.** Cette enquête a évalué les valeurs alimentaires, l'achat d'aliments, et d'autres mesures liées aux aliments et à l'alimentation pendant la pandémie de COVID-19 au Québec, Canada. L'influence du stress sur l'alimentation a également été examinée.

**Méthodes.** Une enquête sur les ménages a été réalisée en ligne auprès d'adultes québécois de ≥ 18 ans (n = 658). Les changements dans les différentes mesures durant, comparativement à avant, la pandémie ont été évalués au moyen de statistiques descriptives et d'analyses thématiques des réponses de type texte libre. Les mesures liées à l'alimentation en fonction du niveau de stress quotidien (faible, moyen, élevé) ont été évaluées à l'aide du test de tendance de Cochran–Armitage.

**Résultats.** La plupart des répondants ont déclaré accorder plus d'importance aux aliments locaux et en acheter davantage (77 % et 68 %, respectivement) et 60 % ont déclaré avoir augmenté leurs dépenses d'épicerie (moyenne ± écart-type : 28 % ± 23 %). Les répondants présentant un niveau de stress quotidien plus élevé étaient plus susceptibles de déclarer qu'ils mangeaient plus qu'à l'habitude par rapport à la période précédant la pandémie (faible stress : 21 %; stress moyen : 34 %; stress élevé : 39 %; tendance *p* < 0,0001). Les réponses de type texte libre ont révélé que le fait de passer plus de temps à la maison constituait une raison de manger plus qu'à l'habitude.

**Conclusions.** Pour favoriser une saine alimentation pendant et après la pandémie, les diététistes devraient tenir compte du bien-être mental/émotionnel des patients et du temps passé à la maison. En outre, le soutien à l'égard des aliments locaux pourrait permettre de favoriser une saine alimentation ainsi que la durabilité et la résilience post-pandémique des systèmes alimentaires.

**Mots-clés :** valeurs alimentaires, achat d'aliments, compétences alimentaires, pandémie de COVID-19.

(Rev can prat rech diétét. 2023;84:69–76)

(DOI: 10.3148/cjdr-2022-030)

Publié au [dcjournal.ca](https://dcjournal.ca) le 22 novembre 2022

## INTRODUCTION

The COVID-19 pandemic has changed daily life around the globe. Restrictions to control the spread of the SARS-CoV-2 virus, such as working from home and closure of non-essential services (including schools), have had extensive unintended socioeconomic impacts [1, 2]. Quebec was the Canadian epicentre at the start of the pandemic and the province imposed a lockdown between 13 March and 4 May 2020

(see Supplementary Material<sup>1</sup> for further resources on the timeline of the pandemic in Quebec). Residents were instructed to remain home and limit trips for essential items, such as food. The first wave of the pandemic in Quebec began to subside in late May 2020 and public health restrictions were eased during the provincial deconfinement period (i.e., easing out of the lockdown) that began in the summer.

<sup>1</sup>Supplementary data are available with the article at <https://dcjournal.ca/doi/suppl/10.3148/cjdr-2022-030>.

Individual behaviours and perceptions related to food are important to evaluate during the COVID-19 pandemic, as the unique societal experiences of social distancing and isolation likely impacted complex factors connected to food intake including food access and psychosocial determinants of eating (for example, stress [3]). Current evidence on eating behaviours during the pandemic are mixed with both positive and negative impacts being reported, often within the same study sample [4–10]. However, while previous investigations have evaluated diet quality and intake, important practical and psychosocial considerations that can influence eating behaviour have been largely unexplored, including grocery spending, food skills, food values, desire to eat, and stress. Due to the unprecedented nature of the COVID-19 pandemic, investigations of the broader set of factors connected to food and eating are warranted.

We previously reported a reduction in the frequency of in-store grocery shopping and increased use of online grocery ordering during the first wave of the pandemic among a sample of Quebec households that responded to an online survey [11, 12]. This present investigation aimed to evaluate reported changes in food-related (food values, food skills, and grocery spending) and eating-related (desire to eat and eating amount) outcomes during the pandemic as compared to 2019 among participants who responded to a follow-up survey. Since stress has been consistently linked with eating behaviour [3], we also assessed respondent stress level and hypothesized that those with higher reported stress would report greater changes in their desire to eat and eating amount during the pandemic.

## METHODS

Detailed methods for the survey have been reported elsewhere [11]. Briefly, an open online survey was initially conducted during the lockdown period in Quebec in May 2020. Participants were recruited through radio and digital media advertisements, social media campaigning, e-mail listservs, and word of mouth. A follow-up survey was collected in August 2020, after the provincial deconfinement period and prior to the onset of the pandemic's second wave. The surveys were developed by the research team, comprised of nutrition and food environment investigators, and were available in English and French. The follow-up survey consisted of up to 36 questions, depending on the number of applicable follow-up questions. However, the present report is focused on results from 15 questions (two open-ended) that queried the outcomes of interest to this analysis (see Supplementary File<sup>1</sup> for Survey Questions). Ethics approval was obtained from the McGill University Faculty of Agriculture and Environmental Sciences Research Ethics Board (#20-05-021). As per ethics requirements, all questions were optional. Thus, minor variations in sample sizes across questions occur due to non-response.

Changes in food values (Survey Q1; “more important”, “less important”, “no change”) were assessed using the 11

items from Lusk and Briggeman's food values scale, which has been validated against grocery scanner data of food purchasing among a consumer panel of households in the United States of America [13, 14]. Two additional items of interest to the present investigation were included (purchasing from local retailers and food product brand). Changes in food product purchasing (Q2; “purchased more”, “purchased less”, “no change”) were evaluated using 21 food categories commonly found in grocery scanner data [15, 16]. Weekly grocery budget in 2019 (Q3) was assessed using increments of \$50 based on the most recent Statistics Canada estimate of household food spending (approximately \$119/week in 2016) [17]. Grocery budget change since the start of the pandemic was assessed with “decreased”, “did not change”, or “increased” options (Qs 4 and 5).

Survey items also evaluated changes in desire to eat (Qs 6–8), food skills in the household (Qs 9–11; definition provided on survey [18, 19]), eating amount (Q12; “eat more than you usually do”, “eat less than you usually do”, “no change”), and food interests/actions (Q13) (response options for Qs 6–11 and Q13: “increased”, “decreased”, “no change”). Follow-up questions were included for the desire to eat (Q7) and food skills (Q10) items to identify reasons for reported changes, which included 16 options such as stress, emotions, time, motivation, and media influences (social or other). Moreover, two open-ended questions were included for respondents to describe reasons for changes in their own words (Q8 and Q11). Stress was evaluated with two items from the 2020 Canadian Community Health Survey (Annual Component) (Qs 14 and 15): (i) a 5-point scale on daily stress level and (ii) an 8-item sources of stress question [20]. Items evaluating changes in outcomes were framed with the text “Compared to the year before COVID-19 (2019)...”.

## Statistical analysis

Descriptive statistics were calculated to report frequency (%) of responses using available data per survey item and mean and standard deviation for change in grocery budget. For comparisons by stress level, the 5-point scale on daily stress was collapsed into three levels (Not at all stressful and Not very stressful: “Low stress”; A bit stressful: “Some stress”; Quite a bit stressful and Extremely stressful: “High stress”). Cochran–Armitage test for trend was used to compare patterns of responses for changes in eating outcomes by the 3-level stress variable. Free text responses to open-ended items were evaluated by two investigators (DEN and KL) using thematic analysis [21]. Responses were read several times by DEN to identify themes with an inductive approach and propose categories. KL reviewed and together they both developed a coding frame and finalized categories. DEN performed categorization, which KL reviewed. Review of the initial categorization yielded 94% consensus. Discrepancies were discussed and 100% consensus was achieved. Themes that were unique from the list of options

provided and that were reported by  $\geq 5$  respondents are presented in the results.

## RESULTS

Among 1056 participants who consented to being contacted for follow-up, 658 (62%) consented to this survey and 633 responded to the last question (96% completion). Characteristics of the present sample aligned with those of the respondents who completed the baseline survey [11]. Respondents were primarily females residing in large urban areas with mid-to-high household incomes. The majority were married/common-law and the most prevalent household size was 3 or more individuals (Table 1). Most participants reported that their days were a bit stressful and one-quarter reported high stress. Work, health, and family were the most frequently reported sources of stress (Supplementary Table S1<sup>1</sup>).

### Food values, purchasing and spending

Compared to 2019, the food values that were most selected as gaining importance were purchasing food from local retailers (77%) and country of origin of food products (68%) (Table 2). Safety, environmental impact, price, ethical impact, naturalness, and brand of food products were also selected as gaining importance, but to a lesser extent (23%–48%). The remaining food values were relatively unchanged (nutritional value, convenience, taste, appearance, and tradition). The most noticeable reported change in food product purchasing compared to 2019 was for local food products (65% purchased more), while changes to all other food products were mixed. Subsets of respondents reported more purchasing (32%–40%) of frozen/shelf-stable items (canned or dried goods, baking products, alcohol, chips or other salty snacks, frozen fruits and vegetables) and some reported less purchasing (17%–26%) of fresh and frozen prepared meals, meat products, sweet snacks and desserts, and carbonated beverages with sugar (Table 2). The most selected weekly grocery budget in 2019 was \$100–\$149/week and most participants (60%) reported that their grocery spending increased compared to 2019 (Table 3). Among those who reported an increase, the mean  $\pm$  standard deviation increase in food spending was 28%  $\pm$  23% (range: 5%–175%, mode: 20%).

### Eating, food skills, and food interests

Compared to 2019, 28% of participants reported an increase in their desire to eat and 32% said they eat more than they usually do compared to 2019 (Table 3). The most selected factors (item response frequency  $>40\%$ ) that reportedly played a role in increased desire to eat were more comfort/enjoyment of food, stress, boredom, emotions, and anxiety (Figure 1 and Supplementary Table S2<sup>1</sup>). Free-text analysis revealed four additional themes, which were being at home and around food more often, increased cravings/snacking, a need to eat all meals with children who were at home, and health

**Table 1.** Respondent characteristics.

Characteristic	n (%) <sup>a</sup>
<b>Age group (years)</b>	
18–39	223 (34%)
40–59	278 (42%)
60 and older	155 (24%)
Total	656
<b>Gender</b>	
Woman	597 (91%)
Man	58 (9%)
Specified another gender	3 (<1%)
Total	658
<b>Language</b>	
French	383 (58%)
English	275 (42%)
Total	658
<b>Total household income</b>	
<\$20,000	26 (4%)
\$20,000–\$49,999	100 (15%)
\$50,000–\$99,000	251 (39%)
\$100,000–\$149,999	150 (23%)
\$150,000 or more	123 (19%)
Total	650
<b>Marital status</b>	
Never married	120 (18%)
Married/common-law	452 (69%)
Separated/divorced/widowed	84 (13%)
Total	656
<b>Urban vs. rural</b>	
Large population center	482 (77%)
Medium population center	38 (6%)
Small population center	36 (6%)
Rural	74 (12%)
Total	630
<b>Household size</b>	
Single individual	140 (22%)
2 individuals	229 (36%)
3 or more individuals	274 (43%)
Total	643
<b>Children at home<sup>b</sup></b>	
No	312 (57%)
Yes	235 (43%)
Total	547
<b>Thinking about the amount of stress in your life, would you say that most of your days are ... ?<sup>a</sup></b>	
Not at all stressful	31 (5%)
Not very stressful	151 (24%)
A bit stressful	293 (46%)

(continued)

Table 1. (Continued).

Characteristic	n (%) <sup>a</sup>
Quite a bit stressful	143 (22%)
Extremely stressful	22 (3%)
Total	640

<sup>a</sup>Percentages may not total to 100% due to rounding.<sup>b</sup>The response rate for this question is 83%; thus, results should be interpreted with caution.

consciousness. See Supplementary Table S3<sup>1</sup> for selected free-text responses from each theme. Eight percent of respondents reported that their desire to eat decreased and 12% reported that they eat less than they usually do. The most selected factors (item response frequency >40%) for a decreased desire to eat were stress, anxiety, and decreased motivation to cook (Supplementary Table S4<sup>1</sup>). Free-text analysis revealed health consciousness as an additional theme (Supplementary Table S3<sup>1</sup>).

Thirty-nine percent of respondents reported that food skills in their household had increased compared to 2019, while only 2% reported that food skills had decreased (Table 3). The most selected factors (>40%) related to increase in food skills were more time to prepare food, increased motivation to cook, more comfort/enjoyment of food, and more interest in food (Supplementary Table S2<sup>1</sup>). Free-text analysis revealed six additional themes, which were increased family participation, fear of virus exposure/reduced shopping frequency, reducing food waste, health consciousness, sourcing local foods/gardening, and closure of restaurants (Supplementary Table S3<sup>1</sup>). Among the small proportion of participants who reported that food skills had decreased, the most common selected factors (>40%) were stress, decreased motivation to cook, emotions, and food prices (Supplementary Table S4<sup>1</sup>). Free-text analysis revealed one additional theme, which was greater use of prepared foods.

Participants also reported changes to their food-related interests and actions. While interest in growing food, cooking, baking, and use of online grocery ordering increased among some (37%–43%), desire to go grocery shopping for fun, desire to eat at sit-down restaurants, and “fill-in” grocery trips (to buy a small number of ingredients/items) decreased (58%–70%) (Supplementary Table S5<sup>1</sup>).

### Eating-related outcomes by stress level

Significant differences in eating-related outcomes were observed by stress level. The frequency of reporting an increased desire to eat compared to before the pandemic significantly increased with stress level (low stress: 18%, some stress: 28%, high stress: 38%,  $p$ -trend <0.0001). The frequency of reporting a decreased desire to eat also significantly increased with stress level, although proportions were lower (low stress: 4%, some stress: 8%, high stress: 13%,  $p$ -trend <0.0001). The same significant observations were

present for eating amount with 21%, 34%, and 39% (low, some, and high stress groups, respectively) reporting that they eat more than they usually do compared to 2019 and 9%, 11%, and 16%, respectively, reporting that they eat less than they usually do ( $p$ -trend <0.0001).

## DISCUSSION

Among a sample of predominantly female adults in Quebec who responded to a follow-up survey, changes were reported in food and eating-related outcomes compared to before the pandemic. One of our most noticeable observations was the increased importance of purchasing food from local retailers. Support for local economies, including local food systems, has been reported globally during the pandemic [22, 23]. While local food systems promote sustainability and can provide access to healthy foods, they may also be important for building post-pandemic resiliency in food systems [24, 25]. In addition to purchasing more local food products, many respondents reported purchasing more baking products, alcoholic beverages, and frozen/shelf-stable products. A Consumer Price Index analysis of Canadian food purchases in the early months of the pandemic also reported increased purchasing of non-perishable products and baking products [26]. Most respondents reported an increase in their household food spending, which has been observed in other Canadian investigations [27, 28]. Increased food spending may be due to several factors including increased time spent at home, higher food prices [27], and potentially purchasing more food for a household reserve in the event of required self-isolation, an observation that we previously reported from our baseline data [11].

Our respondents reported increased interests in growing food and cooking/baking compared to before the pandemic. However, certain interests/actions in food procurement reportedly decreased, including small “fill-in” grocery trips and desire to eat at sit-down restaurants. These observations likely reflect adherence to stay-at-home directives, but also concerns of virus exposure in grocery stores and restaurants. Indeed, many participants in our study reported increased activity in ordering online groceries and take-out food (either by phone, online, or mobile app). Consumer concerns of virus transmission in grocery stores and food safety during the pandemic have been reported in other survey investigations conducted in Canada and internationally (e.g., India) [29, 30]. While, to our knowledge, no reports exist of virus transmission among patrons of food retailers, the impact of the pandemic on the food service sector has been profound. In 2020, approximately 30% of Canadian expenditures on food away from home shifted to grocery store spending [31]. Restaurants coped in part by adjusting operations to take-out and delivery services, and it is anticipated that prioritizing take-away services may prevail even post-pandemic [32].

Stress appeared to be linked to both reported increases and decreases in desire to eat and amount eaten (though more frequently linked to reported increases in these outcomes).

**Table 2.** Changes in importance of food-related factors and food purchasing during the pandemic compared to 2019 (pre-pandemic).

<b>Food value<sup>a</sup></b>	<b>More important</b>	<b>No change</b>	<b>Less important</b>	<b>Total responses</b>
Purchasing food from local retailers	500 (77%)	135 (21%)	11 (2%)	646
Country of origin of the food products	440 (68%)	198 (31%)	10 (2%)	648
Safety of the food products	312 (48%)	341 (52%)	1 (<1%)	654
Environmental impact of the food products	265 (41%)	360 (55%)	25 (4%)	650
Price of the food products	249 (38%)	331 (51%)	71 (11%)	651
Ethical impact of the food products	226 (35%)	406 (62%)	18 (3%)	650
Naturalness of the food products	192 (30%)	448 (69%)	7 (1%)	647
Food product brand	148 (23%)	475 (73%)	27 (4%)	650
Nutritional value of the food products	124 (19%)	518 (79%)	11 (2%)	653
Convenience of preparing the food products	102 (16%)	486 (74%)	65 (10%)	653
Taste of the food products	68 (10%)	573 (88%)	12 (2%)	653
Appearance of the food products	60 (9%)	569 (87%)	25 (4%)	654
Tradition associated with food products	58 (9%)	565 (87%)	24 (4%)	647
<b>Food product</b>	<b>Purchased more</b>	<b>No change</b>	<b>Purchased less</b>	<b>Total responses</b>
Local food products	415 (65%)	216 (34%)	10 (2%)	641
Canned or dried goods	254 (40%)	366 (57%)	22 (3%)	642
Baking products (e.g., flour, sugar)	239 (37%)	364 (57%)	40 (6%)	643
Alcoholic beverages	234 (36%)	330 (51%)	79 (12%)	643
Frozen fruits and vegetables	219 (34%)	383 (60%)	40 (6%)	642
Chips or other salty snacks	208 (32%)	360 (56%)	75 (12%)	643
Fresh fruits and vegetables	203 (32%)	399 (62%)	41 (6%)	643
Meat alternatives	150 (23%)	458 (72%)	31 (5%)	639
Bread products	136 (21%)	423 (66%)	85 (13%)	644
Candy, chocolate, or other sweet snacks	119 (19%)	404 (63%)	118 (18%)	641
Dairy products	96 (15%)	513 (80%)	35 (5%)	644
Meat products	89 (14%)	442 (69%)	106 (17%)	637
Carbonated beverages (without sugar)	88 (14%)	471 (74%)	81 (13%)	640
Dairy alternatives	86 (14%)	516 (81%)	35 (5%)	637
Breakfast cereals	77 (12%)	503 (79%)	60 (9%)	640
Frozen prepared foods	70 (11%)	433 (68%)	136 (21%)	639
Water (plain)	63 (10%)	515 (81%)	61 (10%)	639
Fresh prepared foods	62 (10%)	453 (71%)	126 (20%)	641
Juice	62 (10%)	515 (81%)	61 (10%)	638
Prepared cakes/desserts	54 (8%)	421 (66%)	165 (26%)	640
Carbonated beverages (with sugar)	30 (5%)	488 (76%)	123 (19%)	641

Note: Percentages may not total to 100% due to rounding. Results are listed in descending order by "More important" and "Purchased more", respectively.

<sup>a</sup>Food-related factors are comprised of Lusk and Briggeman's [13] 11 food values and two additional items (purchasing food from local retailers and food product brand).

This observation aligns with the recognized complexity between stress and eating, which can lead to both over- and under-eating [33]. Indeed, other research has reported mixed observations of both healthful and unhealthful dietary outcomes during the pandemic within the same study sample [6–10]. Among our sample, comfort/enjoyment of food, stress, and boredom were the most frequently reported reasons for increased desire to eat, and thematic analysis revealed other reasons such as being home and around food frequently and

needing to prepare all meals for children at home. These results give novel insight into possible reasons for changes in eating behaviour during the pandemic and should be considered by dietetics professionals in their practice or research.

Food skills have been positively associated with diet quality [34, 35], thus the reported increase in household food skills could hold benefits for individuals and families. We also observed a theme that food skills and meal planning were used

**Table 3.** Reported changes to grocery budget, desire to eat, eating amount, and household food skills during the pandemic, compared to 2019 (pre-pandemic).

Survey questions	n (%) <sup>a</sup>
<b>What was your household's weekly budget for grocery shopping in 2019 (i.e., the year BEFORE COVID-19)?</b>	
Under \$50 per week	13 (2%)
\$50–\$99 per week	144 (23%)
\$100–\$149 per week	207 (33%)
\$150–200 per week	139 (22%)
\$200–\$250 per week	79 (13%)
Over \$250 per week	49 (8%)
Total	631
<b>Please indicate how your household's weekly budget for grocery shopping changed since the start of the COVID-19 epidemic in Quebec.</b>	
Increased	387 (60%)
No change	216 (34%)
Decreased	39 (6%)
Total	642
<b>Compared to the year before COVID-19 (2019), how has your desire to eat changed?</b>	
Increased	177 (28%)
No change	413 (64%)
Decreased	51 (8%)
Total	641
<b>Since the start of COVID-19, would you say you . . .</b>	
Eat more than you usually do	204 (32%)
Eat less than you usually do	75 (12%)
No change in how much you eat	361 (56%)
Total	640
<b>Compared to the year before COVID-19 (2019), how have food skills in your household changed?</b>	
Increased	249 (39%)
No change	380 (59%)
Decreased	14 (2%)
Total	643

<sup>a</sup>Percentages may not total to 100% due to rounding.

to minimize food waste, since many respondents indicated they had reduced their grocery shopping frequency. More time and more motivation to prepare food were common factors for the report of increased food skills. Although more research is needed, we speculate that cooking could have been used as a coping strategy during points of the pandemic with stricter restrictions, given the limited abilities for interactions and activities outside of the home. Indeed, positive attitudes

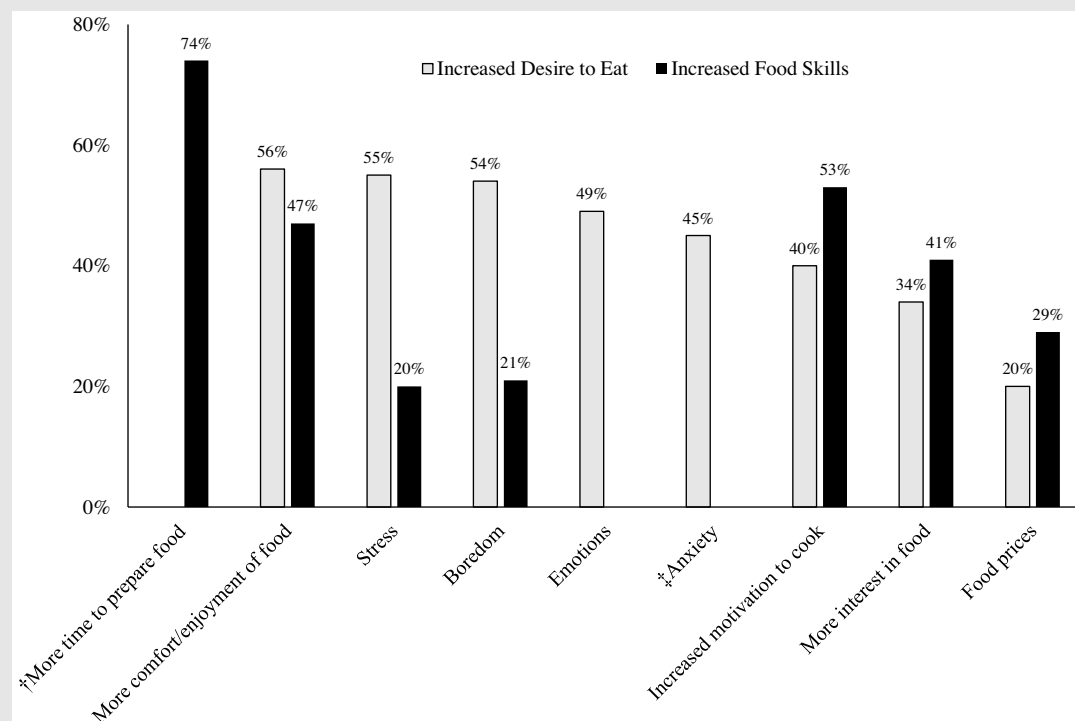
toward home cooking during the pandemic have been reported internationally. An online survey conducted in the United Kingdom among a representative sample of adults reported that nearly 75% of respondents enjoyed cooking at home over the year 2020 [36], and cooking was reported to be related to pleasure and relaxation during a pandemic lockdown in Turkey [37]. However, some individuals may grow fatigued from the increased need to cook and turn to consuming prepared foods, which we observed among a small proportion of our respondents. It is interesting to note that some respondents selected media exposures (social or other media) as a reason for increased food skills, but few reported media exposures as a reason for changes in eating outcomes. Future considerations of links between media exposures, food preparation and intake are warranted, as time spent on social media has increased during the pandemic [38, 39]. While exposure to food marketing on social media is gaining recognition as a factor that may influence eating behaviour among youth [40, 41], its relevance for adult food choices is also an emerging area for investigation [42].

Our investigation is not without limitations. First, recruitment of representative samples of the population is challenging with open online surveys. Indeed, our sample was comprised primarily of women and thus is not representative of the province of Quebec. The self-reported nature of the data is another limitation. The accuracy and (or) reliability of survey responses may be impacted by response bias, recall bias, and social desirability bias. Lastly, although our investigation included subjective aspects of eating, we did not measure dietary intake and thus cannot infer whether reported changes were healthful or less healthful. Notwithstanding the above, social media campaigns to assist with recruitment are increasingly being recognized for their effectiveness in accessing low prevalence and hard-to-reach populations and have been reported to be advantageous for surveys conducted during the pandemic [43, 44]. Moreover, our study design required the household's primary grocery shopper to be the respondent. The large proportion of female respondents may reflect observations that women are more likely to take on responsibilities for food budgeting, purchasing, and preparation within a household [45]. Women also have been reported to be more knowledgeable about a household's food situation, potentially being more suitable respondents for household food surveys [46]. Lastly, our findings align with previous reports about food purchasing in Canada during the pandemic and existing knowledge regarding the complexity between stress and eating, increasing our confidence in our observations.

## RELEVANCE TO PRACTICE

Given the global trend for increased importance of supporting local economies, dietitians and nutrition professionals in various sectors (clinical practice, public health, and research/education) may wish to engage with local food providers to promote healthy eating, sustainability, and post-pandemic

**Figure 1.** Most frequently selected reasons for reporting increased desire to eat and increased household food skills during the pandemic, compared to 2019 (pre-pandemic).



Note: Full results as n (%) are reported in Supplementary Table S2<sup>1</sup>, including for the remaining reasons provided in the questions that were reported at a frequency of <20%.

<sup>†</sup>Option provided on increased food skills question only.

<sup>‡</sup>Option provided on increased desire to eat question only.

resiliency in food systems. Increased household food skills could hold benefits for individuals and families, though dietitians can contribute to communicating strategies that reduce fatigue of food preparation. Finally, given our observations of stress and time spent at home being linked to reports of increased eating and desire to eat, practicing dietitians should inquire about patients' mental/emotional well-being and time spent at home. Where indicated, counselling on strategies for regulating food intake and stress management can be provided.

**Financial support:** McGill Social Sciences and Humanities Research Council (SSHRC) Institutional Grant and the McGill Interdisciplinary Initiative in Infection and Immunity (MI4). Support for open access publication was provided by the Canadian Home Economics Foundation Gwenyth Bailey Simpson Award.

**Conflict of Interest and Funding Disclosure:** The authors have no conflicts of interest.

## REFERENCES

1. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 Home Confinement on Eating Behaviour and Physical Activity: Results of the ECLB-COVID19 International Online Survey. *Nutrients*. 2020;12(6). Epub 2020/06/03. PMID: 32481594. doi: 10.3390/nu12061583.
2. Shubber N, Sheppard J, Alradhawi M, Ali Y. The impacts of the novel SARS-CoV-2 outbreak on surgical oncology - A letter to the editor on "The socio-economic implications of the coronavirus and COVID-19 pandemic: A review". *Int J Surg*. 2020;79:109–10. PMID: 32439572. doi: 10.1016/j.ijsu.2020.05.032.
3. Yau YH, Potenza MN. Stress and eating behaviors. *Minerva Endocrinol*. 2013;38(3):255–67. PMID: 24126546.
4. Lamarche B, Brassard D, Lapointe A, Laramée C, Kearney M, Côté M, et al. Changes in diet quality and food security among adults during the COVID-19-related early lockdown: results from NutriQuebec. *Am J Clin Nutr*. 2021;113(4):984–92. PMID: 33398347. doi: 10.1093/ajcn/nqaa363.
5. Werneck AO, Silva DR, Malta DC, Gomes CS, Souza-Junior PR, Azevedo LO, et al. Associations of sedentary behaviours and incidence of unhealthy diet during the COVID-19 quarantine in Brazil. *Public Health Nutr*. 2021;24(3):422–6. PMID: 33087204. doi: 10.1017/S1368980020004188.
6. Deschasaux-Tanguy M, Druet-Pecollet N, Esseddik Y, de Edelenyi FS, Alles B, Andreeva VA, et al. Diet and physical activity during the coronavirus disease 2019 (COVID-19) lockdown (March-May 2020): Results from the French NutriNet-Santé cohort study. *Am J Clin Nutr*. 2021;113(4):924–38. PMID: 33675635. doi: 10.1093/ajcn/nqaa336.
7. Czenczek-Lewandowska E, Wyszynska J, Leszczak J, Baran J, Weres A, Mazur A, et al. Health behaviours of young adults during the outbreak of the Covid-19 pandemic - a longitudinal study. *BMC Public Health*. 2021;21(1):1038. PMID: 34078340. doi: 10.1186/s12889-021-11140-w.
8. Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attina A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an

- Italian survey. *J Transl Med.* 2020;18(1):229. PMID: [32513197](#). doi: [10.1186/s12967-020-02399-5](#).
9. Sidor A, Rzymiski P. Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland. *Nutrients.* 2020;12(6). PMID: [32503173](#). doi: [10.3390/nu12061657](#).
  10. Ferrante G, Camussi E, Piccinelli C, Senore C, Armaroli P, Ortale A, et al. Did social isolation during the SARS-CoV-2 epidemic have an impact on the lifestyles of citizens?. *Epidemiol Prev.* 2020;44(5-6 Suppl 2):353-62. doi: [10.19191/EP20.5-6.S2.137](#). PMID: [33412829](#).
  11. Tavanaei M, Nielsen DE. Food purchasing patterns in Quebec, Canada during the first wave of the COVID-19 pandemic. *J Home Econ Inst Aust.* 2021.
  12. Karamanoglu I, Dube L, Nielsen DE. 2020. Food Access, Concerns and Perceptions During Covid-19 First Wave: Quebec Survey. Montreal: School of Human Nutrition, McGill University [cited 2021 Jul 9]. Available from [https://www.kpu.ca/sites/default/files/Food%20access%20concerns%20and%20perceptions%20during%20COVID-19\\_QC.pdf](https://www.kpu.ca/sites/default/files/Food%20access%20concerns%20and%20perceptions%20during%20COVID-19_QC.pdf)
  13. Lusk JL, Briggeman BC. Food values. *Am J Agric Econ.* 2009;91(1):184-96.
  14. Lusk JL. External validity of the food values scale. *Food Qual Prefer.* 2011;22(5):452-62.
  15. Paquet C. Environmental Influences on Food Behaviour. *Int J Environ Res Public Health.* 2019;16(15). doi: [10.3390/ijerph16152763](#). PMID: [31382447](#).
  16. Han HY, Paquet C, Dube L, Nielsen DE. Diet Quality and Food Prices Modify Associations between Genetic Susceptibility to Obesity and Adiposity Outcomes. *Nutrients.* 2020;12(11). PMID: [33143186](#). doi: [10.3390/nu12113349](#).
  17. Statistics Canada. Survey of Household Spending, 2016. 2017 [cited 2021 Jul 9]. Available from <https://www150.statcan.gc.ca/n1/daily-quotidien/171213/dq171213b-eng.htm>
  18. Fordyce-Voorham S. Essential food skills required in a skill-based healthy eating program. *J Home Econ Inst Aust.* 2009;16(2):16-20.
  19. Lavelle F, McGowan L, Hollywood L, Surgenor D, McCloot A, Mooney E, et al. The development and validation of measures to assess cooking skills and food skills. *Int J Behav Nutr Phys Act.* 2017;14(1):118. PMID: [28865452](#). doi: [10.1186/s12966-017-0575-y](#).
  20. Statistics Canada. Canadian Community Health Survey (CCHS) - Annual component - 2020 [cited 2021 Jul 9]. Available from [https://www23.statcan.gc.ca/imdb/p3instr.pl?Function=assembleInstr&lang=en&Item\\_Id=1262397](https://www23.statcan.gc.ca/imdb/p3instr.pl?Function=assembleInstr&lang=en&Item_Id=1262397)
  21. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77-101.
  22. Kim J, Yang K, Min J, Hope White B., fear, and consumer behavioral change amid COVID-19: Application of protection motivation theory. *Int J Consum Stud.* 2022;46(2):558-574. doi: [10.1111/ijcs.12700](#).
  23. Nemes G, Chiffolleau Y, Zollet S, Collison M, Benedek Z, Colantuono F, et al. The impact of COVID-19 on alternative and local food systems and the potential for the sustainability transition: Insights from 13 countries. *Sustain Prod Consum.* 2021;28:591-9. doi: [10.1016/j.spc.2021.06.022](#).
  24. Kaiser M, Goldson S, Buklijas T, Gluckman P, Allen K, Bardsley A, et al. Towards Post-Pandemic Sustainable and Ethical Food Systems. *Food Ethics.* 2021;6(1):4. doi: [10.1007/s41055-020-00084-3](#).
  25. Thilmany D, Canales E, Low SA, Boys K. Local Food Supply Chain Dynamics and Resilience during COVID-19. *Appl Econ Perspect Policy.* 2021;43(1):86-104. doi: [10.1002/aep.13121](#).
  26. Statistics Canada. Canadian Consumers Prepare for COVID-19. 2020 [cited 2021 Jul 9]. Available from <https://www150.statcan.gc.ca/n1/pub/62f0014m/62f0014m2020004-eng.htm>
  27. Agri-Foods Analytics Lab. Canada's Food Price Report 11th edition. 2021 [cited 2021 Jul 9]. Available from [https://cdn.dal.ca/content/dam/dalhousie/pdf/sites/agri-food/Food%20Price%20Report%202021%20-%20EN%20\(December%208\).pdf](https://cdn.dal.ca/content/dam/dalhousie/pdf/sites/agri-food/Food%20Price%20Report%202021%20-%20EN%20(December%208).pdf)
  28. Angus Reid Group. COVID-19: Weekly Monitoring of Canadian Perceptions & Behaviour - Wave 7. 2020 [cited 2021 Jul 9]. Available from [http://www.ufcw.ca/templates/ufcwcanada/images/directions20/2035/Angus\\_Reid\\_COVID-19\\_Tracker\\_-\\_WAVE\\_7\\_April\\_28\\_\\_2020\\_.pdf](http://www.ufcw.ca/templates/ufcwcanada/images/directions20/2035/Angus_Reid_COVID-19_Tracker_-_WAVE_7_April_28__2020_.pdf)
  29. Kitz R, Walker T, Charlebois S, Music J. Food packaging during the COVID-19 pandemic: Consumer perceptions. *Int J Consum Stud.* 2022;46(2):434-448. doi: [10.1111/ijcs.12691](#).
  30. Shamim K, Ahmad S, Alam MA. COVID-19 health safety practices: Influence on grocery shopping behavior. *J Public Aff.* 2021;21(4):e2624. doi: [10.1002/pa.2624](#).
  31. Goddard E. The impact of COVID-19 on food retail and food service in Canada: Preliminary assessment. *Can J Agric Econ.* 2020;10. doi: [10.1111/cjag.12243](#).
  32. Kim E, Jung Jang Y, Kraak VI. Restaurants Can Innovate and Recover From the Covid-19 Pandemic. Boston University School of Hospitality Administration. 2021. [cited 2021 Dec 19]. Available from [https://www.bu.edu/bhr/files/2021/10/BHR\\_Kim-et-al\\_Restaurant-Innovation\\_NOV.21-1.pdf](https://www.bu.edu/bhr/files/2021/10/BHR_Kim-et-al_Restaurant-Innovation_NOV.21-1.pdf)
  33. Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. *Nutrition.* 2007;23(11-12):887-94. PMID: [17869482](#). doi: [10.1016/j.nut.2007.08.008](#).
  34. Lavelle F, Bucher T, Dean M, Brown HM, Rollo ME, Collins CE. Diet quality is more strongly related to food skills rather than cooking skills confidence: Results from a national cross-sectional survey. *Nutr Diet.* 2020;77(1):112-20. PMID: [31602753](#). doi: [10.1111/1747-0080.12583](#).
  35. Carroll N, Sadowski A, Parizeau K, von Massow M, Wallace A, Jewell K, et al. Food Skills: Associations With Diet Quality and Food Waste Among Canadian Parents. *J Nutr Educ Behav.* 2021;53(5):371-9. PMID: [33526389](#). doi: [10.1016/j.jneb.2020.10.018](#).
  36. Premier Foods. The Kitchen Cooking Index. A report on the nation's cooking habits and mealtime trends. 2021 [cited 2021 Jul 9]. Available from <https://www.premierfoods.co.uk/CorporateSite/media/documents/media/Premier-Foods-Kitchen-Cooking-Index-February-2021.pdf>
  37. Guler O, Haseki MI. Positive Psychological Impacts of Cooking During the COVID-19 Lockdown Period: A Qualitative Study. *Front Psychol.* 2021;12:635957. doi: [10.3389/fpsyg.2021.635957](#).
  38. Venegas-Vera AV, Colbert GB, Lerma EV. Positive and negative impact of social media in the COVID-19 era. *Rev Cardiovasc Med.* 2020;21(4):561-4. PMID: [33388000](#). doi: [10.31083/j.rcm.2020.04.195](#).
  39. Trott M, Tully M, Shin J, Barnett Y, Butler L, et al. Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review *BMJ Open Sport & Exercise Medicine.* 2021;7:e000960. doi: [10.1136/bmjsem-2020-000960](#).
  40. Coates AE, Hardman CA, Halford JCG, Christiansen P, Boyland EJ. Social Media Influencer Marketing and Children's Food Intake: A Randomized Trial. *Pediatrics.* 2019;143(4). PMID: [30833297](#). doi: [10.1542/peds.2018-2554](#).
  41. Potvin Kent M, Pauze E, Roy EA, de Billy N, Czoli C. Children and adolescents' exposure to food and beverage marketing in social media apps. *Pediatr Obes.* 2019;14(6):e12508. PMID: [30690924](#). doi: [10.1111/ijpo.12508](#).
  42. Gerritsen S, Sing F, Lin K, Martino F, Backholer K, Culpin A, et al. The Timing, Nature and Extent of Social Media Marketing by Unhealthy Food and Drinks Brands During the COVID-19 Pandemic in New Zealand. *Front Nutr.* 2021;8(65). doi: [10.3389/fnut.2021.645349](#).
  43. Ali SH, Foreman J, Capasso A, Jones AM, Tozan Y, DiClemente RJ. Social media as a recruitment platform for a nationwide online survey of COVID-19 knowledge, beliefs, and practices in the United States: methodology and feasibility analysis. *BMC Med Res Methodol.* 2020;20(1):116. PMID: [32404050](#). doi: [10.1186/s12874-020-01011-0](#).
  44. King DB, O'Rourke N, DeLongis A. Social media recruitment and online data collection: A beginner's guide and best practices for accessing low-prevalence and hard-to-reach populations. *Can Psychol.* 2014; 55(4):240-9.
  45. Phipps S, MacDonald M, MacPhail F. Gender equity within families versus better targeting: an assessment of the family income supplement to employment insurance benefits. *Can Public Policy.* 2001;27:423-46.
  46. US Department of Agriculture, Economic Research Service. CPS Food Security Supplement Data File: Questionnaire. 2013 [cited 2021 Jul 9]. Available from <https://www.ers.usda.gov/data-products/food-security-in-the-united-states/>