

Food Access, Concerns and Perceptions During Covid-19 First Wave: British Columbia



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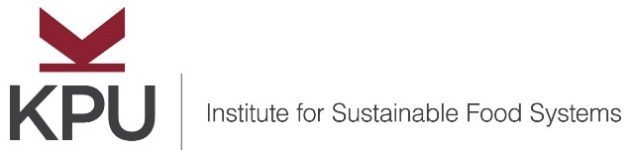
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Our applied research focuses on the potential of regional food systems in terms of agriculture and food, economics, community health, policy, and environmental stewardship. Our extension programming provides information and support for farmers, communities, businesses, policy makers and other. Community collaboration is central to our approach.

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FG Trade, Portrait of woman buying at supermarket - using face mask

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Executive Summary

This study examined how the COVID-19 pandemic affected BC resident's food access, food purchasing and consumption, and how it may have influenced people's perceptions regarding our food system. As British Columbia faces another wave of outbreaks seemingly worse than the first, it is important to understand consumers' behavioral change and adaptation around one of the most fundamentally critical dimensions of well-being - food. Our findings provide food system stakeholders with information that can assist with preparation for future threats as well as achieve equity and resiliency in food system outcomes.

A total of 2,211 BC residents participated in the survey. About one-third of the responses were from those residing in Metro Vancouver. The majority of the respondents identified as female (85%). Sixty-nine percent of respondents were between 30 to 59 years old. Respondents were highly educated with 58% holding Bachelor's degrees or higher. Respondents' annual household income was evenly distributed among the low, medium low, medium high and high income groups. Respondents' concern about the pandemic was moderately high and increased in the older age groups.

During the first wave of the COVID-19 pandemic, consumers' food access was partially affected. Results showed that typical consumers exhibited a high degree of adaptation to a new food environment. Respondent food shopping trips were less frequent averaging once a week or fewer. Compared to 2019 (pre-pandemic), in-person food access channel utilization decreased significantly. The greatest reduction in participation rate was for restaurant dining, while online grocery shopping saw an increase in participation. Participation rates in alternate supply chains (farmers' market, CSA, direct from producers) were low in the early stage of the pandemic as the farming season was not yet underway. However, during the summer the participation rate increased but was still lower than that reported for 2019.

The majority of consumers stated that generally it was not very difficult to access food. What difficulty there was had to do with accessing specific foods in the quantity desired. Two major impediments to food access were pandemic anxiety and income (or increased food prices). Other key barriers were proximity to food stores, lack of transportation, and the need to self-isolate/ quarantine. Even though it was not particularly difficult to access food, the results showed that different groups of people (such as Indigenous respondents, respondents with children living at home, and respondents with a high risk of severe illness from COVID-10 infection) had a more difficult time.

Consumers' concern over food access increased over time during the pandemic. Twenty-six percent of all respondents stated that they were worried that they may occasionally not have access to enough food for a healthy life for all household members in the month to come. This percentage increased to over 30% for respondents who were unemployed, those with household income less than \$40,000, and for Indigenous respondents. Four key supports that respondents desired were for access to locally grown products, access through conventional supply chains (such as longer hours, reduction in time waiting in lines, access to online shopping, etc.), financial assistance, and an increased ability to grow ones' own food.

Slightly under half of respondents experienced a change in diet during the pandemic. The two most cited and contrasting patterns of diet change were increased sweet/salty snack consumption and increased consumption of fruits and vegetables. Many respondents indicated what they considered another positive change in behavior; having more time to prepare food. The main drivers behind a change in diet were: more time spent at home; pandemic stress, isolation and boredom; focusing on being healthy; infrequent food shopping trips or limited availability; and financial hardship or affordability.

Consumers were worried that food supply could be more affected by exogenous variables such as foreign trade policies and natural disasters (e.g. pandemics) in food exporting countries. Hence, they wanted the government to give more focus and support toward building local/regional food systems to increase local food production capacity and food system resiliency.

There is no doubt that this trying and challenging time is not over. As BC enters the second wave of the COVID-19 pandemic, food system actors need to ensure that there will not be a food access crisis amidst the health and economic crises. Survey results highlight the five interconnected issues from the consumers' perspective that may help guide food system planners, activists, producers and policy makers:

First, results illustrated that in-person food shopping declined while online food shopping increased during the pandemic. Therefore, online marketing support should be given to smaller regional scale farmers and producers so they can reach consumers and remain competitive. On the other hand, certain groups of consumers may be at a disadvantage, especially those who do not have internet access or have minimal computer literacy. Therefore, it is important that diverse in-person food access channels are available within local communities.

Second, pandemic anxiety plays an important role in limiting food access. To help address consumer concerns, information (such as risk of transmission via food, new restrictions, safety measures, etc.) has to be communicated clearly by health officials. Local food producers and businesses should continue to reassure consumers by providing safe shopping environments.

Third, the pandemic creates vulnerability in food access and heightens inequality in our food system. Fiscal and social interventions should be continued to assure that vulnerable populations can exercise their right to access healthy food during the pandemic. Additional research is needed to investigate these issues in detail and bring forth tangible mitigation strategies.

Fourth, both healthy and unhealthy dietary behaviors occurred during the pandemic due to stress, increased time spent at home, financial constraints, and the desire to boost personal immune systems. It is important to monitor the population's dietary regime and mental health. Public health programming to encourage and maintain healthy eating during stressful events should be designed and implemented.

Fifth, inadequacy in current local food distribution infrastructure systems was one of the reasons why participation in alternative supply chains remained relatively small during the pandemic. Greater (physical and digital) infrastructure supports should be invested in to assist producers in delivering their food to consumers. Business models such as co-operatives should be revitalized and supported to enhance producers' collaboration and market power/opportunity. Flourishing of local producers and businesses means that they can help mitigate other barriers to food access (lack of transportation or food retail options within local communities). Finally, extension education training programs (e.g. workshops, seminars, demonstrations) on small scale farming, home gardening, cooking and food preservation will be more important than ever.

Unsettled times brought about by the COVID-19 pandemic emphasize the importance of local/regional food system development. Our communities need food systems which not only provide wholesome nutritious food to consumers but also equal opportunity in food access to all.

This study is a collaboration of five institutions across Canada: Institute for Sustainable Food Systems (Kwantlen Polytechnic University), School of Public Health and Faculty of Extension (University of Alberta), School of Journalism and Communication (Carleton University), School of Human Nutrition (McGill University) and Food Policy Lab (Dalhousie University). Links to reports from the other regions can be found at: <https://www.kpu.ca/isfs/covid19-consumer-survey>

“This is our time to be kind, to be calm, and to be safe.”

Dr. Bonnie Henry, BC Provincial Health Officer

1. Introduction

Toward the end of 2019, the world first learned about a novel coronavirus that was later named Covid-19 and declared a pandemic. Within three months, mitigating restrictions on travel, social gathering, recreational activity and business operations were imposed in over 100 countries (BBC News, 2020). Such restrictions were of a scale the world had never seen before. The effort to slow virus transmission through physical distancing and limiting economic activities resulted in the loss of businesses, jobs and incomes. Canadian real Gross Domestic Product (GDP) fell by nearly 12% from March to April 2020 (Statistics Canada, 2020a). In May 2020, the Canadian unemployment rate reached a record high at 13.7% (Statistics Canada, 2020b). Global GDP growth is expected to fall by 5% in 2020 (IMP, 2020). Economic crises caused by this pandemic have jeopardized human well-being and development progress especially in vulnerable and disadvantaged groups (UN, 2020).

In Canada, by the end of March, the federal government had advised against all non-essential travel outside of the country, issued restrictions on the entry of foreign nationals and recommended the adoption of work-from-home policies (Canadian Institute for Health Information, 2020). Provincial health authorities worked with their governments to recommend and ultimately impose restrictions on inter-provincial travel, non-essential businesses and services, and recreational sites according to situations in their provinces or territories (Government of Canada, 2020; WorldAware, 2020).

As the number of daily cases rose in Canada, so did concern and trepidation. During the first few weeks after the declaration of the pandemic, a behavior of “hoarding” of medical/cleaning supplies and food emerged (Lau, 2020; Brewster, 2020). Empty grocery store shelves and stories of those who were left

without food regularly made headlines across Canada from early March to mid-April (Lopez Martinez, 2020; Bench, 2020). The promise of convenience and abundance of food delivered to consumers through the global supply chain was broken. The North American global-industrial food system’s “just-in-time” inventories, which boasts freshness and efficiency, manifest as one of its numerous weaknesses as a result of the pandemic.

The pandemic has revealed serious fragilities in the global-industrial food system about which many food system experts have long raised concerns (Shattuck, Holt-Giménez, and Patel, 2009; Rosin, Stock and Campbell, 2012; Puma, et. al., 2015). Now, the general populace has been made far more aware and has been motivated to rethink the relationship between their food system and community resiliency. The disruption of our food system caused by the pandemic represents a ‘dress rehearsal’ for the kinds of disruption we can expect as a result of other widespread shocks, such as climate change, global economic and political instabilities and geo-political conflict. As such, it is very valuable to understand how the current crisis has affected citizens and which citizens were most acutely affected. Thus, the purpose of this study was to assess how the COVID-19 pandemic affected people’s food access, food purchasing and consumption, and how perceptions regarding our food system may have altered. The results provide quantitative and qualitative information on the behaviors and sentiments of Canadians during the pandemic. These findings can help assist food system actors in preparing response actions for future potential perturbation and building a resilient food system for the 21st century.

This study is a collaboration of five institutions across Canada: Institute for Sustainable Food Systems (Kwantlen Polytechnic University), School of Public Health (University of Alberta), School of Journalism and Communication (Carleton University), School of Human

Nutrition (McGill University) and Food Policy Lab (Dalhousie University). Five nearly identical online surveys were administered separately in British Columbia, Alberta, Ontario, Quebec, and Atlantic Canada (New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland and Labrador) from April to August 2020. A total of 4,928 responses were received.

Results in this report focus on those from British Columbia. Links to reports from the other regions and information about the distribution of participants in the five survey regions can be found in Appendix A. An inter-provincial study such as this one can shed light on the similarities and differences in the impacts of Covid-19 on food related outcomes, behaviors and perceptions emanating from the pandemic and food systems in each region. The information highlights how geography and regional culture influence people's behavior and contributes to the on-going discussion regarding food equity, as well as the importance and urgency of creating reliable and resilient regional food systems.

2. Survey process

This study was approved by the Kwantlen Polytechnic University (KPU) Research Ethics Board on April 3, 2020. The questionnaire was designed by the Institute for Sustainable Food Systems (ISFS) and pretested with KPU colleagues as well as a small group of the general public to ensure the clarity of each question as well as the reliability and validity of the survey. The online survey was administered in BC from April 15 to August 15, 2020 through SurveyMonkey®. Survey participation was voluntary and anonymous. No incentives were offered to participants. The complete survey questionnaire is presented in Appendix B.

Invitations to participate in the survey, with the internet link, were distributed through the following channels:

- KPU and ISFS' websites and social media platforms including Facebook, Instagram and Twitter were used to advertise the survey and reach out to our social media followers.
- Snowball method: Information about the study and link to the survey were sent to numerous supportive organizations such as the Ministry of Agriculture, local Agricultural Advisory Committees, local Food Policy Councils, Health Authorities, FarmFolk CityFolk, Vancity, universities, local neighbourhood houses, etc. These organizations were asked to distribute the survey to people in their networks and other organizations.
- Paid advertisement: A Facebook advertisement was employed to reach out to the general public whose Facebook accounts stated that they were residents of BC.

The survey was limited to those who were BC residents and over the age of 19 years at the time of their survey participation. While the main advantages of an online survey are the ease of participation and low administrative costs, we recognize that certain population groups may not be accurately represented in the results, such as those who do not have computer or internet access, or those who may not be able to read English well.

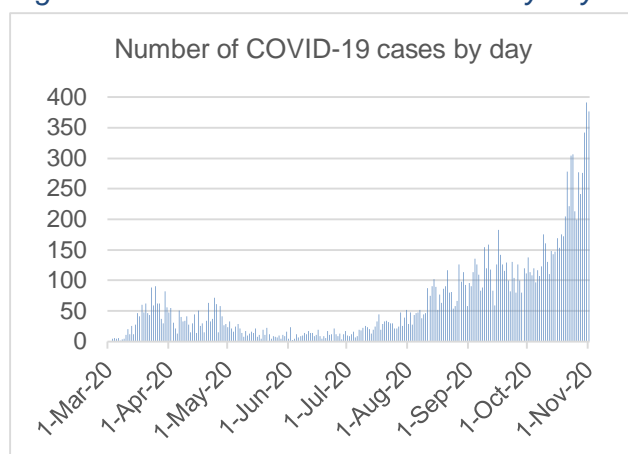
All statistical analyses for this study were conducted using the STATA® (16.1) software package.



3. The COVID-19 situation in BC and impacts on our food systems

Eight months after the March 11th World Health Organization declaration of the COVID-19 pandemic, (WHO, 2020), BC is currently in Phase 3 of its Restart Plan (BC Government, 2020e). The number of cases (Figure 1) rose at the start of the pandemic and fell during the summer as BC was able to control community outbreaks (BC Centre for Disease Control, 2020). However, new infection rates rose sharply in the Fall of 2020, constituting the second and a more severe wave of the pandemic (BC Government, 2020d). This section highlights provincial responses and impacts on food systems during the first wave of the COVID-19 pandemic.

Figure 1: Number of COVID-19 cases by day



Data source: BC Center for Disease Control, 2020

Three Phases of the BC's Restart Plan

In Phase 1 BC began taking steps to reduce the spread of COVID-19 in response to increasing cases within the province. A public health and provincial state of emergency were declared on March 17th and March 18th, respectively (BC Government, 2020a; BC government, 2020b). A number of provincial protective measures were taken. They focused on reducing physical contact among citizens such as a mandate on physical distancing, the requirement of a 14-day isolation plan for travelers arriving from outside of BC, a ban on mass gatherings, closure of dine-in service at restaurants and bars, the closure of all non-

essential services, and a reduction of in-classroom schooling.

During this phase temporary closure of businesses resulted in mass lay-offs causing the provincial unemployment rate to rise to its peak of 13.4% in May 2020 (Statistics Canada, 2020c). To alleviate the impacts of the COVID-19 pandemic the BC government launched a Temporary Rental Supplement program for low- and moderate-income renters who lost income as a result of COVID-19 (BC Housing, 2020). They also provided a one-time \$1000 Emergency Benefit for Workers whose employment had been affected due to the pandemic. In total, the BC COVID-19 Action Plan set aside \$5 billion in income support, tax relief and direct funding for people, businesses and services affected by the pandemic with \$2.8 billion set aside for individuals and the services they rely on, and the other \$2.2 billion for businesses (BC Government, 2020c).

Phase 2 (May 19 – Jun 23, 2020) allowed the reopening of many non-essential businesses. Safety and physical distancing measures were expected to remain in effect, and individuals were encouraged to stay at home as much as possible (BC Government, 2020e). Travel restrictions remained in place. Gatherings of 50 or more people were still not permitted. However, inside patronage of restaurants and bars was now possible. The number of active cases remained relatively stable during this time, allowing for the health authorities to transition into Phase 3 of the BC's Restart Plan, on June 24th (BC Centre for Disease Control, 2020). In Phase 3 many of the same management measures remained in effect, although it was now encouraged to wear masks inside all public spaces, and travel for non-essential purposes was permitted within the province (BC Government, 2020e). In person schooling for K-12 schools resumed on June 1st and continued into the Fall, while universities moved most of their classes to virtual environments (BC Government, 2020e).



Impacts to consumers

At the start of the pandemic, due to uncertainty about the spread of the virus, consumers began to stock up on food. The Canadian retail sales of food and beverage increased by nearly 3 billion dollars from February to March 2020 (Statistics Canada, 2020d). Around this time, panic buying caused temporary interruptions in access for basic items such as hand sanitizers, toilet paper, non-perishable food items and other staple goods (Bogart, 2020). As a result, some stores put measures in place to restrict the number of items purchased for some high demand essential items, such as hand-sanitizer (Pedersen, Tomlinson and Matteis, 2020). However, the larger supply-chain for food remained largely unaffected (CBC News, 2020).

Consumers, during this time were motivated to adjust their food procurement and dining behaviors. They increased online food shopping. They also increased preparation of meals at home (Accenture, 2020; Food Insight, 2020). Two surveys of Canadian consumers conducted in March and April 2020 by Dalhousie University in partnership with the Angus Reid Institute found that the majority of

Canadians were concerned about health risks associated with going to the grocery store, so they did not shop as often and took precautions such as increasing the use of sanitizer, disinfecting grocery products, and wearing masks and gloves when they did enter stores (Agri-Food Analytics Lab, 2020a and 2020b).

Additional concern over food access was related to increasing food prices. During the pandemic, the consumer price index for food indicated that food prices increased (Statistics Canada, 2020e). For example, in May 2020, prices for meat rose more than 13% compared to May 2019. Costs of other non-perishable food such as canned tuna, flour and rice also rose between 9-14% (Statistics Canada, 2020f). Clapp and Moseley (2020) contend the food system/ access crisis stemming from the COVID-19 pandemic was due to three inter-related issues: disruptions of supply chains, job losses and economic recession, and uneven food price dynamics. As a result, the livelihood of many Canadians is at risk.

Impacts to producers and workers

As food and beverage establishments were closed for indoor service in BC, there was a large drop in sales for this sector in March and April (Statistics Canada, 2020g). Many small-scale farmers reliant on direct restaurant sales experienced substantially curtailed trade (Farm Folk CityFolk, 2020). A survey of BC producers conducted by FarmFolk CityFolk (FFCF) found that nearly three-quarters of direct market farmers surveyed anticipated a loss of revenue over the coming year. Many were interested in having communication and market support, especially for switching towards online sales and service (FFCF, 2020).

As the pandemic continued, significant issues within the food sector were brought to light, especially in regard to Covid-19 outbreaks in the meat processing and horticulture sectors (Bureau, 2020; Carrigg, 2020; Duncan, 2020; Korstrom, 2020). Several Covid-19 outbreaks in meat processing plants highlighted

underlying issues that had already existed prior to COVID-19, especially in regard to safety and sanitation (Hunter, 2020). As of May 12, 39 inspectors from the Canadian Food Inspection Agency had tested positive for COVID-19, and more than 1,500 cases of COVID-19 had been linked to a Cargill meat-processing plant in southern Alberta, with outbreaks being reported at similar facilities across the country (Hunter, 2020; Tait, Baum & Grant, 2020). More than 100 cases were traced back to outbreaks in 3 federally regulated poultry plants in BC in May (Hunter, 2020).

For the horticulture sector, issues included a reduction in migrant labour and increased production vulnerabilities during the pandemic (Falconer, 2020; Haley et. al., 2020). Border crossing restrictions created uncertainty for

those relying on temporary foreign workers. According to a survey conducted in June by the BC Fruit Growers Association, about two-thirds of Okanagan tree fruit growers were expecting reduced yields and profitability due to a shortage of labour for harvest and the extra costs associated with COVID-related health guidelines (van Emmerik, 2020). To assist producers, the BC Ministry of Agriculture spent \$10 million to cover the cost of the quarantine program for temporary foreign workers. The pandemic highlighted systematic problems associated with dependence on temporary foreign workers such as living and working conditions, healthcare coverage, rights and protection, as well as the need to address such issues at all levels of government (Haley et. al., 2020).



4. Results and discussions

Survey results are presented in five sections. The first highlights response rate, key characteristics of respondents, and their level of concern over the COVID-19 pandemic. The second discusses different channels people used to access food during the pandemic. The third looks at challenges in food access experienced by respondents, and their concerns. The fourth discusses general shopping behavior and diet changes. Finally, the last section gathers respondents' perceptions and opinions on global and regional food systems, and any supports they need to increase their food access.

4.1 Survey response rate and respondents' key characteristics

Survey responses by region

A total of 2,211 participants submitted survey responses. Participants were instructed to skip answering any questions that they did not wish to answer. Therefore, response rates for each question (represented with the letter "n") varied. Figure 2 indicates distribution of survey responses in different regions of the province. About one-third of the responses were residents residing in the Metro Vancouver area. During Phase 1 of BC's restart plan, there were 1,616 responses (73%) received, while in Phase 2 there were 595 responses (27%) received.

Respondents' demographic information

The demographic information of survey participants is presented in Table 1 (page 8). About 85% of respondents identified as female. The majority of respondents (69%) were between 30 to 59 years old. Fifty-eight percent had a Bachelor degree or higher. Almost two-thirds of respondents (62%) were currently employed (part-time or full-time).

Respondents' annual household income was fairly evenly distributed with 22% reporting household income of less than \$40,000, 29% reporting income between \$40,000 - \$79,999, 25% reporting income between \$80,000 - \$119,999, and 24% reporting income of greater than \$120,000. As a reference point, in 2018 in BC, the median annual household income of a two-person family was \$94,000 while the median annual household income of a lone-parent family and persons not in a census family were \$47,000 and \$30,000 respectively (Statistics Canada, 2020h).

The majority of respondents lived in a one or two-person household with no children (under the age of 19) living at home. Forty percent of respondents indicated that they belonged to vulnerable groups (those who were at increased risk of severe illness from the COVID-19 infection).



Figure 2: Number of survey responses in BC by region

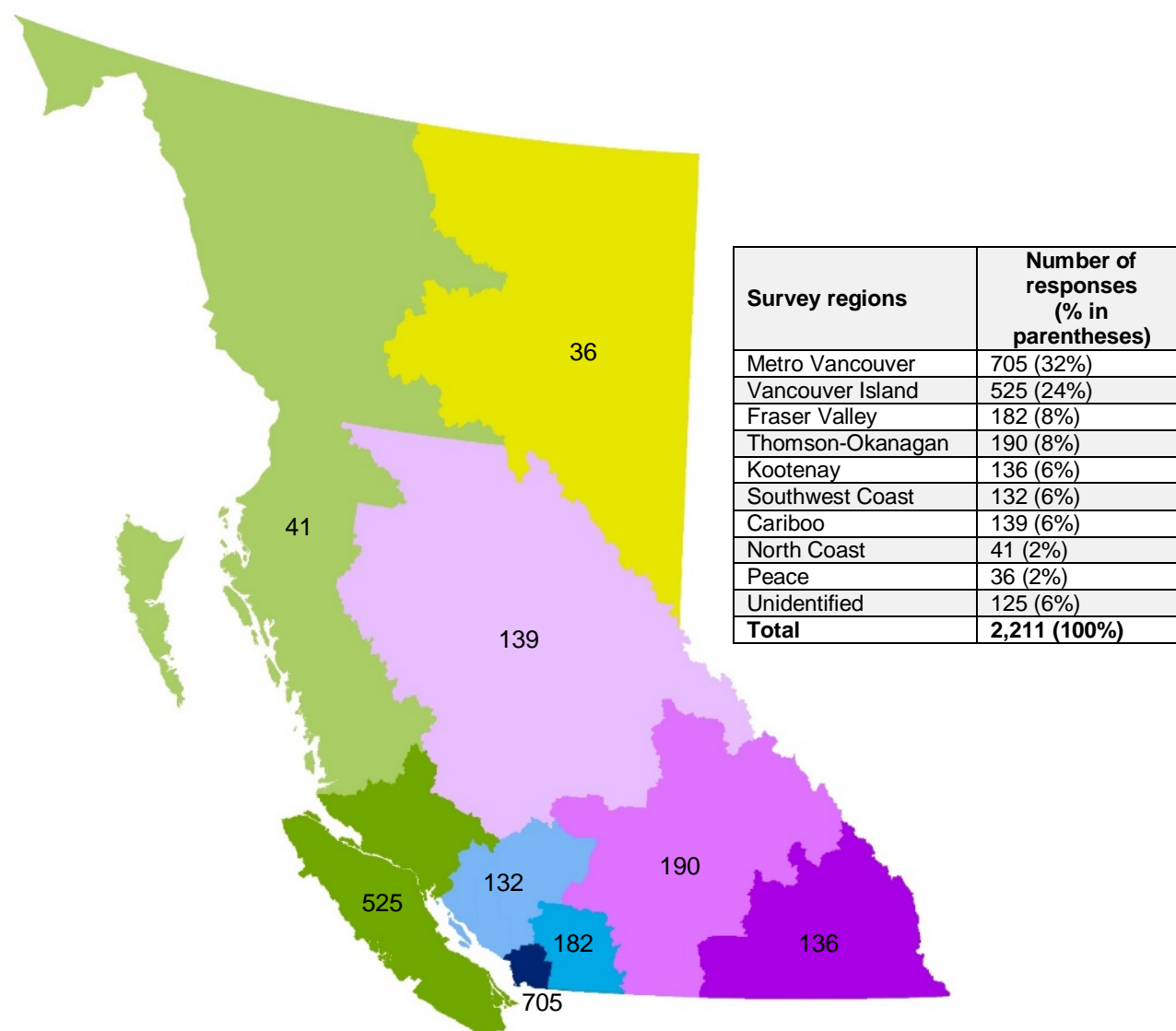


Table 1: Survey respondents' demographic Information

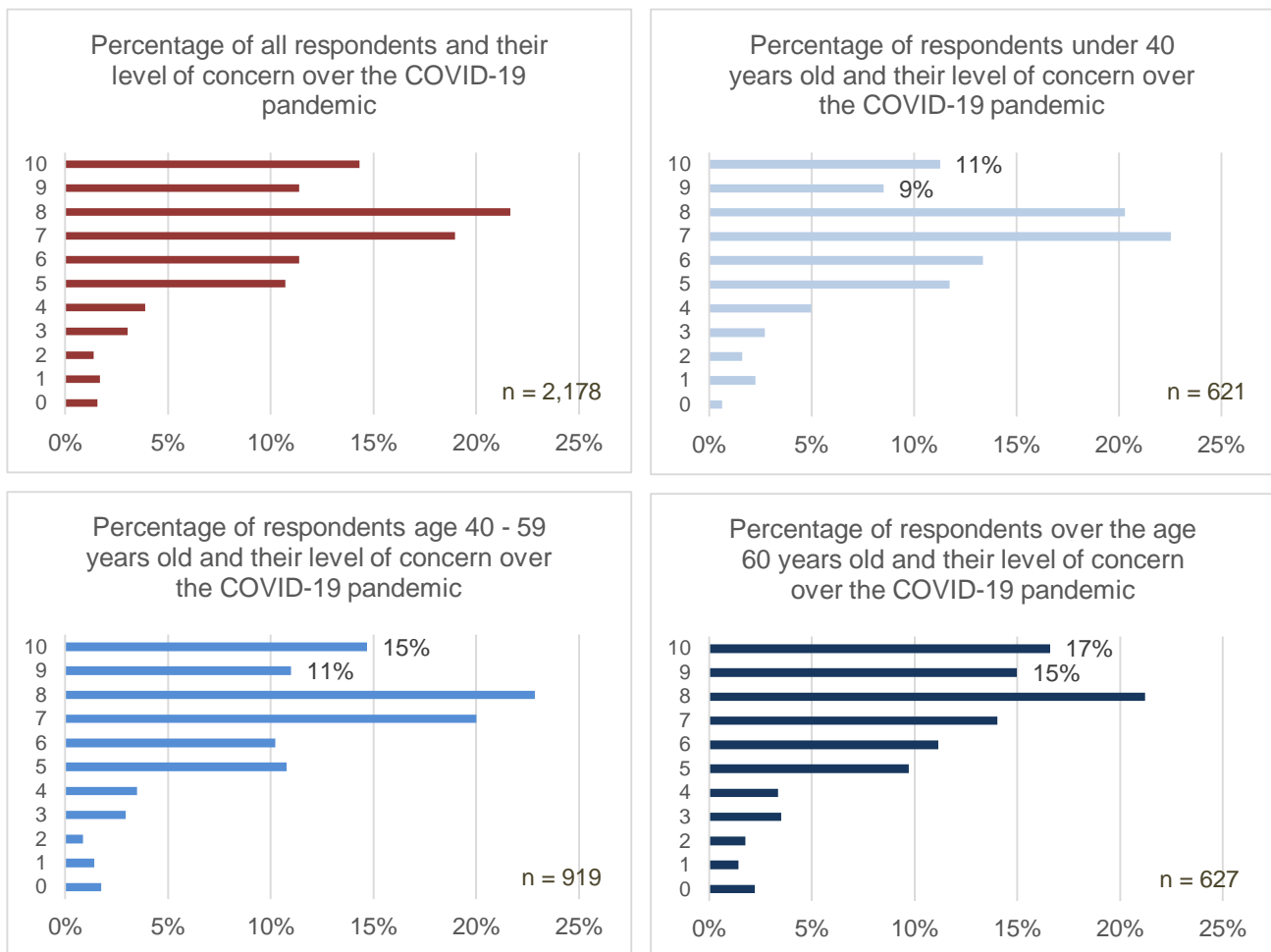
	# of responses	% of total responses
Gender		
Female	1,839	85%
Male	294	14%
Non-binary/Other	24	1%
Age		
19 - 29 years old	179	8%
30 - 39 years old	454	21%
40 - 49 years old	495	22%
59 - 59 years old	435	20%
60 - 69 years old	426	19%
70 years or older	210	10%
Education		
High school or less	186	9%
Some college	312	14%
College diploma	416	19%
Bachelor's degree	684	31%
Graduate/professional degree	580	27%
Employment status		
Employed	1324	62%
Unemployed	350	16%
Retired	458	22%
Annual household income in 2019		
Less than \$40,000	428	22%
\$40,000 - \$79,999	574	29%
\$80,000 - \$199,999	500	25%
More than \$120,000	482	24%
Marital status		
Single	363	17%
Married/domestic partnership	1,450	67%
Divorced/separated/widowed	340	16%
Number of people in the household		
One	379	18%
Two	917	42%
Three	335	16%
Four	322	15%
Five or more	208	10%
Number of children (younger than 19 years old) living in the household		
None	1,454	69%
One	279	13%
Two	284	13%
Three	69	3%
Four or more	30	1%
Number of adults 65 years or older living in the household		
None	1,510	71%
One	331	16%
Two	261	12%
Three or more	11	1%
Number of respondents who are vulnerable to COVID-19		
Yes	871	40%
No	1,286	60%

Concerns over the COVID-19 pandemic were considerable especially for respondents in an older age group

Respondents were asked to rate their level of concern over the COVID-19 pandemic from 0 to 10. Zero representing the lowest level of concern while 10 representing the highest level of concern. Figure 3 presents the level of concern of all respondents compared to respondents in three different age groups. The percentage of respondents who stated that they were extremely concerned (concern level 9 and 10) increased per respondent's age from 20% (for respondents under the age of 40) to 26% (for respondents age 40-59 years old) and

32% (for respondents older than 60 years old). The statistical analysis shows that the average level of concern of all respondents was 7 out of 10. The mean (average) level of concern for respondents under 40 years old was 6.8 while the average level of concern for respondents age 40-59 and 60 and over was 7.1 and 7.13, respectively. There was a statistically significant difference in the average of these age groups as determined by one-way ANOVA ($F(2,216)=3.74$, $p < 0.05$). The Tukey's post hoc test revealed that the average level of concern of those under 40 years old was statistically lower than the two older age groups ($p < 0.05$).

Figure 3: Percentage of respondents' level of concern over the COVID-19 pandemic for all respondents and by respondents' age group. (10 - highest level of concern; 0 - the lowest level of concern)



4.2 Food access channels

Number of ways people accessed food during the COVID-19 pandemic were fewer compared to 2019

People may have different ways to acquire (access) their food. In this study we identified 16 different options by which people may access their food, such as in-person at stores, dining out at restaurants, online shopping, growing their own food, farmers' markets, the food bank, etc. (The list of these options can be found in Appendix B, question 11 and 12.) Respondents were asked to select all channels that they used to access food in 2019 (i.e. pre-pandemic, from January to December) and during the pandemic (since the declaration of the pandemic up to the day they participated in the survey).

A statistical comparison of the average (mean) number of ways respondents used to access food in 2019 and during the pandemic demonstrated that during the pandemic respondents chose fewer options to access food ($t(2202) = 51.32, p < 0.01$). Figure 4 illustrates that, in 2019, on average respondents engaged in 5 different food access channels. However, during the pandemic, the average number of ways that respondents used to access their food reduced to 3.

Figure 4: Average number of food access channels engaged by survey respondents in 2019 and during the COVID-19 pandemic

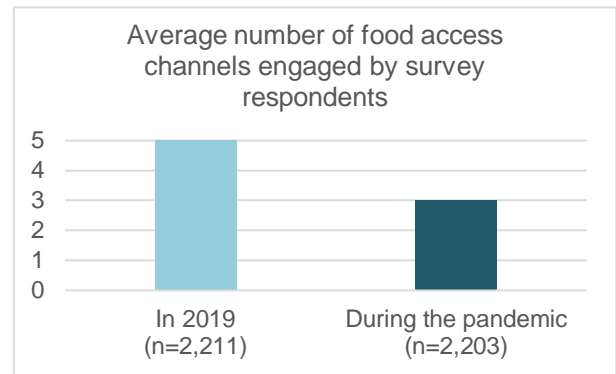
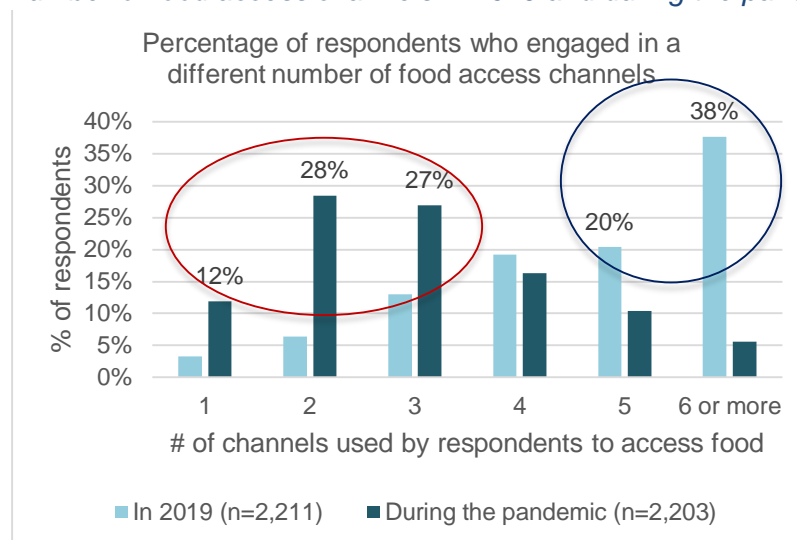


Figure 5 compares the distribution of the percentage of respondents and number of ways they accessed food in 2019 and during the pandemic. In 2019, the majority of respondents (58%, circled in blue) engaged in 5 or more ways to access their food. During the pandemic the majority of respondents (67%, circled in red) engaged in 3 or fewer different ways.

Physical distancing guidelines in effect could explain why the number of ways people accessed food became fewer.

Figure 5: Percentage of respondents who engaged in a different number of food access channels in 2019 and during the pandemic



During the pandemic, engagement in in-person food shopping declined

Figure 6 compares two in-person food access channels in 2019 and during the COVID-19 pandemic. The first channel is in-person participation in a conventional supply chain such as shopping at retail and wholesale stores. The second channel is dining at restaurants and cafes (including cafeterias at schools and workplace).

In 2019, of the total 2,211 responses, 99% and 82% stated that they chose to access food in-person in stores and restaurants. During the pandemic, of the 2,203 responses, 90% stated that they shopped in-person in stores while only 6% stated that they dined at restaurants and cafes. For both the reduction in participation rates from 2019 compared to during the pandemic was statistically significant as determined by one-way ANOVA ($F(1,2201)=161.32$, $p<0.01$ and $F(1,2201)=11.54$, $p<0.01$).

During Phase 1 of the BC's restart plan, many restaurants temporarily closed down or served only take-out meals. Schools and non-

essential businesses were closed. Citizens were advised to work from home and otherwise stay home if possible. This surely contributed to the large reduction in participation in restaurant/ cafe dining.

Percentage of consumers engaging in restaurant dining in the summer increased compared to the spring.

A statistical comparison of percentage of respondent participation in restaurant dining between spring and summer 2020 indicated that engagement in restaurant dining increased significantly in the summer ($t(2201)=-13.44$, $p<0.01$). Figure 7 shows that in the spring (April – May) 2020, of the total 1,637 respondents, 2% stated that they accessed food through restaurant dining. In the summer (June – August) 2020, of the total 566 respondents, 16% dined in restaurants. Increased participation in restaurant dining coincided with Phase 2 of BC's restart plan when infection rates declined and outdoor seating was possible.

Figure 6: Percentage of respondents using in-person food access channels in 2019 compared to during the COVID-19 pandemic

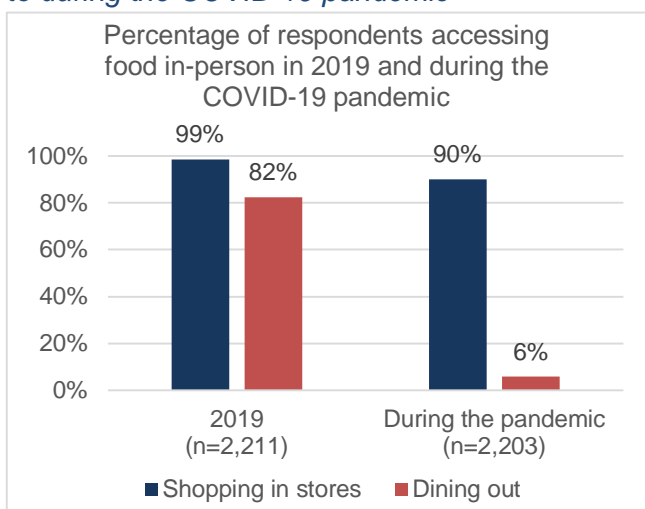
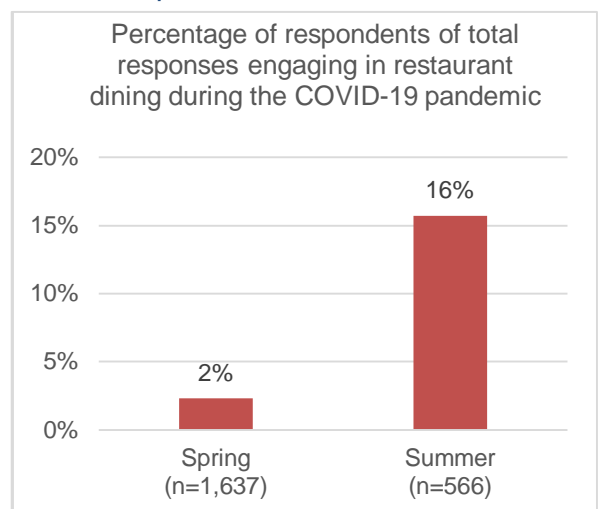


Figure 7: Percentage of respondents engaging in restaurant dining during the COVID-19 pandemic

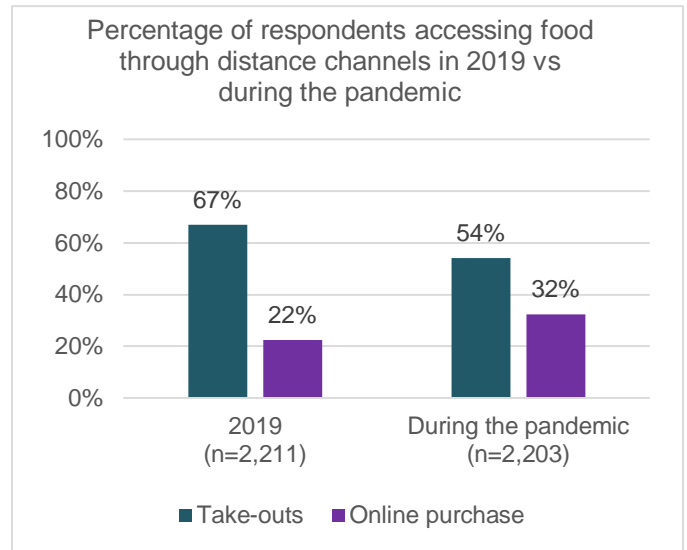


Many consumers who did not engage in online grocery shopping in 2019 did so during the pandemic.

In contrast to in-person shopping, statistical analysis indicated that online grocery ordering (delivery/pick-up) significantly increased ($t(2202)=-10.06$, $p<0.01$). In 2019, of the total 2,211 responses, 22% stated that they engaged in online grocery shopping (either ordering directly from stores or ordering through third-party websites). During the pandemic, this number increased to 32% (Figure 8). Detailed analysis revealed that among those (1,711) who stated that they did not engage in online grocery shopping in 2019, 20% (357 responses) stated that they now grocery shopped online.

Another distance food access option was ordering take-out meals from restaurants. The percentage of respondents engaging in this channel significantly declined, from 67% in 2019 to 54% during the pandemic.

Figure 8: Percentage of respondents using distance food access channels in 2019 compared to during the pandemic



($t(2202)=11.68$, $p<0.01$) However, the percentage of respondents accessing food by take-out meals was not significantly different between the Spring and Summer 2020.



Overall food access through alternative supply chain channels declined during the pandemic. Due to unavailability of local products and access options, the reduction was greater in the spring compared to the summer.

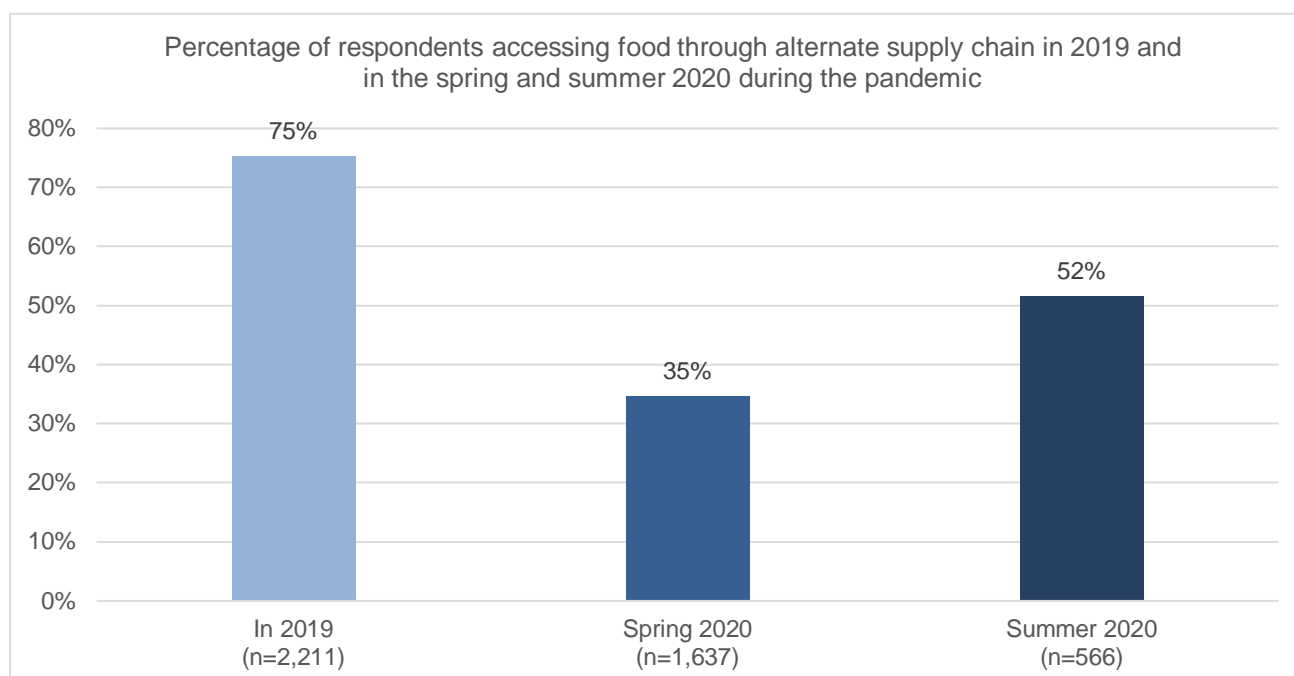
In this study, food access through alternate supply chain channels is defined as food purchased from farmers' markets, community supported agriculture (CSA) subscription, herd share, and food purchased directly from farmers and producers.

For 2019, of the total 2,211 responses, 75% indicated that they had accessed food through at least one of the alternative supply chain channels. During the pandemic, the percentage of people engaging in alternate supply chain channels reduced significantly

($t(2202)=32.67$, $p<0.01$). It is worth noting that during the start of the survey (April and May) availability of local food was limited. A number of respondents commented that they planned to subscribe to a CSA program or go to farmers' markets once local products were in season.

Figure 9 highlights the rate of participation in the alternate supply chain in 2019 and during the pandemic in spring and summer 2020. In the spring, of the 1,637 respondents, 35% stated that they accessed food from one of the alternate supply chain channels. In the summer when local products were in season, this number increased significantly ($t(2202)=-7.18$, $p<0.01$). Of the 566 respondents participating in the survey in the summer, 52% stated that they accessed food from one of the alternate supply chain options.

Figure 9: Percentage of respondents accessing food through alternate supply chain in 2019 and in the spring and summer 2020 during the COVID-19 pandemic



Food self-access activities (growing, hunting, fishing and harvesting wild food) declined slightly during the pandemic in the spring but increased in the summer.

Instead of purchasing food, people can access food through their own means. In this study, self-access of food is defined as growing crops, raising animals, hunting, fishing and harvesting wild food for personal/ family consumption. Respondents were asked to select if they engaged in these activities in 2019 and during the pandemic.

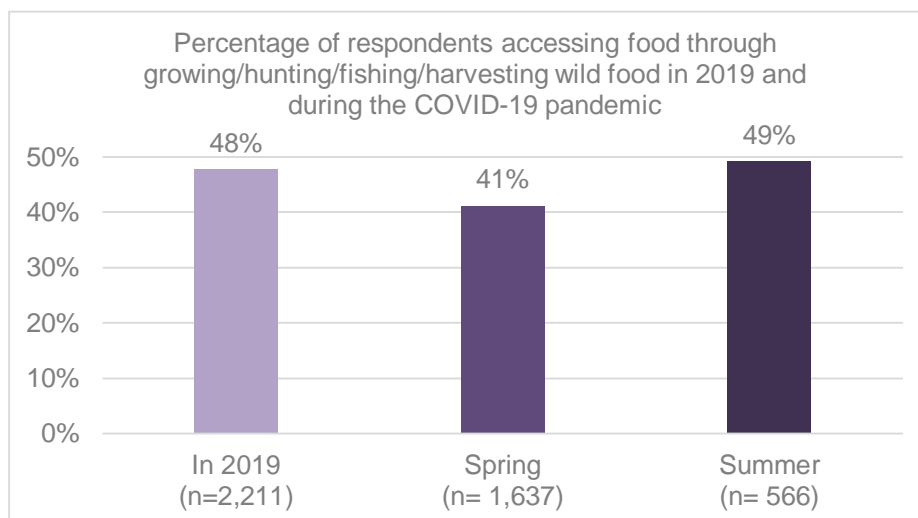
Figure 10 illustrates that the percentage of respondents engaging in self-food access activities declined from 48% in 2019 to 41% in spring 2020 during the pandemic. In the summer, the percentage of respondents engaging in these activities increased to 49%.

The t-test analysis indicated that the percentage of people who engaged in self-food access activities was significantly reduced during the pandemic compared to 2019 ($t(2202)=5.15$, $p<0.01$). The percentage of respondents engaging in self-food access activities in the summer 2020 was no different compared to 2019. Anecdotally, a number of respondents noted that even though they wished to grow their own food during the pandemic, their living situations did not allow them to do so - especially those in small apartments.



Results suggest that when seasons were amenable, the pandemic did not reduce the ability of people to access food through their own means. Seasonality, however; plays an important role in this means of food access. Therefore, if the pandemic continues into the winter, we expect that the percentage of people who access food through this channel will reduce substantially.

Figure 10: Percentage of respondents of total responses accessing food through growing/hunting/fishing/harvesting wild food in 2019 and during the pandemic



4.3 Food access challenges and concerns

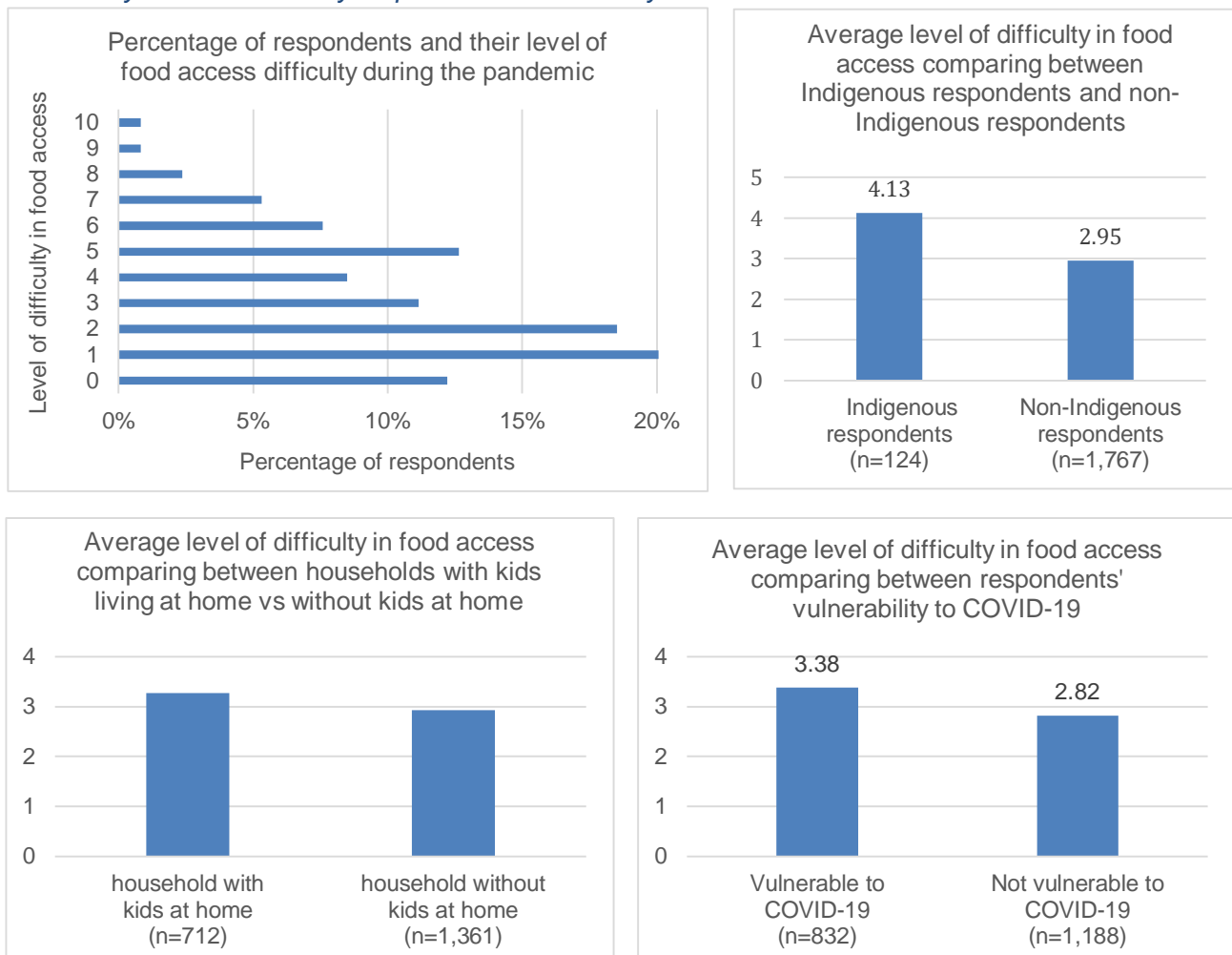
In general, respondents felt that it was relatively easy to access food during the pandemic. However, certain groups of people (such as Indigenous people, families with children living at home and those vulnerable to COVID-19 virus) experienced higher levels of difficulty.

For this question, we asked respondents to rate how difficult it was to access food during the pandemic. Respondents could rate their difficulty in accessing food from 0 (extremely easy) to 10 (extremely difficult). The majority of respondents indicated that it was relatively easy to access food (Figure 11). The average (mean) level of difficulty reported was at 3 out of 10.

When separating the Indigenous population from all respondents, we found that their average (mean) level of food access difficulty was at 4 out of 10. Statistical analysis confirmed that Indigenous respondents found it significantly more difficult to access food during the pandemic compared to others. ($t(1889)=5.48$, $p<0.01$).

When separating respondents by the presence of children under 19 living at home, we found that households with children living at home statistically had higher levels of difficulty than respondents with no children living at home ($t(2071) = -3.1164$, $p<0.01$). Similarly, respondents who self-identified as high-risk of severe illness from the COVID-19 virus statistically had higher levels of difficulty in food access than those who were not high-risk individuals ($t(2018)=5.2918$, $p<0.01$).

Figure 11: (Top right) Percentage of respondents and their level of difficulty in food access. (Top left) Comparison between the average level of difficulty in food access for Indigenous respondents and non-Indigenous respondents. (Bottom right) Comparison between the average level of difficulty in food access by the presence of children living at home. (Bottom left) Comparison between the average level of difficulty in food access by respondents' vulnerability to the COVID-19 virus.

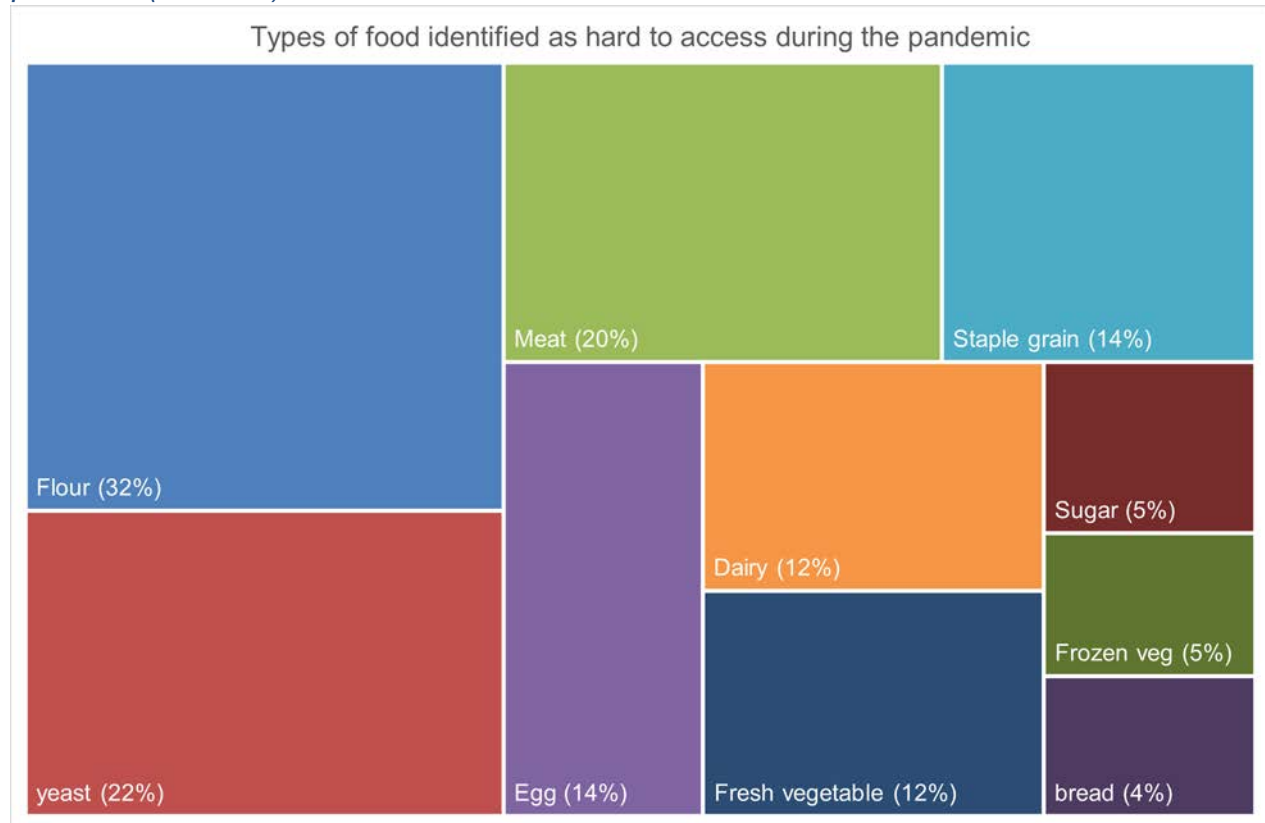


While it was not very difficult to access food, the difficult part was getting the specific types of food that respondents needed.

In this section, respondents were asked to identify specific foods that were hard to access during the pandemic. Of 1,989 respondents

who answered this question, 775 (39%) said they could get everything they needed. The other 1,214 respondents (61%) identified different food items difficult to obtain. Figure 12 highlights the top 10 food items that were hard to access during the pandemic as identified by respondents.

Figure 12: Types of food items identified by survey respondents as hard to access during the pandemic (n = 1214)



Other items identified were canned goods, plant based protein and dairy supplements, diet specific items (such as gluten free goods) and ethnic food items.

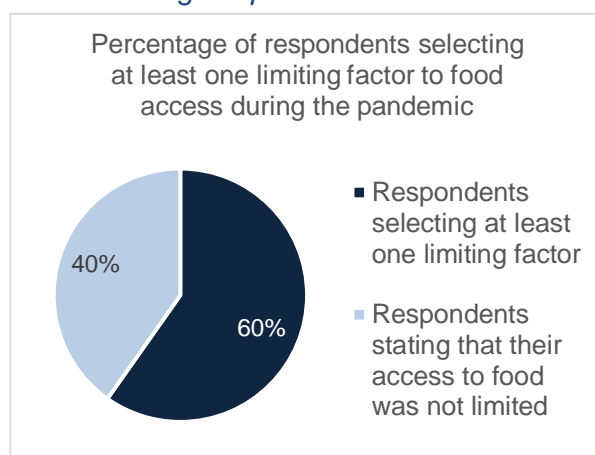
The top two factors that may limit respondents' food access were personal finances and anxiety about going out to purchase food.

Respondents were asked to select all the factors that may be limiting their access to food. Of 517 respondents, 208 (40%) indicated that their access to food was not limited while 309 respondents (60%) selected at least one limiting factor (Figure 13).

Focusing on those who experienced limitation to food access, results show that the top two factors were income/food price and concern over exposure to Covid-19. Figure 14 summarizes percentages of respondents who selected different factors that may impact their ability to access food (per the 309 respondents). As respondents were allowed to select more than one option, the total percentage does not add up to 100%.

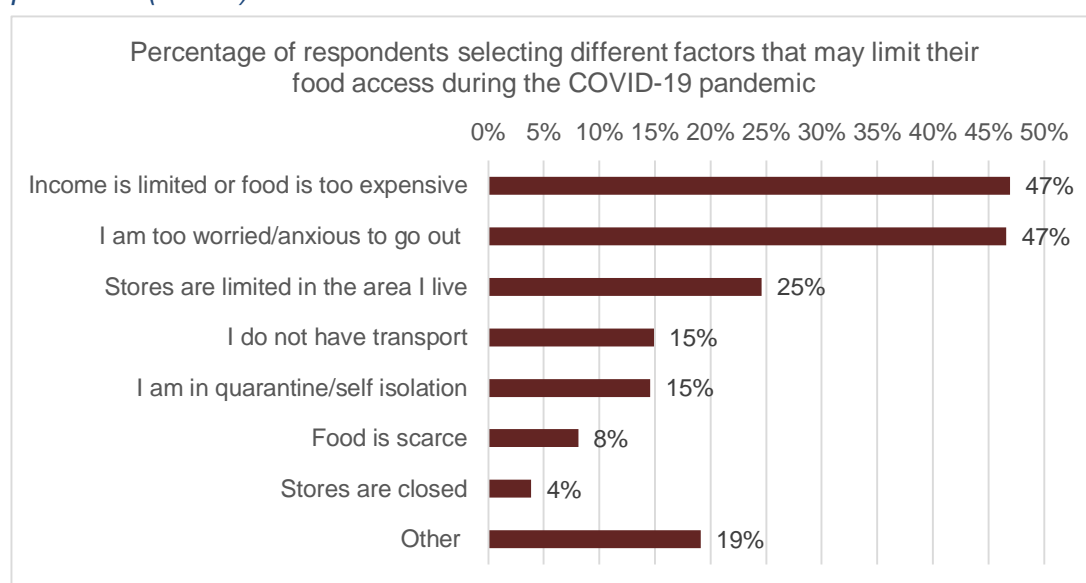
In addition to income/food price and anxiety, physical access is another factor that may

Figure 13: Percentage of respondents selecting at least one limiting factor to food access during the pandemic



affect respondents' access to food. These factors include distance to stores, lack of transportation and the requirement to self-isolate. Other factors included limited options of certain food items, unpleasant shopping experience in stores due to the need to maintain physical distancing, and long line-ups.

Figure 14: Percentage of respondents (of those who stated that their access to food was limited) and the different factors that may limit their food access during the pandemic (n=309)



Higher proportion of respondents with lower household income noticed an increase in food price.

In this question, respondents were asked if they noticed an increase in food price during the pandemic. Percentages of respondents answering this question were categorized by annual household income. Results (Figure 15) reveal that a greater proportion of respondents in the lower income groups seemed to notice food price increase than did those in the higher income groups.

These results are not surprising. When one has limited disposable income any change in prices of essential items such as food will affect purchasing ability and decision making more than for those with higher incomes.

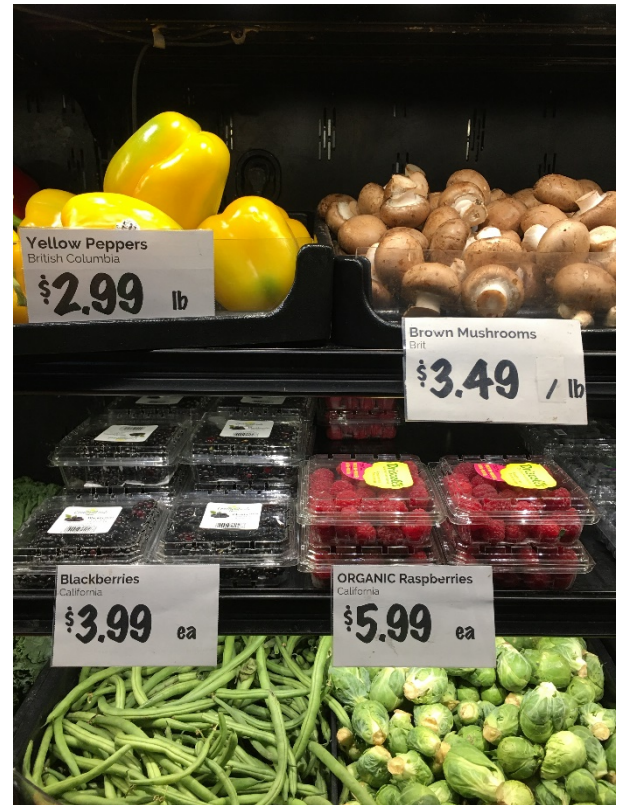
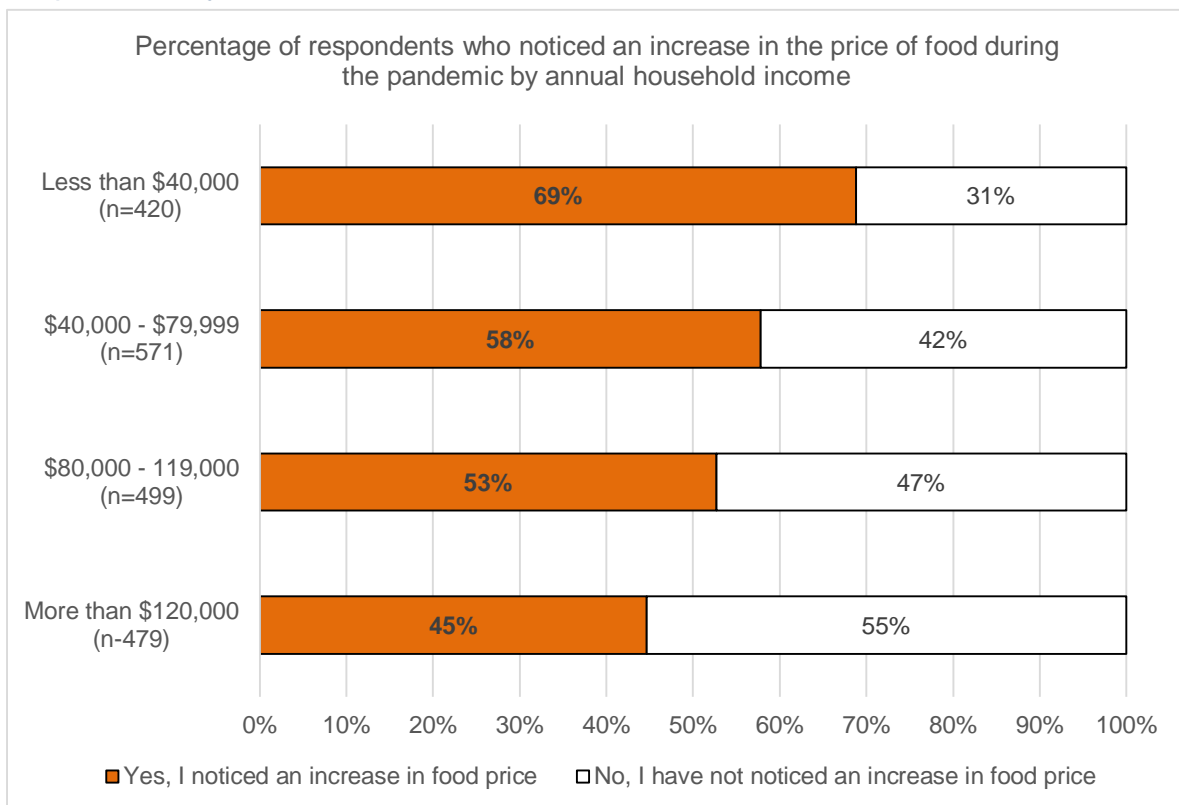


Figure 15: Percentage of respondents who noticed an increase in the price of food during the pandemic by annual household income



Respondents' concern over their food access situation rose as the pandemic continued.

Respondents were asked to evaluate their food access situation in 2019 and during the pandemic by selecting a level of agreement to the following statements:

"At times in 2019, I didn't have access to enough food for an active healthy life for all household members"

"This month, during the COVID-19 pandemic, I don't have enough food for an active healthy life for all household members"

"Thinking about next month, I'm concerned that I won't have enough food for an active healthy life for all household members"

Four levels of agreement from which respondents could select were:

"Always true",

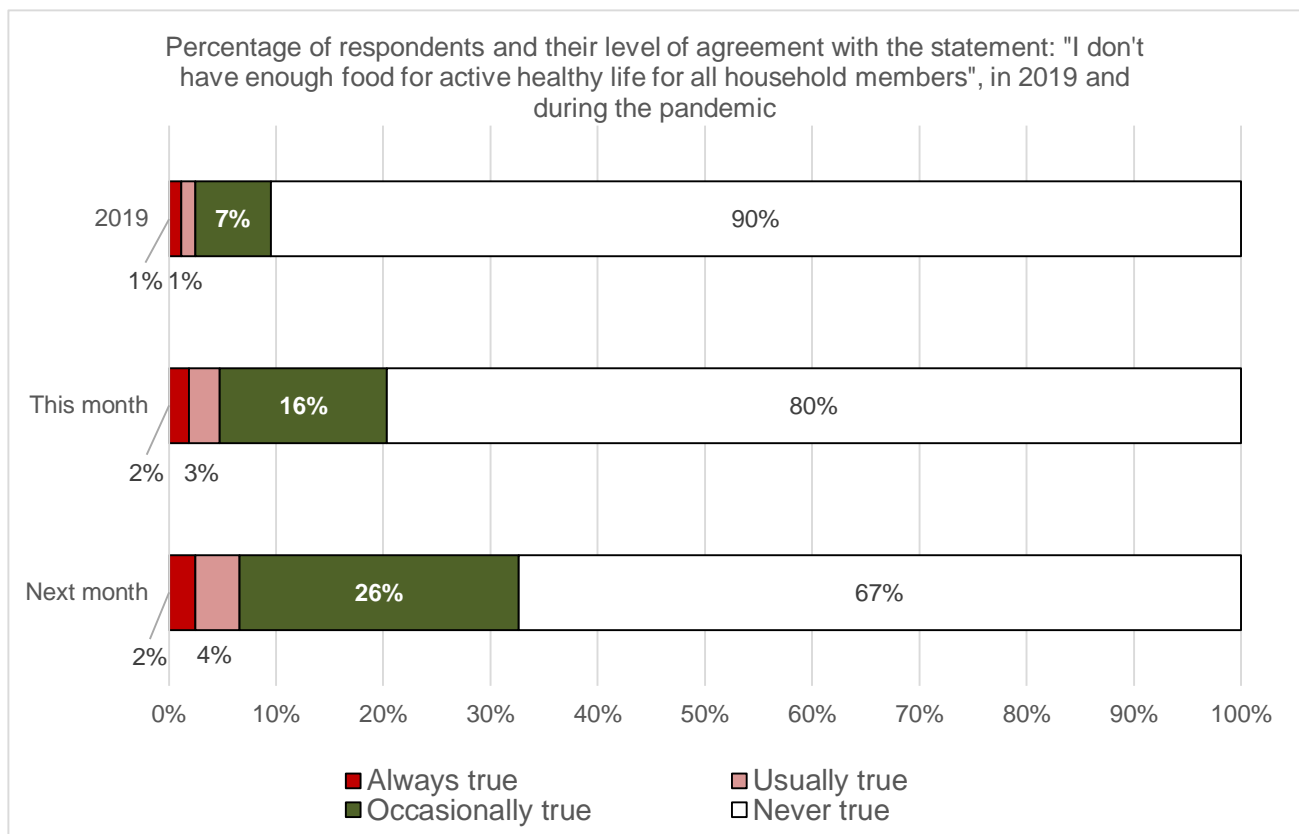
"Usually true",

"Occasionally true" and

"Never true".

The percentages of respondents who answered that the statements were *"always true"* and *"usually true"* increased slightly during the pandemic compared to 2019 (Figure 16). However, the percentage of people who selected *"occasionally true"* for 'this month' (indicating some level of concern over food insecurity) more than doubled from 7% in 2019 to 16% during the pandemic. This percentage increased even further to 26% when respondents were asked about their concern in the 'next month'.

Figure 16: Percentage of respondents and their level of agreement with the statement: "I don't have enough food for an active healthy life for all household members," in 2019 and during the pandemic



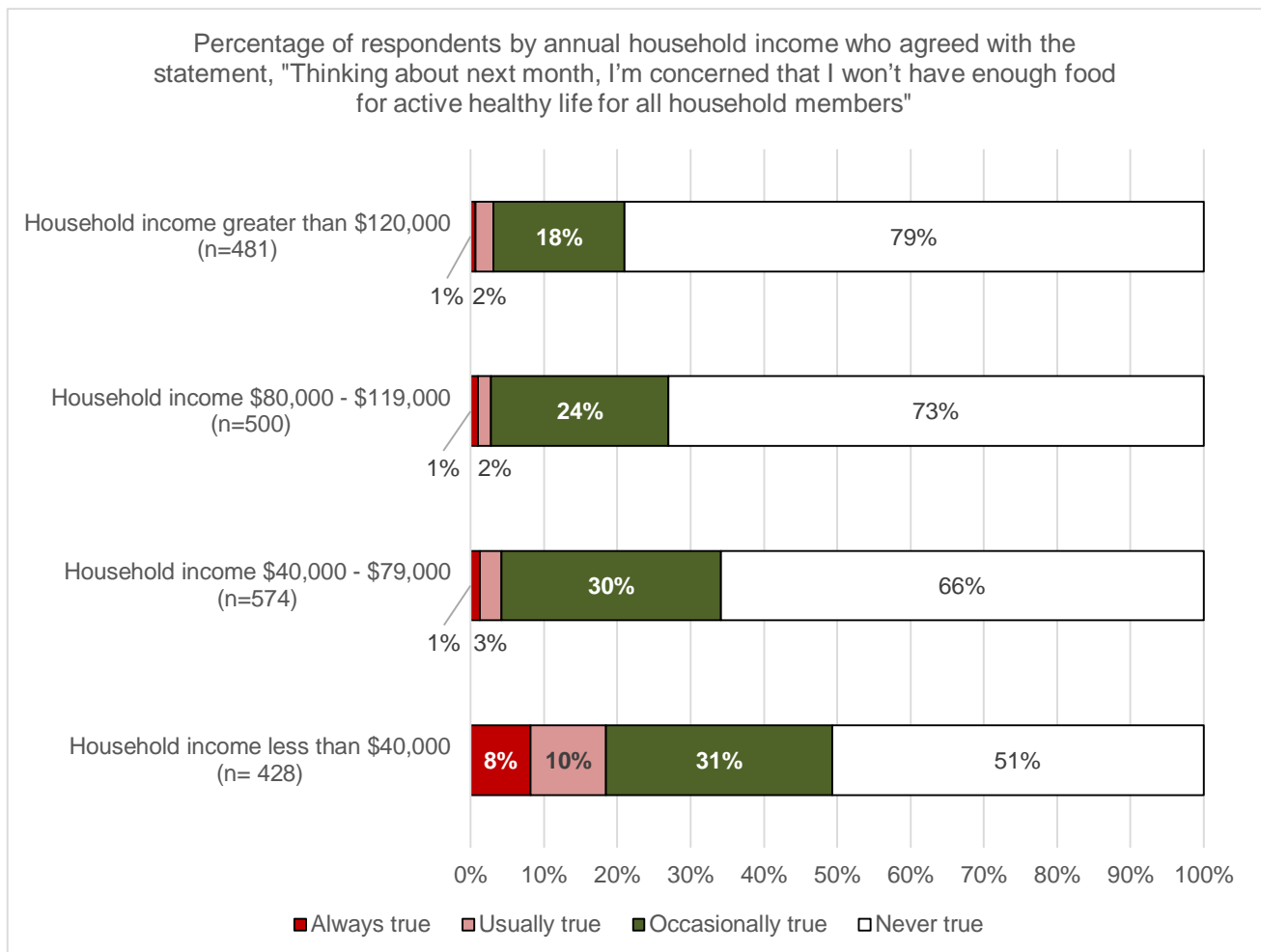
Respondents with lower household income anticipated greater concern over their household future food access

In this section we compare different respondent groups level of agreement to the statement, *“Thinking about next month, I’m concerned that I won’t have enough food for an active healthy life for all household members”*. Figure 17 conveys respondents’ level of agreement to this statement. The percentage of respondents who believed that the statement was *“always true”* was 8% for

respondents whose annual household income was less than \$40,000, compared to 1% for higher income groups.

Likewise, the percentages of those who answered *“occasionally true”* and *“usually true”* were far greater for respondents in the two lower income groups compared to those in the two upper higher income groups. For example, 31% and 10% of respondents in the lower two income group selected *“occasionally true”* while 18% and 2% of respondents in the higher two income group selected this option.

Figure 17: Percentage of respondents by annual household income who were concerned that they may not have access to enough food for active healthy life next month during the pandemic



Unemployed respondents and Indigenous respondents felt less secure regarding future food access for their household

When comparing percentages of respondents by their employment status (Figure 18), higher percentages of unemployed respondents agreed with the statement, “Thinking about next month, I’m concerned that I won’t have enough food for active healthy life for all household members”.

Similarly, when comparing percentages of Indigenous respondents to non-Indigenous respondents (Figure 19), the former expressed greater concern over their future food access. (To explore this issue in detail, further research is needed as the number of Indigenous respondents in this survey was relatively small compared to the number of non-Indigenous respondents.)

Figure 18: Percentage of respondents by employment status who were concerned that they may not have access to enough food for active healthy life for all household members in the next month during the pandemic

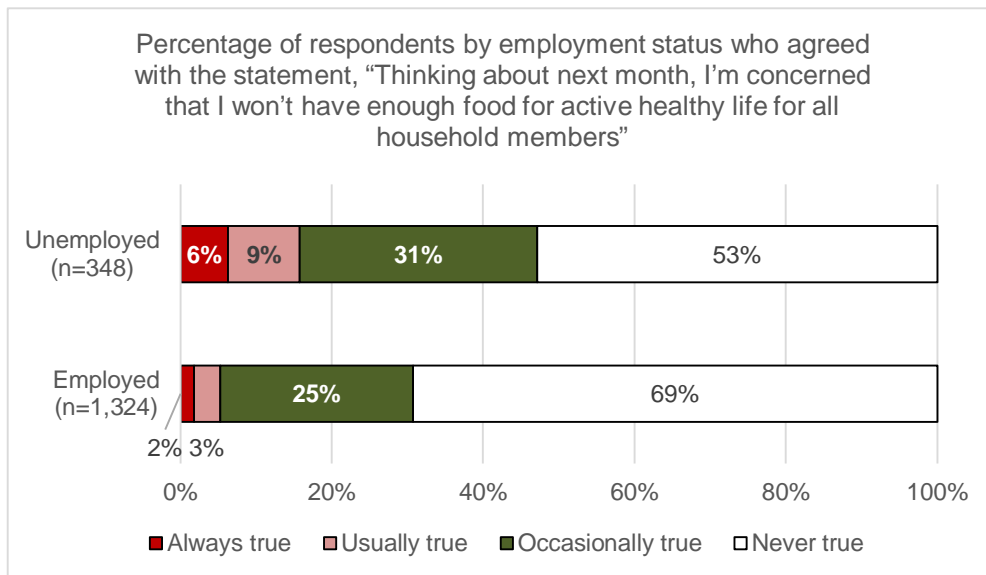
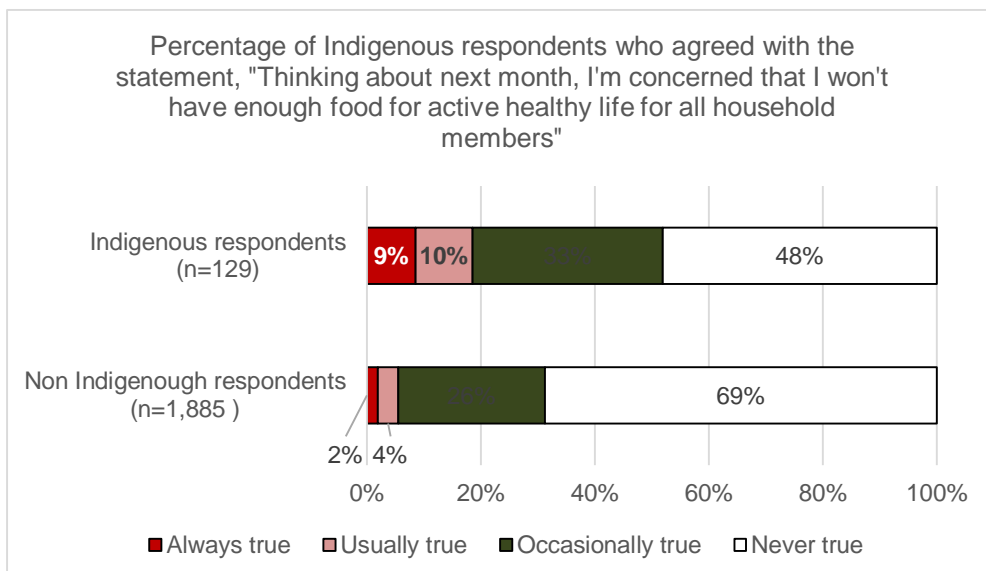


Figure 19: Percentage of Indigenous respondents who were concerned that they may not have access to enough food for active healthy life for all household members in the next month during the pandemic compared to non-Indigenous respondents



4.4 Shopping behavior and diet

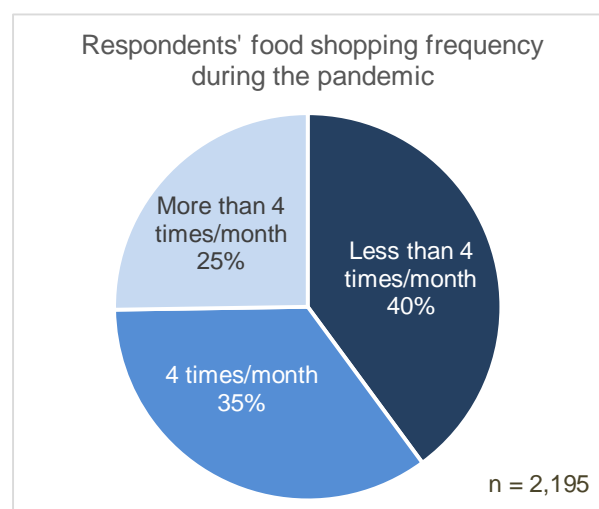
Food shopping was not as frequent during the COVID-19 pandemic

Respondents were asked how often they shopped for food during the pandemic based on a per-month period of time. Forty percent of respondents stated that they shopped less than 4 times/month (or less than once a week) and 35% of respondents stated that shopped 4 times/month (or about once a week) (Figure 20). The results suggest that the majority of people recognized the importance of limiting their exposure by curtailing shopping trips.

During the pandemic, respondents stocked up on shelf stable goods as well as baking ingredients

For this question, respondents selected the types of food that they purchased more during the pandemic. (Respondents were able to select multiple food types, as such percentages do not add up to 100%.) Respondents reported the greatest increase in purchases of canned and dried goods (Figure 21). Such goods do not need refrigeration or freezer space; hence are easier to store than other types. They are often staple foods such as rice, pulses, and dried beans. Respondents also bought more baking ingredients. This could be the reason why flour and yeast were reported to be among

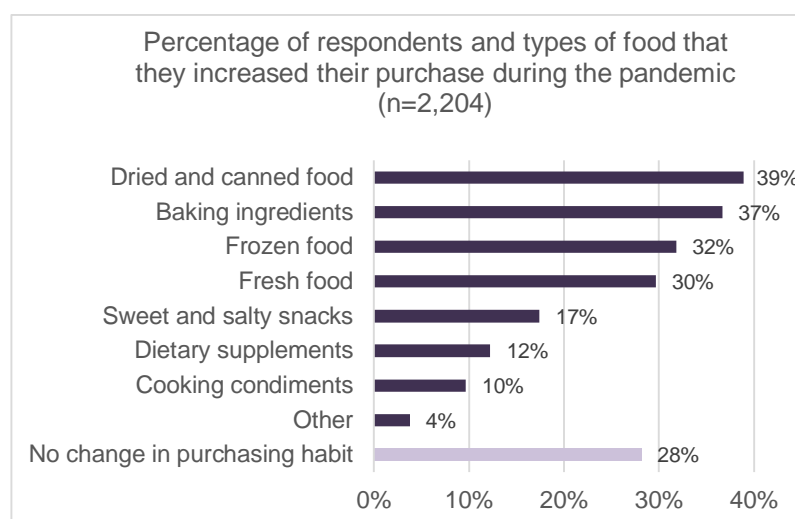
Figure 20: The frequency of food shopping during the COVID-19 pandemic



the items that were hard to access. A number of respondents reported buying more of everything in general.

Interestingly, those who reported buying more fresh food stated that they did so because they now cooked more at home. Further, many stated that they bought more from local producers to support local businesses.

Figure 21: Percentage of respondents and types of food that have been purchased more during the pandemic



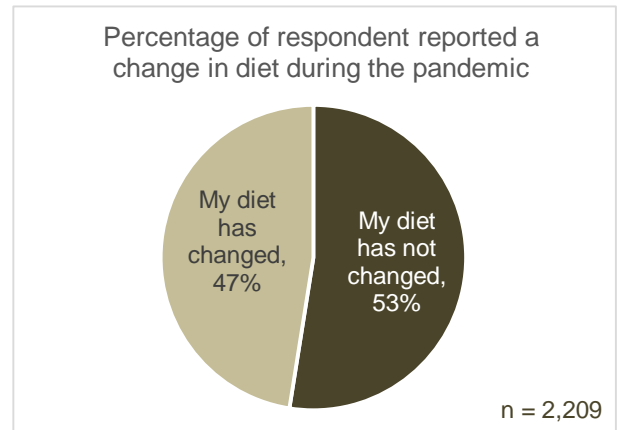
Slightly over half of respondents did not experience a change in diet during the pandemic. For those whose diet did change, several patterns of change emerged.

As the food environment changed during the pandemic, we were interested to see if and how diet was impacted. Fifty-three percent of respondents stated that their diet had not changed during the pandemic while 47% stated that it had changed (Figure 22).

Only respondents who reported dietary change (1,043 respondents) were asked to indicate patterns of change in their diet. The results on percentages of respondents selecting different patterns of diet change from a pre-determined list are shown in Figure 23. As respondents were allowed to select more than one pattern, the total percentages shown do not add up to 100%.

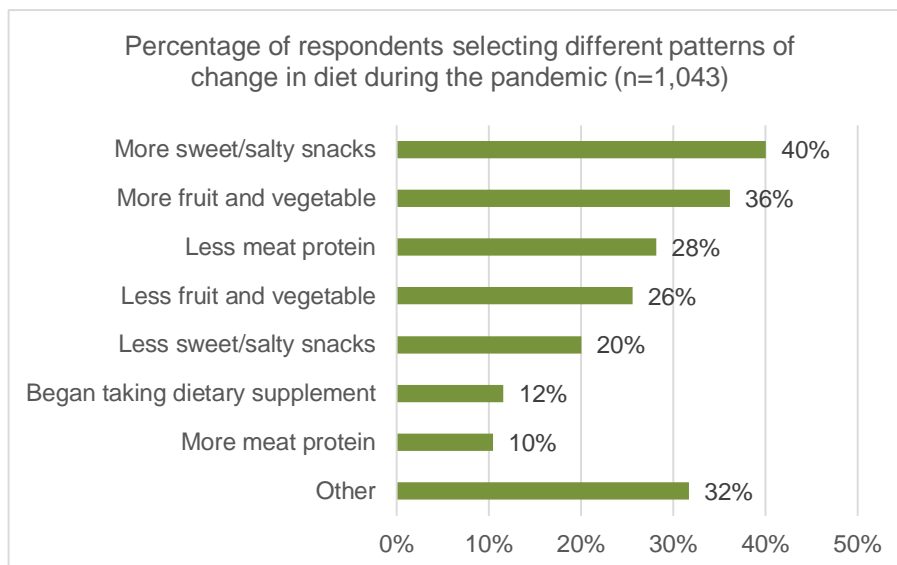
The leading change with 40% of respondents was increased consumption of sweet and/or salty snacks. The second leading change was

Figure 22: Percentage of respondents reported a change in diet during the pandemic



an increase in consumption of fruits and vegetables with 36% of respondents selecting this. About 32% selected “other” change which included increasing consumption of non-perishable food, increasing home cooking and baking and consuming any type of food that was available in stores.

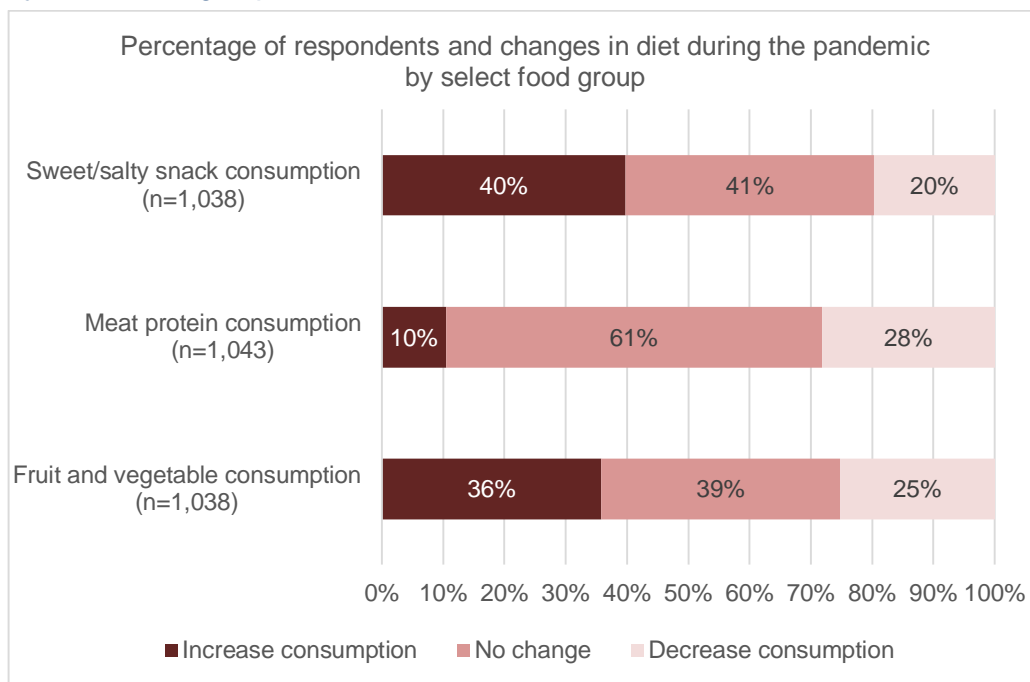
Figure 23: Percentage of respondents selecting different patterns of change in diet during the pandemic



Patterns of change among the different food groups were not mutually exclusive, meaning that respondents could both increase consumption of sweet and/or salty snack foods as well as increase their consumption of fruits and vegetables. However, change for the same food group is mutually exclusive, meaning that respondents could not choose to increase and decrease consumption of a food group at the same time. As such we can make comparisons between respondents who stated

that they increased, decreased or did not change their consumption of select food groups. Results (Figure 24) indicate that meat protein consumption was less sensitive to change compared to fruit/vegetable and sweet/salty snacks consumption. Sixty-one percent of respondents reported no change in meat protein consumption compared to 41% and 39% for sweet/salty snack and fruit and vegetable, respectively.

Figure 24: Percentage of respondents and changes in diet during the pandemic by select food group



Five most cited reasons for the change in diet: (1) more time spent at home, (2) pandemic stress, isolation and boredom, (3) focusing on being healthy, (4) infrequent food shopping trips and limited availability, and (5) financial hardship or affordability.

After respondents indicated their patterns of diet change, a follow up question asked them to explain why the change occurred. About 960 respondents answered this open-ended question. The following highlights key revelations:

- (1) More time spent at home due to the pandemic seemed to have both positive and negative impacts on people. Those who associated time at home with positive impacts cited the ability to meal plan and cook higher quality and healthier meals. On the other hand, those who associated time at home with negative impacts cited higher consumption of food especially sweet and salty snacks.
- (2) The uncertainty of the pandemic caused respondents to feel stressed. Additionally, increased time spent at home led some respondents to feel isolated and bored. As a result, “comfort eating” was the main reason respondents increased their sweet and salty snack consumption.
- (3) A number of respondents wanted to remain healthy and enhance their immune system during the pandemic. This led to an increased consumption of fruits and vegetables in their diet. Some also started taking dietary supplements.
- (4) Respondents reported that to reduce the risk of exposure and becoming infected, they reduced their shopping frequency as well as restaurant meals (both dining in and

take-out). As such, their access to perishable items such as fruits and vegetables became limited.

- (5) Many respondents reported that income and higher food price was a limiting factor. They had to reduce consumption of certain foods or switch from more expensive items such as fresh meat to something more affordable such as processed meat or pulse products.
- (6) Other reasons for changes in diet included adjusting eating behavior to products that were available at the time of shopping, buying (and consuming) food that can be stored longer, buying fresh products directly from local producers to support their businesses during the pandemic, eating products that can be grown or preserved at home more, and having less time due to limited access to child care.



4.5 Perceptions of global vs regional food systems and types of support needed

Food system scale, configuration and resiliency as it relates to community development and well-being is a topic that has come more to the fore in recent years. The dominant food system and our relationship with it has been tested by the pandemic. This section evaluates respondents' perception of the food system. A set of three questions was put forth. The first asked respondents to rate their level of concern over the reliability of the global food supply chain from 0 to 10. Zero was not at all concerned while 10 was extremely concerned.

The second question asked respondents if they agreed that a substantially developed local/regional level food system can be more reliable than the global food system. Respondents were able to select their level of agreement on the scale of 0 to 10. Zero was strongly disagree while 10 was strongly agree.

The final question asked respondents if the pandemic had them thinking that the provincial government should put greater efforts into building and strengthening local/regional food

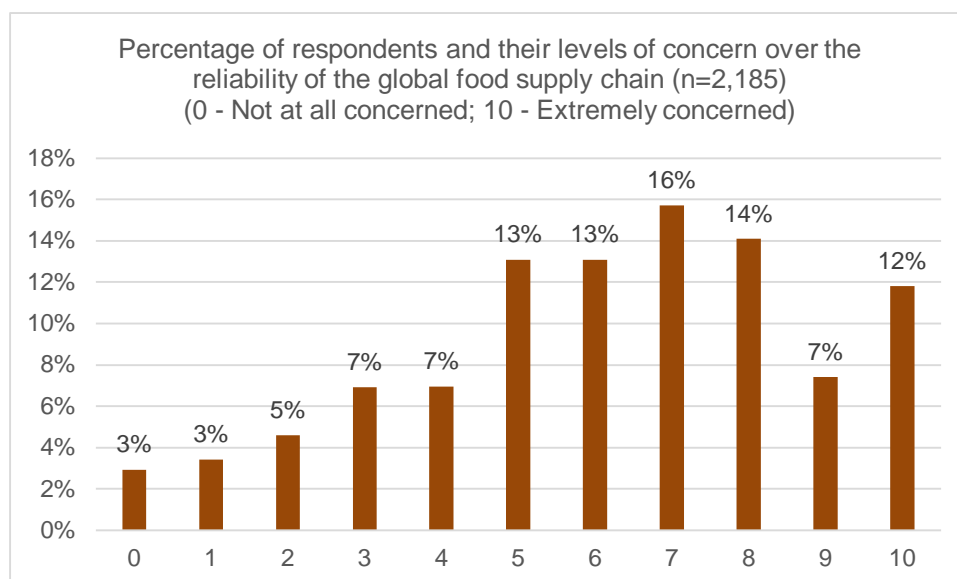
systems in BC. Like the previous question, the response scale was from 0 (strongly disagree) to 10 (strongly agree).

Respondents were moderately concerned about the reliability of the global food supply chain.

With regard to the reliability of the global food supply chain, on average, respondents' level of concern was moderate (6/10). When comparing the level of concern by gender, we found that female respondents had greater concern (6.2/10) $t(2106)=2.93$, $p < 0.01$ than their male counterparts (5.7/10). Figure 25 presents percentages of respondents and the distribution of concern.

Nearly one-fifth of respondents felt extremely concerned over the reliability of the global food system. Respondents were then asked to explain why they felt concerned. They believed that BC relies too heavily on imported food as well as migrant labour and that they are afraid BC's food access may be limited if other countries change their export policies in extreme events such as a pandemic or natural disaster in their countries (Reuters, 2020; Jordan, 2020).

Figure 25: Percentage of respondents and the distribution of their level of concern over the reliability of the global food supply chain



The majority of respondents felt strongly that a more substantially developed local/regional food system would be more reliable than the global food system during the pandemic.

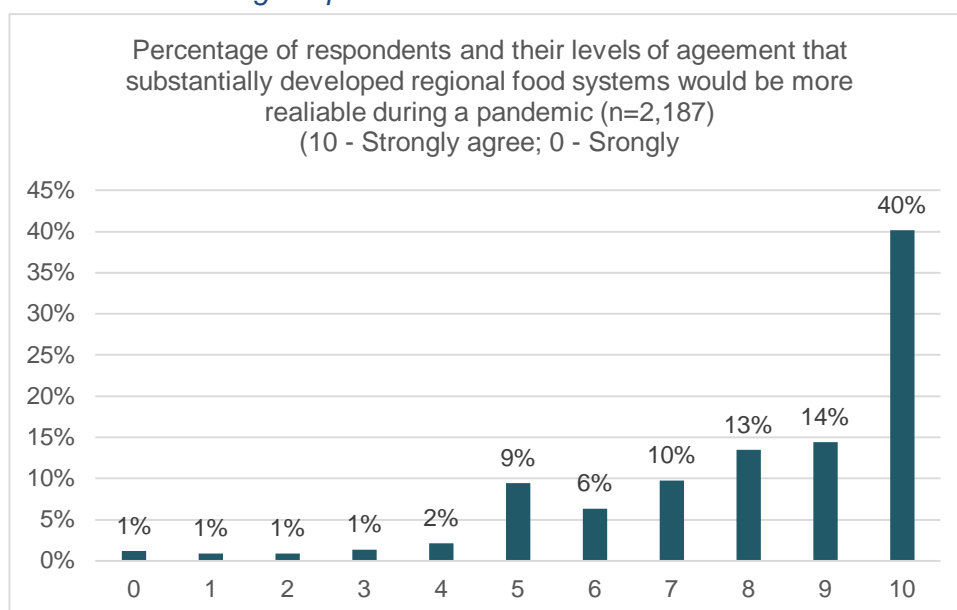
The majority of respondents (54%) strongly believed that substantially developed local/regional food systems would be more reliable providing food for their tables (Figure 26). When asked to explain the reasons why they believed so, the three most cited reasons were: increased food self-reliance, shorter supply chains and increased resiliency.

Forty percent of respondents explained that they believed that if local/regional food systems were more developed where they lived, they would have more food produced locally and could be less dependent on imported food. Thirty-nine percent of respondents believed that there would be shorter supply chains if local/regional food systems were developed, and that shorter supply chains would reduce the number of people getting infected. Thirty percent of respondents believed that local/regional food

systems would be more resilient to exogenous factors such as foreign trade policies, virus outbreaks in other countries, and transportation disruptions. Other reasons cited were trust in local producers, the willingness of community members to help each other during times of crisis, and better quality products.

Only about 6% of respondents did not agree that substantially developed local/regional food systems could be more reliable than the global food system during the pandemic. They stated that due to seasonality, land and labour constraints, consumers would not be able to rely solely on local products in winter months. They also believed that small local businesses would be affected by the pandemic more and would not be able to compete with multinational businesses. Additionally, they questioned the affordability of local products.

Figure 26: Percentage of respondents and the distribution of their level of agreement that substantially developed regional food systems would be more reliable during the pandemic



The majority of respondents strongly agreed that more support should be given to build and strengthen their local/regional food systems.

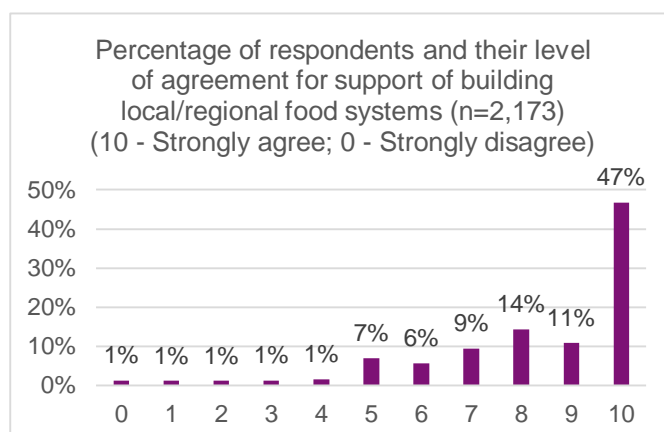
Figure 27 clearly shows that amid the pandemic the vast majority of respondents felt strongly that more support should be given to build and/or strengthen their local/regional food systems. Based on answers to the previous questions, many respondents stated that they live in remote locations and felt strongly that to improve their food access local food production capacity needed to increase.

Four key supports that respondents needed were, accessing locally grown products, accessing food products through conventional supply chains, financial assistance, and an increased ability to grow their own food

About 1,000 respondents reported the types of support that they would like to receive in order to improve their food access. As this question requested open-ended responses, respondents' answers were categorized into different themes.

The first type of support, with the most number of respondents reporting, was access to locally grown products. The general sentiment of respondents was that they wished to support local producers and see more locally grown products available at an affordable price. Respondents would like to see better distribution systems for local products to improve their access; either having more physical options such as farmers' markets and local stores where they lived, or through an online delivery system, and CSA subscriptions. Relaxing restrictions of the sale of meat by small scale producers was also noted. A number of respondents mentioned subsidy or assistance such as the Farmers' Market Coupon program, so they could better afford local products.

Figure 27: Percentage of respondents' agreement for support of building local/regional food systems



The second type of support respondents suggested was accessing food from the conventional supply chain. Within this theme, the majority of respondents mentioned the availability of different selections of food, increased delivery capacity, bulk buying, and ensuring that safety measures are strictly followed.

The third type centered around financial support. Respondents felt that in order for them to have access to good healthy food, they needed more financial assistance. Respondents referred to avenues such as grocery store gift cards, universal basic income, increased child tax benefits, living wage, increased pension, and increased disability assistance.

Finally, respondents would like supports that would allow them to grow/harvest/make their own food. Respondents would like access to community gardens, information and training on farming and food preservation, as well as financial support to encourage the use of urban spaces for food production.

5. Discussions and implications to BC food systems

Since the rapid spread of COVID-19 around the world, there have been many changes in the way consumers behave and perceive their relationship with food and the system through which they access it (Aday and Aday, 2020; Béné, 2020; Butu et. al., 2020; DeBroff, 2020). This study brings to light 5 key, interconnected points regarding how British Columbians adjusted their behaviors and perceptions during the COVID-19 pandemic. These findings may provide valuable guidance in regard to system shock response and have important implications in shaping our local/regional food system in preparation for a prolonged period of pandemic most immediately, as well as an uncertain post-pandemic world.

First, online food shopping became more prominent during the pandemic. Additional support for online marketing should be provided to local producers to help maintain their competitiveness.

Results illustrated that all forms of in-person food access experience in BC declined during the pandemic compared to 2019. While in-person shopping at conventional supply chain outlets remained the key food access channel, the greatest reduction in food procurement rates was restaurant dining. Online food purchase was the only food access channel where participation rate increased compared to 2019.

Findings from other studies suggested similar results. A survey in the United States (US) found that nearly half of respondents currently participate in online food retail (Redman, 2020). The COVID-19 pandemic and the “stay at home” recommendations induced a temporary growth in online food trade in Germany (Dannenberg et. al., 2020). Chang and Meyerhoefer (2020) found evidence of a positive relationship between the number of new cases and the sales of online food trade in

Taiwan. Even when the pandemic ends, a number of Canadian consumers are expected to continue to access food online (Agri-food Analytics Lab, 2020b). The shift to online food shopping reflected consumers’ effort to reduce personal risk of virus transmission during the pandemic.

Thus, this result should be taken into account by local food producers in their business planning. However, small scale local producers and businesses may be at a disadvantage compared to businesses in the global food supply chain regarding the use of online ordering platforms (Butu, et. al., 2020). Hence, additional assistance from the government or other organizations may be needed to ensure that local producers remain competitive.



Second, pandemic anxiety played an important role in limiting food access. Clear communication by health care officials is needed. Safe shopping environments should continue to be provided.

Our results indicated that pandemic anxiety may directly or indirectly affect consumers in different ways. (1) It directly caused consumers to reduce the number of ways and places where they accessed food. (2) It also caused concern over the future and the ability to access enough for active and healthy life for all household members. And (3) it indirectly turned food shopping into a stressful activity.

Results from other studies revealed similar trends. Studies from China, Finland and Poland suggested that perceived severity of

the pandemic and fear of limited access to food induced consumer behaviors such as food stockpiling and hoarding (Wang et. al., 2020; Laato, et. al., 2020; Jeżewska-Zychowicz, Plitchta and Królak, 2020). A consumer survey conducted in the US found that the anxiety was centered around not having access to specific food when out shopping (DeBroff, 2020). In Iran, the increasing price of essential goods was one of the main sources of stress during the pandemic (Mousavi, Hooshyari and Ahmadi, 2020). Safety and sanitization measures have become a new norm for Canadian consumers when shopping for food (Agri-food Analytics Lab, 2020b; Haas et. al., 2020; Nielsen, forthcoming).

To address consumers' fear and reduce anxiety, information (such as risk of transmission via food, additional restrictions and safety measures, etc.) has to be communicated clearly by health officials using an evidence-based approach. Local food producers and businesses can also reassure consumers by continuing to provide safe shopping environments with enough space to physically distance, sanitization stations, and using contactless payment methods.

Third, the pandemic heightened inequality in our food systems. Greater fiscal and social interventions are necessary to increase vulnerable population's ability to access food, and ensure that new types of vulnerability are not created.

Our results highlighted a long established food security dynamic: that income is a key barrier to food access (coupled with pandemic anxiety). Lower income households were more sensitive to changes in food prices. Additionally, as employment status was directly related to income, those who lost their jobs due to the pandemic were likely to experience higher concern over future food access. Although our study did not use the standard measurement of food insecurity, our results were consistent with other literature on population food insecurity. Loopstra (2020)

identified groups of population who were vulnerable to food insecurities during the UK lockdown. These people were economically vulnerable (at risk of poverty), adults experiencing loss of income, people with disabilities, and those in self-isolation. In May 2020, Statistics Canada reported that Canadian households with children living at home were experiencing higher levels of food insecurity as well as those who were not employed during the survey period (Statistics Canada, 2020i).



Lack of income not only created vulnerability in food access in general, it also pushed people to make unhealthy food choices (such as fast food and processed meat) because those foods have lower prices but are energy dense (i.e. rich in fat and sugar) (Kamphuis et. al., 2006; Zhang et. al., 2011). A study in Australia estimated that for low-income families to be able to afford a 'healthy food basket', they would have to spend approximately 30% of their household income (Ward et. al., 2013).

In this regard, fiscal and social interventions should be put forth to assure that vulnerable populations can exercise their right to access adequate, healthy food during the pandemic. Income and employment status were not the only determinants of food access inequality identified in our study. Results also indicate that Indigenous populations exhibited a higher level of difficulty accessing food.

Further specific investigation should be conducted on food access in Indigenous populations/ communities during the pandemic as our survey sample contained a relatively small sample of Indigenous participants. Additional factors that may induce food access inequality include internet access and computer literacy. This becomes especially important when consumers need to access food through online transactions - an emerging trend critical to development of local/regional food systems.

Fourth, two contrasting behaviors of dietary change emerged during the pandemic. Public health programming needs to address the impact of mental health on diet choices and implement strategies to encourage and maintain healthy diets in population.

On one hand, a number of respondents reported increasing consumption of sweet/salty snacks due to pandemic stress and boredom resultant from time spent at home. On the other hand, a similar number of consumers reported increasing consumption of fruits and vegetables in order to remain healthy, boost their immune systems and reduce potential severity of illness in the event of getting sick.

There is scientific evidence supporting stress-eating behavior especially of sugar, fat and alcohol (Abbas & Kamel, 2020; Mattioli et. al., 2020; Ingram, Maciejewski & Hand, 2020). Therefore, our result demonstrating increased snack consumption was not surprising. A survey of European consumers suggested that around 10-27% of consumers in England, France, Italy, Germany and Spain consumed a less healthy diet during the COVID-19 outbreaks in March and April (Wunsch, 2020).

While the pattern of unhealthy eating emerged during the pandemic, the opposite pattern of healthy eating also occurred. Studies from France, Poland and Spain shared similar results on the two contrasting dietary changes

(Deschasaux et. al., 2020; Górnicka et. al., 2020; Scarmozzino and Visioli, 2020). Healthy diet (such as consumption of fruits and vegetables) is often referred to as one of the prevention strategies for numerous diseases (Willett, 1994). It is believed that whole fresh food could improve our immune system to protect against infection and/or reduce the severity of illness when infected (Han and Hoang, 2020; Jawhara, 2020; Moazzen et. al., 2020).

Implications for health officials are threefold: (1) Public health programming on food choices, nutrition education and food preparation to encourage healthy eating during stressful events such as a pandemic should be designed and implemented. (2) Greater efforts need to be put into monitoring the population's diet and mental health to better ensure people can transition from bad eating habits developed during the pandemic to avoid long term health consequences. (3) Strategies to maintain the adoption of healthier eating (even after the pandemic) would be beneficial to reduce public health care related expenses in the long run.



Fifth, British Columbians would like to see development of robust local-regional food systems. Greater infrastructure support should be provided to local communities around BC to assist producers in delivering food to consumers.

The knowledge of having a stable food supply with short travel distances (i.e. supply chains) reassured people of their food access capacity

during the pandemic. From the consumer perspective, respondents also understood the importance of supporting local producers and businesses especially during the pandemic. The results indicated that the majority of consumers needed most support in procurement of local products. This not only reflected consumers' preference for local food but indirectly indicated the inadequacy of the current local systems including production, distribution, and retail. Clapp and Moseley (2020) pointed out that diversified market opportunities and infrastructure which supported local producers was often lacking compared to businesses participating in the global supply chain.

Therefore, the development of appropriate environments for local farmers and businesses who participate in alternate supply chains should be a priority in economic recovery and development strategies for provincial and local governments. A business model such as co-operatives should be revisited and supported to enhance producers' collaboration and market opportunities. With the presence of local producers and businesses within local communities, it would reduce another barrier to food access indicated by a number of consumers in our survey (lack of transportation and limited availability of stores where they lived).

Another aspect of local/regional food system development derived from this study included individuals' ability to access food through gardening and urban agriculture. Consumers needed support in terms of information and training to enhance their skills, and increase their access to land/community gardens. This last finding illustrates the need for innovative extension education programming such as the Richmond Farm School run by the Institute for Sustainable Food Systems at Kwantlen Polytechnic University.

6. Conclusion

At the time of the release of this report, the province of BC has entered the second wave of the COVID-19 pandemic. It is likely that this health crisis will continue throughout the winter and into the summer. This report presents results on consumers' behaviors, concerns and perceptions during the first wave of the pandemic. The results suggest that, in general, consumers exhibited high degrees of adaptation to a new food environment. However, certain groups of our population may be less able to adapt and hence more vulnerable than others. Therefore, appropriate assistance should be dedicated to them to ensure that inequality in our food systems does not widen. Issues of mental health in relation to food access and consumption should be investigated further. Local producers and businesses will have to find innovative ways to satisfy consumers' demand while remaining competitive. Finally, reliance solely on the global food supply chain is considered too risky and not supported by BC citizens; they want stronger local-regional food systems that directly support their communities. Real efforts have to be put into the development and growth of local and regional food systems all around BC.



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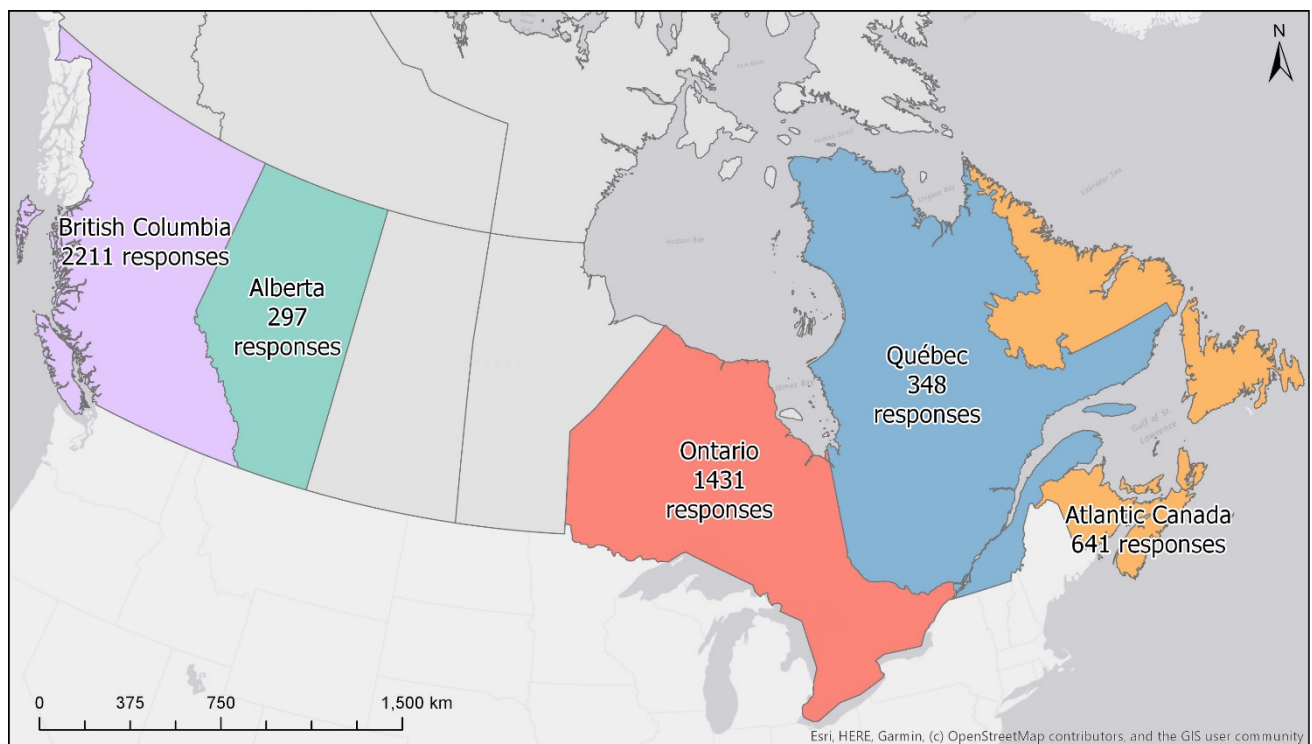
Appendix A

Inter-provincial survey response rates by province and
link to other regional reports

Survey response rates in each province are summarized in the figure below. Due to limited resources, the survey was not conducted in Manitoba, Saskatchewan, Yukon, Nunavut and the Northwest Territories.

Final reports from Alberta, Ontario, Quebec and Atlantic Canada can be found at:

<https://www.kpu.ca/isfs/covid19-consumer-survey>



Appendix B: Survey Questionnaire

Food access perceptions and concerns in BC during the COVID-19 pandemic

Letter of Informed Consent

You have been invited to participate in a survey on consumer food access, perceptions and concerns during the COVID-19 pandemic. This project is designed and executed by the Institute for Sustainable Food Systems (ISFS) at Kwantlen Polytechnic University (KPU). The survey can be completed online in approximately 15 minutes. Please review the informed consent information and contact the principal investigator if you have any questions.

Title of Research Project: BC consumer food access, perceptions and concerns during the COVID-19 pandemic

Principal Investigator: Dr. Kent Mullinix

Purpose of the Project

The main goals of this project are to advance our understanding of food access and the food related behavior of BC consumers during the COVID-19 pandemic. The results will provide evidence of the impacts of a pandemic on one of the basic human needs - food - from the consumer's perspective.

Voluntary Participation

Your participation is voluntary. You may withdraw from the study by simply clicking the exit link on the top right hand corner or closing your web browser. Any responses you completed up to that point will be deleted. You may skip any of the questions you do not wish to answer. There will be no negative consequences for an incomplete survey response or withdrawal.

Procedures and Confidentiality

Your answers are completely anonymous. Survey responses will be summarized and reported in an aggregate form within a report. The report study will be published on the ISFS website at <https://www.kpu.ca/isfs/publications>. Please note that when doing online research, there is always the chance of hacking from outside sources. To protect you, we will do the following: (a) we are not asking you to provide personally identifiable information; (b) we will disable IP address tracking by our online survey; (c) we will download and store your data on a secure KPU server; (d) after downloading, we will delete your responses from the online survey tool; and (e) we will treat your anonymized data confidentially and will only allow the research team or future researchers to have access to the data. We suggest that you disable any browser cookies before beginning this survey or clear them after completing the survey.

Risks of Harm/Discomforts/Inconvenience

There is no potential negative economic or social risk associated with your participation. A minimal amount of emotional risk is expected by your participation in this project. If you become distressed during the online survey process, you can stop the survey at any time. You can contact the ISFS' Director, Dr. Kent Mullinix, to express your concerns.

Benefits

There are no financial benefits associated with completing the survey. However, your participation will help provide information on the impacts of Covid-19 on consumer food access, food purchases and

consumption, as well as food related perceptions and concerns. Furthermore, the knowledge gained from this study will contribute to the on-going discussion on the importance and/or urgency of transitioning into a more reliable and resilient regional food system.

Contact Information

By consenting to participate, you have not waived your rights to legal recourse in the event of research related harm. If you wish to contact someone regarding this research, contact the principal investigator, Dr. Kent Mullinix (Tel: 604-599-2540 or email: kent.mullinix@kpu.ca) or the Kwantlen Polytechnic University Research Ethics Board at 604-599-3163 or reb@kpu.ca.

- * 1. I agree to participate in this study. I understand the purpose and nature of this study and I am participating voluntarily. I understand that I can withdraw from the study at any time, without any penalty or consequences.
☐ Yes ☐ No
- * 2. I understand that I can withdraw from this survey at any time by closing the web browser.
☐ Yes ☐ No
- * 3. I understand that I can skip any questions that I do not feel comfortable with or wish to answer.
☐ Yes ☐ No
- * 4. Please know that you can withdraw from the study by clicking "Exit" in the top right hand corner or closing your web browser. You may also skip any questions you don't want to answer.
 Do you want to continue answering the survey?
☐ Yes, I want to continue
☐ No, I do not want to continue

Confidentiality Statement: All your answers will be anonymous and your name will not be attached to your responses.

- 5. Are you 19 years of age or older?
☐ Yes ☐ No
- 6. Are you a resident of BC?
☐ Yes ☐ No
- 7. Are you currently residing in BC?"
☐ Yes ☐ No
- 8. Please enter the first three digits of the postal code of your current residence

Food access perceptions and concerns in BC during the COVID-19 pandemic

Concern about the COVID-19 Pandemic

Note:

- On March 11th, 2020, the World Health Organization (WHO) announced that the worldwide
- COVID-19 outbreak is a pandemic. On March 13th, 2020, the Government of Canada advised against non-essential travel abroad. Thereafter, physical distancing practice was implemented, non-essential businesses closed and activities were cancelled.

9. Do you belong to one of the following groups that are identified as high-risk for severe illness from COVID-19? Please select all that apply

- ☐ People aged 65 years and older
- ☐ People who live in a nursing home or long-term care facility People with chronic lung disease or moderate to severe asthma People who have serious heart conditions
- ☐ People who are immunocompromised including cancer treatment
- ☐ People of any age with severe obesity (body mass index [BMI] >40) or certain underlying medical conditions, (particularly if not well controlled, such as those with diabetes, renal failure, or liver disease etc)
- ☐ Other (please specify)
- ☐ I do not belong to a vulnerable group

10. Rate how concerned you are about the COVID-19 pandemic:

Not at all concerned Extremely concerned

Food access perceptions and concerns in BC during the COVID-19 pandemic

Food Access

11. Prior to the pandemic (in 2019), how did you access your food? Select all that apply.

- ☐ Buying groceries/meals in-person at a grocery store.
- ☐ Buying groceries/meals online from a grocery store to be picked up/delivered to your home.
- ☐ Buying groceries/meals from other online stores (i.e SPUD, Amazon, Instacart) and receiving deliveries to your home.
- ☐ Buying produce/products at Farmers markets.
- ☐ Receiving CSA (Community Supported Agriculture) weekly produce box.
- ☐ Buying produce/products directly from farms/farmers/fish and seafood harvesters"
- ☐ Dine at restaurants (including fast-food, café, etc).
- ☐ Order take-out meals from restaurants (including fast-food, café, food trucks, etc.).
- ☐ Order prepared meals or kits to be delivered from delivery services (i.e Hello Fresh, Chef's Plate etc).
- ☐ Meals purchased from school/university cafeteria or dining hall.
- ☐ Meals purchased from workplace cafeteria or dining hall.
- ☐ Groceries or meals received from food banks/charities/BC Farmers' Market Nutrition Coupon Program
- ☐ Groceries or meals received from workplace.
- ☐ Groceries or meals received from family or friends
- ☐ Growing your own food
- ☐ Hunting, fishing, or harvesting wild food
- ☐ Other (please specify)

12. Since the declaration of the pandemic, how do you access your food now? Select all that apply

- ☐ Buying groceries/meals in-person at a grocery store.
- ☐ Buying groceries/meals online from a grocery store to be picked up/delivered to your home.
- ☐ Buying groceries/meals from other online stores (i.e SPUD, Amazon, Instacart) and receiving deliveries to your home.
- ☐ Buying produce/products at Farmers markets.
- ☐ Receiving CSA (Community Supported Agriculture) weekly produce box.
- ☐ Buying produce/products directly from farms/farmers/fish and seafood harvesters
- ☐ Dine at restaurants (including fast-food, café, etc).
- ☐ Order take-out meals from restaurants (including fast-food, café, food trucks, etc.).
- ☐ Order prepared meals or kits to be delivered from delivery services (i.e Hello Fresh, Chef's Plate, etc).
- ☐ Meals purchased from school/university cafeteria or dining hall.
- ☐ Meals purchased from workplace cafeteria or dining hall.
- ☐ Groceries or meals received from food banks/charities/BC Farmers' Market Nutrition Coupon Program
- ☐ Groceries or meals received from workplace.
- ☐ Groceries or meals received from family or friends
- ☐ Growing your own food
- ☐ Hunting, fishing, or harvesting wild food
- ☐ Other (please specify)

13. Since the declaration of the pandemic, how often do you purchase food?

- ☐ Less than once a month
- ☐ Once a month
- ☐ 2 times per month
- ☐ 3 times per month
- ☐ 4 times per month
- ☐ More than 4 times per month

14. Since May 19th, 2020, BC transitioned into the second phase of the re-start plan allowing people to gather in groups up to 6 and keep a physical distance. How often do you purchase food using no-contact or delivery options?

- ☐ Less than once a month
- ☐ Once a month
- ☐ 2 times per month
- ☐ 3 times per month
- ☐ 4 times per month
- ☐ More than 4 times per month
- ☐ I do not use no-contact or delivery options

15. How difficult is it currently to access food?

Extremely easy
Extremely difficult

16. What are the factors that may be limiting your access to food right now? Select all that apply.

- ☐ I am in quarantine/self isolation.
- ☐ I do not have transport.
- ☐ Stores are limited in the area I live.
- ☐ Stores are closed.
- ☐ I am too worried/anxious to go out and purchase food.
- ☐ Income is limited or food is too expensive.
- ☐ Food is scarce.
- ☐ My access to food is not limited
- ☐ Other (please specify)

17. Please specify the type of food you have trouble accessing during the COVID-19 pandemic? If it is none, please type "None"

18. Have you noticed an increase in the price of food?

- ☐ Yes
- ☐ No

Food access perceptions and concerns in BC during the COVID-19 pandemic

Personal Food Security Concern

Please indicate your level of agreement on each of the following statements:

19. At times in 2019, I didn't have access to enough food for active healthy life, for all household members"

- ☐ Always true
- ☐ Usually true
- ☐ Occasionally true
- ☐ Never true

20. "During the COVID-19 pandemic, in this month, I don't have access to enough food for active healthy life, for all household members"

- ☐ Always true
- ☐ Usually true
- ☐ Occasionally true
- ☐ Never true

21. "Thinking about next month, I am concerned that I will not have access to enough food for active healthy life, for all household members"

- ☐ Always true
- ☐ Usually true
- ☐ Occasionally true
- ☐ Never true

Food access perceptions and concerns in BC during the COVID-19 pandemic

Food system related perceptions and concerns

22. During the COVID-19 pandemic, how concerned are you about the reliability of the global food supply chain (where most of our food is imported from other countries) to bring food to your table?

Not at all concerned

Extremely concerned



Please explain briefly why you selected the level of concern in the previous question.

23. During the COVID-19 pandemic, do you believe that a substantially developed local/regional level food system (food is grown and distributed in BC/your region) can be more reliable in bringing food to your table than the global food supply chain?

Strongly Disagree

Strongly Agree



Please explain briefly why you selected the level of agreement in the previous question

24. Does the pandemic have you thinking greater effort by the provincial government should be put forth to build and strengthen local/regional food systems in BC?

Strongly Disagree

Strongly Agree



Food access perceptions and concerns in BC during the COVID-19 pandemic

Food consumption

25. Has your diet changed since the COVID-19 became a global pandemic?

- ☐ Yes, my diet has changed.
- ☐ No, my diet has not changed.

26. How has your diet changed? Select all that apply.

- ☐ I began eating more fruits and vegetables.
- ☐ I began eating less fruits and vegetables.
- ☐ I began eating more meat protein.
- ☐ I began eating less meat protein.
- ☐ I increased my consumption of sweets and/or salty snacks.
- ☐ I decreased my consumption of sweets and/or salty snacks.
- ☐ I began to take dietary supplement.
- ☐ Other (please specify)

27. Please explain briefly why your diet changed?

Food access perceptions and concerns in BC during the COVID-19 pandemic

Food Purchases

28. What types of food do you **buy more of** now during the pandemic? Select all that apply.

- ☐ Fresh food (including groceries and meals)
- ☐ Frozen food (including groceries and meals)
- ☐ Dried and canned food (including groceries and meals)
- ☐ Sweets and salty snacks
- ☐ Baking condiments (i.e. flour, yeast, baking powder etc)
- ☐ Cooking condiments (i.e salt, pepper, spices, ketchup, chutney, salsa, hot sauce, etc)
- ☐ Dietary supplements (i.e multi-vitamins, Vitamin C, Vitamin D, Elderberry extract, Omega-3, etc)
- ☐ There is no change. I always buy the same type and quantity of food.
- ☐ Other (please specify)

29. What types of food do you **buy less of** now during the pandemic? Select all that apply.

- ☐ Fresh food (including groceries and meals)
- ☐ Frozen food (including groceries and meals)
- ☐ Dried and canned food (including groceries and meals)
- ☐ Sweets and salty snacks
- ☐ Baking condiments (i.e. flour, yeast, baking powder etc)
- ☐ Cooking condiments (i.e salt, pepper, spices, ketchup, chutney, salsa, hot sauce, etc)
- ☐ Dietary supplements (i.e multi-vitamins, Vitamin C, Vitamin D, Elderberry extract, Omega-3, etc)
- ☐ There is no change. I always buy the same type and quantity of food.
- ☐ Other (please specify)

30. What types of support would you like to receive to enable you to access the food that you want in the quantity that you want?

Food access perceptions and concerns in BC during the COVID-19 pandemic

Demographic questions

31. What gender do you identify with?

- ☐ Female
- ☐ Male
- ☐ Non-Binary
- ☐ I prefer not to disclose

32. Which category below includes your age?

- | | |
|-----------------------------|------------------------------------|
| <input type="radio"/> 19-29 | <input type="radio"/> 60-69 |
| <input type="radio"/> 30-39 | <input type="radio"/> 70-79 |
| <input type="radio"/> 40-49 | <input type="radio"/> 80 and older |
| <input type="radio"/> 50-59 | |

33. Please specify whether you belong to any of the following equity-seeking groups? Select all that apply.

- ☐ Indigenous Peoples
- ☐ Persons with disabilities
- ☐ Other racially visible persons
- ☐ Women in roles in which they are under-represented
- ☐ I do not belong to an equity-seeking group
- ☐ Other (please specify)

34. What is the highest level of school you have completed or the highest degree you have received?

- ☐ Less than high school diploma
- ☐ High school diploma or equivalent (e.g., GED, ABE)
- ☐ Some college but no degree
- ☐ College diploma
- ☐ Bachelor degree
- ☐ Graduate degree/professional degree

35. What is your total household income before tax in 2019?

- ☐ Less than \$20,000
- ☐ \$20,000 – \$39,999
- ☐ \$40,000 – \$59,999
- ☐ \$60,000 – \$79,999
- ☐ \$80,000 – \$99,999
- ☐ \$100,000 – \$119,999
- ☐ \$120,000 – \$139,999
- ☐ \$140,000 – \$159,999
- ☐ \$160,000 – \$179,999
- ☐ \$180,000 – \$199,999
- ☐ More than \$200,000

36. What is your marital status?

- ☐ Single, never married
- ☐ Married or domestic partnership
- ☐ Widowed
- ☐ Divorced
- ☐ Separated

37. What is your employment status today?

- ☐ Employed, 35 hours per week or more
- ☐ Employed, 20-34 hours per week
- ☐ Employed, less than 20 hours per week
- ☐ Unemployed
- ☐ Retired

38. Has your employment status changed because of the COVID-19 pandemic?

- ☐ No
- ☐ Yes, I have reduced my hours of work.
- ☐ Yes, I have increased my hours of work.
- ☐ Yes, I became unemployed
- ☐ Yes, I had to/chose to retire

39. Did you qualify for the following federal supports? Select all that apply.

- ☐ Canada emergency response benefit
- ☐ Canada child benefit
- ☐ Temporary salary top-up for low income essential workers
- ☐ Federal government wage subsidy paid to my employer
- ☐ Canada emergency student benefit
- ☐ No, I did not qualify
- ☐ I do not know whether I would qualify
- ☐ Other (please specify)

40. How many people (including yourself) are living in your household?

41. How many children under the age 19 are living in your household?

42. How many adults over the age 65 are living in your household?

Submit your responses

43. Would you like to submit your responses now?

- ☐ Yes, I would like to submit my survey responses
- ☐ No, I would like to withdraw from the survey

Thank you for taking the time to participate in this project. Your contributions will be invaluable in understanding how the COVID-19 pandemic affects consumer food access, food purchases and consumption, food related perceptions and concerns.

If you are interested in learning more about this project, please contact our principal investigator, Kent Mullinix at kent.mullinix@kpu.ca Once the study is complete, the survey results will be published online at: <https://www.kpu.ca/isfs/publication>