Assessing perceived food security among British Columbian rural and urban residents

Zoë DeBoer[1], Dale Chen[2]

[1] Lead Author, B. Tech Student, School of Health Sciences, British Columbia Institute of Technology 3700 Willingdon Ave, Burnaby, BC, V5G 3H2

[2] Supervisor, School of Health Sciences, British Columbia Institute of Technology 3700 Willingdon Ave, Burnaby, BC, V5G 3H2

Abstract

Background

In Canada, food security is a key determinant of public health. Food insecurity is an issue faced by 1 in 8 Canadians, both rural and urban. All communities in Canada face various barriers to achieving food security, however these barriers differ depending on rural or urban residence. High cost of food due to transportation costs are a significant barrier in rural communities, whereas cost of living is the predominant barrier for urban communities. Throughout rural and urban communities in Canada the establishment of local food initiatives and agricultural programs have aided to alleviate the impact of food insecurity. This project aims to gauge the perception of food security among rural and urban communities in British Columbia. Understanding how individuals perceive their own food security will help guide policy and decision making to ameliorate food security in British Columbia.

Methods

A 16-question survey was created using the online software, SurveyMonkey, to assess demographics and perceived food security. The survey was distributed using public Reddit and Facebook pages, it remained active for a period of 49 days. Results were analyzed using NCSS 2021 and chi-square statistical analysis

Results

Of the 96 analyzed survey responses, 51% identified as urban and 48% identified as rural. The study found that there was no statistically significant association between rural and urban residence and perceived food security (P=0.5621). There was a statistically significant association between an individual's ability to grow food and their perceived food security (P=0.0000). A statistically significant association was also found between an individual's ability to afford food and their perceived food security (0.0000). Finally, no statistically significant association was found between an individual's commute time to get groceries and perceived food security (P=0.5621).

Conclusion

Food security is a multifaceted issue faced by British Columbia residents in both rural and urban settings. Though no statistically significant association was found between perceived food security and urban and rural residence, this study outlines the importance of community tailored food programs. Recent events such as COVID-19 and extreme weather have largely influenced perceived food security in both rural and urban environments. Each community type has unique barriers, defined by survey participants, to achieving sustainable, reliable, and healthy access to food.

Keywords: food security, rural, urban, British Columbia, food insecurity

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Introduction

Food security is recognized as a key determinant of community health (Pooler et al., 2019) The Food and Agriculture Association states that food security exists when all people have physical and economic access to sufficient, nutritious, and safe food. This food must meet their dietary needs and preferences (FAO, 2006). In order to realize their full potential in any environment, rural or urban, individuals must have reliable access to nutritious food. In Canada, food security (or insecurity) is an issue faced by 1 in 8 Canadians (Tarasuk & Mitchell, 2017). For many Canadians, access to traditional market foods is not feasible, and food banks are their only option. In 2021, over 63 million pounds of food was distributed from Canadian food banks (Food Banks Canada, 2021).

Food insecurity in Canada, unlike many developing nations, does not result from political and cultural instability, but rather a variety of social and economic factors (Duncan, 2020). The geographic distribution of food security in Canada is determined through a variety of factors including access to food, availability of food, food prices, financial security, and ability to grow food (Tarasuk et al., 2019)

Food security represents a larger challenge in Canada's Indigenous communities. These communities experience food insecurity at more than double the rate of the rest of the Canadian population (Council of Canadian Academies, 2014). For remote northern communities, food insecurity appears to be 2 even higher. Rosol et al. (2011) showed that food insecurity in Northern Canadian Indigenous communities ranged from 43- 69%; significantly higher than the national average.

Being food insecure has more of an effect on health than just nutritional value. Lack of food can lead to increased stress, mental anguish, and chronic illness. By ensuring Canadians have sustainable access to food, healthier communities can be established.

Literature Review

Canadian Food Security

The main barriers to food security in Canada were consistent across publications, ranging from economic instability, cost of food, changing climate, inability to access market foods and lack of sustainable food sources (Balcaen & Storie, 2018; Pooler et al., 2019; Richmond et al., 2021; Ross & Mason, 2020; Tarasuk & Mitchell, 2017). In order to maintain food sustainability and develop local nutritious foods, many publications have described the importance of establishing local food initiatives and agricultural programs (Audate et al., 2019; Fairbridge et al., 2021; Ivanov, 2019; Martin & Vold, 2018; Thompson et al., 2018).

Rural food security

Rural communities discussed throughout the publications analyzed faced similar issues surrounding food security, such as market food cost, distance from urban centers and isolation influences food availability through economic barriers. Increased transportation costs of market foods to rural communities, increases barriers to accessing food (al Hamad et al., 2018; Ivanov, 2019; Kenny et al., 2018). Due to increased market food costs, individuals living in rural communities often reach for energy dense foods, foods high in fat, carbohydrates, and sugars (al Hamad et al., 2018; Kenny et al., 2018). One exception to this trend is seen among the residents of Kimberly, a remote town in British Columbia. This town appears to be healthier than the average remote community due to its unique geographic location, it is isolated from major throughways and has fewer fast-food outlets (Hale et al., 2021). Limited access to energy rich, processed foods lead to residents with higher health outcomes, like their urban counterparts (Hale et al., 2021). To combat food security and establish a healthy supply of fruits, vegetables and meat, many communities focus on the importance of establishing and maintaining local agricultural practices (Ivanov, 2019; Thompson et al., 2018). The establishment of a local food industry in rural communities stabilizes employment, stabilizes food prices, preserves natural landscaping, and develops a holistic connection to the land (Ivanov, 2019; Richmond et al., 2021; Thompson et al., 2018).

Urban food security

Urban food security, much like rural and indigenous food security is multifaceted and influenced by a variety of factors. Cost of living rather than cost of food is a major factor in accessing food in urban centers (al Hamad et al., 2018; Martin & Vold, 2018). Lower income families who live in high rent areas, often have less money left over to access market foods. This leads to decreased meat, fruit and vegetable consumption and increased processed food consumption (al Hamad et al., 2018; Balcaen & Storie, 2018). The spatial distribution of grocery stores and restaurants in urban centers further influence nutrition by increasing access to processed foods (Balcaen & Storie, 2018). Lower income populations live in areas with the highest restaurant access and lowest grocery store access (Balcaen & Storie, 2018). 5 Agricultural initiatives have also been suggested as a solution to offset urban food insecurity. Urban agriculture increases diversity of food available for urban areas, healthy food consumption and accessibility (Audate et al., 2019; Fairbridge et al., 2021; Martin & Vold, 2018). Though many urban communities may have limited space for urban agriculture, the need for urban agriculture to meet food security needs should be considered when establishing urban farming municipal guidelines and bylaws (Fairbridge et al., 2021.).

Indigenous food security

All publications that focused on Indigenous communities, expressed how Indigenous communities grossly overrepresent food insecure Canadians (Miewald et al., 2018; Richmond et al., 2021). Indigenous food security is multifaceted. It is influenced by culture, connection to the land and access to traditional foods (Richmond et al., 2021; Ross & Mason, 2020; Thompson et al., 2018). The connection Indigenous peoples feel to the land and traditional food, in both rural and urban communities, plays a crucial role in the perception of community health and wellness. The self-identity of Indigenous people is tied to cultural food practices and the ability to carry out these practices. Traditional foods act as a link between nutritional health, food security, emotional and social well-being. For this reason, cultural food access is a main contributor to overall health of Indigenous Canadian communities. In urban communities, access to traditional foods is not feasible due to increased living expenses and readily available processed foods (Richmond *et al.,* 2021). Whereas in rural communities' food security is more influenced by increased market food price and challenges to accessing traditional foods as a result of climate change (Kenny *et al.,* 2018; Ross & Mason, 2020; Thompson *et al.,* 2018). The regeneration of traditional food pathways through community agriculture and community engagement have shown to positively influence food security in Indigenous communities (Richmond *et al.,* 2021; Thompson *et al.,* 2018).

Other barriers to healthy living

In both rural and urban environments, food security influences many other aspects of personal health (al Hamad *et al*., 2018; Miewald *et al*., 2018). Food offered by social programs to low-income households and individuals without stable homes, is often low quality or inaccessible due to stigmatization (Miewald *et al.,* 2018). Vancouver's downtown Eastside, for example, has extremely high rates of malnutrition and food insecurity despite numerous social and food services (Miewald *et al.,* 2018). Food security in at risk populations could be addressed through community gardening programs, as suggested by other publications (Fairbridge *et al.,* 2021; Martin & Vold, 2018; Thompson *et al.,* 2018).

Finally, the current COVID-19 pandemic has had a large effect on food security in Canadian populations. Commercial agriculture was put under strain due to consumer demand and labor shortages (Holland, 2020). Consumer 'panic buying' in large quantities was not feasible for small rural communities, often leaving residents with little too no supplies. By establishing community food practices, a sustainable supply of food could be established in all communities.

Much of the research analysed emphasised the importance of maintaining sustainable food systems in order to establish food security and sovereignty. However, a gap in knowledge remains how individuals living in rural and urban communities perceive their own food security. This research will examine how perceived food security is linked to urban and rural residency in British Columbia. Understanding how individuals in different geographic locations in British Columbia perceive their own food security, will aid in establishing effective policy. Geographic variations, access to space, and horticultural knowledge may influence the ability of rural and urban Canadians to develop agricultural practices to influence food security. The differences between the two types of communities could inform future policy. How Canadians perceive food security in their own lives and communities has implications on how policy and legislation are transformed and applied in all aspects of government.

Methods and Materials

Materials

A survey was conducted using SurveyMonkey, an online survey creation software. Survey monkey was used to create, distribute, store, and analyze survey results. A SurveyMonkey licence allows for data to be stored in Canada. Finally, an application to the British Columbia Institute of Technology's (BCIT) Research Ethics Board (REB) will be submitted. All research involving human participants must be approved by the REB (British Columbia Institute of Technology [BCIT], 2018).

Methods

The survey was distributed online using online Reddit forums and public Facebook groups, in which the researcher was not previously apart of.

To achieve representative results, the survey was distributed to as wide a demographic as possible (Statistics Canada, 2021). A variety of British Columbian populations were targeted to achieve a representative sample of the entire province's rural and urban populations. British Columbia has distinct geographic regions, each with specific demographics, these include Vancouver Island, Mainland/Southwest, Cariboo, Thompson Okanagan, Kootenays, North Coast and Northeast (British Columbia, 2021). Each region has unique characteristics, making them all important to consider in order to extrapolate results to larger populations. Urban populations targeted include Greater Vancouver area, Victoria and Kelowna. Rural populations targeted include Northern, Interior, Island, Kootenay, and Coastal communities. Survey participants defined themselves as either urban or rural in the demographic section of the survey, based on their perceived resident type.

The survey contains 16 questions that assess geographic residence, rural or urban residence

and perceived food security. The survey remained active for a period of 49 days (January 2nd, 2022 until February 20th, 2022). Most survey questions are close ended, apart from clarification questions, and a final open-ended question intended for participants to share their thoughts. Asking close ended questions will improve the reliability of the survey. Reliability refers to the extent to which the survey will yield the same results if repeated under the same conditions (Paul C Price et al., 2013). To improve the survey reliability, survey questions should be clear, close ended and unambiguous. The survey is also concise to improve response frequency (Kost & Correa da Rosa, 2018). An individuals perceived food security will change over time and place, this should be considered when extrapolating results to larger demographics.

Validity of the survey should also be considered. Internal validity refers to the extent to which the study design, in this case survey, allows for an accurate conclusion for cause and effect (Paul C Price et al., 2013). To improve internal validity, a pilot test was conducted to ensure understanding and clarity of survey questions. The survey was created using Survey Monkey then distributed to 15 friends and family members of the researcher. Pilot test participants where ask to analyze question clarity and understanding. Any recommendations were considered and implemented before the distribution of the survey to the public. The following changes were made (*see Table 1)*:

Table 1 – Changes made to pilot survey

Change made	Pilot survey	Revised survey
Rewording of question	The area in which you live permit you to grow/raise your own food?	Are you able to grow your own food?
Definition of food security included	What is your opinion on your and your family's food security?	*The World Health Organization defines food security as "the physical and economic access to sufficient, safe and nutritious food to meet [an individual's] dietary needs and food preferences for an active and healthy life".*

		With this definition in mind, what is your opinion on your household food security?

This will minimize ambiguities when the survey is released to the test population. Consistency is also important to minimize internal validity, the same survey protocol will be used for all participants. External validity refers to the ability of the study results to be extrapolated to a larger demographic (Kukull & Ganguli, 2012). In order to maximize external validity an attempt was made to distribute the survey to all major demographics in British Columbia. By covering the major demographics in British Columbia, results may be extrapolated to other rural-urban residents across larger geographic ranges. Furthermore, external validity can also be maximized by increasing sample size (Faber & Fonseca, 2014). Larger sample sizes will be more representative of a larger population, as outliers have a lesser impact on overall results (Kukull & Ganguli, 2012). To improve external validity of this study, survey collector links were kept open for as long as possible to obtain as many respondents as possible. Furthermore, survey links were reposted weekly on the Reddit and Facebook pages utilized to increase the visibility of the survey link and thus increase respondent rates.

An incentive was offered to bolster survey participation. Participants may volunteer to be entered into a sweepstakes. Winners were determined by chance through a random draw (Office of University Council, 2021). The rules for conducting a legal promotional game will be followed, as presented by the University of British Columbia's *Promotional Games Fact Sheet.* Following the completion of survey, data was analyzed using the statistical software NCSS 2021 (NCSS Statistical Software, 2021). This survey collects personal information that may be considered an identifier, postal code, and email address for incentive distributions. As a result, data should be collected on Canadian servers (UBC Office of Research Ethics, 2021). The BC Personal Information Protection Act prevents the transfer of personal information outside of Canada (Personal Information Protection Act, 2003). Without a licence, the US Patriot Act could allow for free access to personal information gained from this survey when data is stored on US servers (US Patriot Act, 2001).

Inclusion criteria

British Columbian residents of all ages will be invited to participate in the survey. Friends, classmates, and family of the investigator will be excluded

Ethics

Ethical considerations were addressed through a cover letter and survey consent form presented to participants prior to commencing the survey. This study must adhere to ethical codes of conduct established by the Research Ethics Board (BCIT, 2018).

Results

Descriptive Data

The survey collected non-numerical data. Both nominal and ordinal non-numerical data was collected. Nominal data refers to data that has no inherent rank or order, whereas ordinal data has assigned ranking (Personal communication [class lecture], 2021). The survey yielded 102 responses, 96 of which were complete and used in analysis (a completion rate of 94%). Responses were excluded if they were not a resident if British Columbia or failed to identify as either urban or rural and failed rank their perceived food security (the two main parameters used for analysis in this project). On average 4 minutes and 50 seconds was taken to complete the survey. Distribution of survey respondents was analyzed based on area of residence, income, and Indigenous identification.

Participant distribution was classified as either urban or rural. Distribution of participants based on area of residence was relatively even. Just over 50% of respondents identified as urban, whereas just over 48% identified as rural (See *Figure 1)*. One respondent preferred not to answer, as a result this response was excluded from analysis. Most respondents reported a household income between $50,000 and $80,000 (25%) (see *Figure 2).* Finally, 10% of respondents identified as Indigenous Canadian.

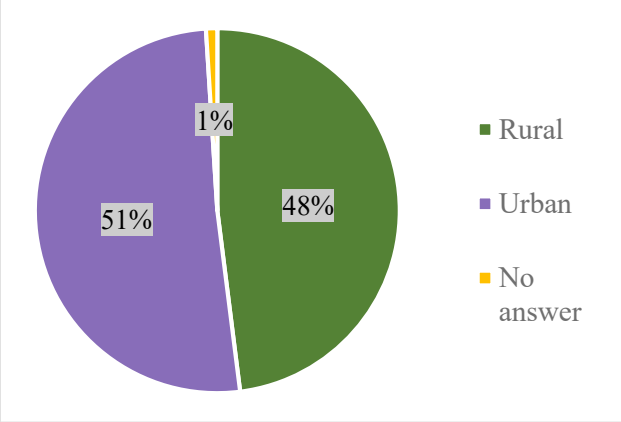

Figure 1-Distribution based on urban or rural residence

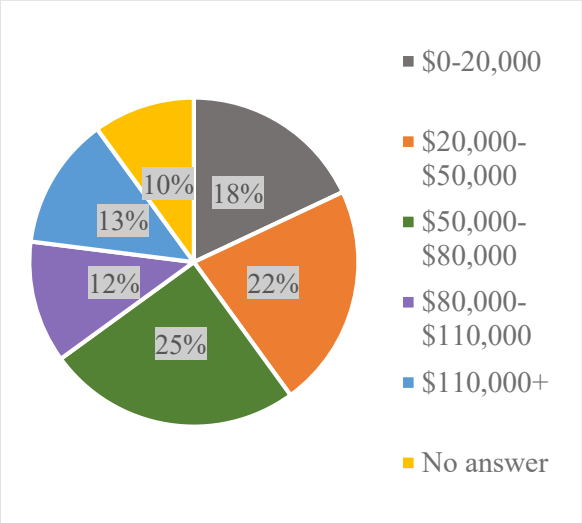

Figure 2 - Respondent income distribution

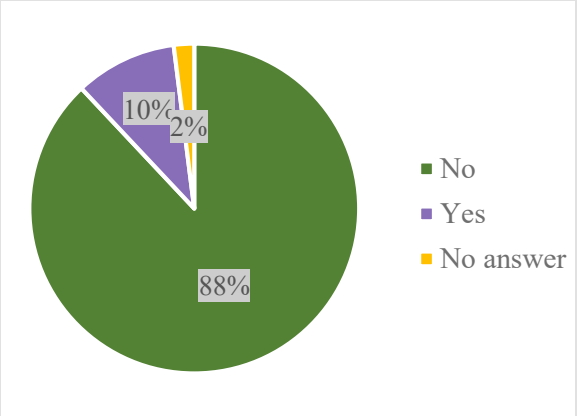

Figure 3 - Indigenous identification among respondents

Inferential Statistics

Survey data was analyzed using NCSS 2021 Statistical Analysis Software (NCSS 2021). Chi-square, $\varkappa^2$, test was used to test for association between variables. A chi squared test was chosen as it can determine whether relationships between certain variables examined are responsible for observed data, or if they are due to chance. The statistical test is a two tailed test, as data is not being analysed in a particular direction. Analysis was done using a p-value (statistical cut off) of 0.05. Results are summarized in the table below (*see Table 2*).

Table 2 – Inferential statistic data

Hypothesis	P-value	Interpretation
H_{01} = There is no association between area of residence (rural or urban) and perceived food security. H_{a1} = There is an association between area of residence (rural or urban) and perceived food security.	0.5621	No association was found between residence location and perceived food security among participants in British Columbia. Chi square test results produced a P-value of 0.5621. Since P>0.05 we cannot reject the H_0 that there is no association between area of residence and perceived food security. Hence, a British Columbia residence in a rural or urban setting has no effect on their perceived food security.
H_{02} = There is no association between an individual's ability to grow food and their perceived food security. H_{a2} = There is an association between an individual's ability	0.0000	An association was found between an individual's ability to grow food and their perceived food security. Chi square test results produced a P-value of 0.000, this is less than the statistically significant cut off of 0.05. Since the P-value is less than 0.05 the null hypothesis that there is no association between an individual's ability to

to grow food and their perceived food security.		grown food and their perceived food security is rejected. Individuals who can grow their own food, perceive themselves as being more food secure.
H_{03} = There is no association between an individual's ability to afford groceries and perceived food security. H_{a3} = There is an association between an individual's ability to afford groceries and perceived food security.	0.0000	An association was found between an individual's ability to afford groceries and their perceived food security. Chi square test results produced a P-value of 0.000, this is less than the statistically significant cut off of 0.05. Since the P-value is less than 0.05 the null hypothesis that there is no association between an individual's ability to afford groceries and their perceived food security can be rejected. Individuals who can afford groceries less often have lower perceived food security. This suggests that survey participants may have an accurate perception of their actual food security.
H_{04} = There is no association between an individual's commute to get groceries and perceived food security. H_{a4} = There is an association between an individual's commute to get groceries and perceived food security.	0.5621	No association was found between an individual's commute time to get groceries and their perceived food security. Chi square test results produced a P-value of 0.5621, this is greater than the statistically significant cut of 0.05, the null hypothesis that there is no association between an individual's commute time to get groceries and perceived food security cannot be rejected. We can conclude that an individual's commute time to get groceries does not influence their perceived food security.

Results

For interpretation of results see *Table 2.*

As statistical analysis produced a P-value of greater than 0.05 for two hypotheses tested, there is no consideration for alpha error in these cases. Beta error, however, could be minimized by obtaining more respondents and increasing the population sample size. By decreasing the beta error, the statistical power of the results will increase.

Two hypothesis tested yielded chi-squared tests smaller than 0.05, alpha error could be reduced in these cases by lowering the statistically significant cut off. Since both P-values are 0.000, alpha error is minimal.

Other data

Respondents provided reasons for being able to grow, or not grow food at their place of residence. Finally, Respondents were given the option to add any comments they had towards their own food security and food security in British Columbia.

Discussion

Results of this study were consistent with those previously discussed in the literature review. These results can be extrapolated to British Columbia as a whole, however due to specific events in British Columbia discussed by survey participants it may be difficult to extrapolate these findings to the rest of Canada (specifically in relation to British Columbia's atmospheric river). Unlike the rest of Canada, during the atmospheric river, major commercial transportation routes were cut off and large expanses of agricultural land destroyed in British Columbia (Canada, 2022). Extreme weather events, as well as the COVID-19 pandemic, however, have and will continue to affect the rest of Canada.

Rural urban residence and perceived food security

No association between rural or urban residence and perceived food security existed for survey participants (see *Table 2)*. As food security is multifaceted, different barriers to achieving food security exist depending on place of residence.

Rural survey participants indicated, in the open-ended portion of the survey that limited road access, isolation and distance to grocery stores were the main barriers to food security. This finding aligns with publications previously discussed in the introduction, rural food security is influenced mainly through physical and economical barriers to accessing food (al Hamad *et al.,* 2018; Ivanov, 2019; Kenny *et al*., 2018). This includes market food costs and distance to access foods; both factors were alluded to by rural survey participants.

Urban residents indicated that housing prices was contributing barrier to achieving food security. Much like rural food security, urban participants alluded to barriers to food security previously discussed as part of the literature review (al Hamad *et al.,* 2018; Martin & Vold, 2018). High cost of food, high cost of rent and low income were the main barriers discussed. One participant from Vancouver stated: "The biggest concern is our cost of living in Vancouver, and if my partner or I lose a job, we'll quickly lose our food security."

Though rural and urban participants had different barriers to food security, many participants (both rural and urban) indicated that

current global climate and weather events influenced their food security. Survey participants indicated that the global supply chain issue influenced the availability of certain foods, including necessities such as milk, eggs, meat, and flour. The severe weather events in British Columbia, such as the atmospheric river which occurred in mid-November, only exacerbated the low supply of necessities (Charlebois, 2021). Through the globalisation of agriculture supply chains, Canadians can access fresh produce year-round, regardless of when it is in season. However, this has reduced the sustainability of our own local supply chains and thus food security (Holland, 2020). Canadians have become increasingly reliant on foreign food supply chain, this only became more apparent during recent weather events and COVID-19 pandemic and resulting supply chain issues (Jensen and Orfila, 2021). Furthermore, fragile food supply chains were disrupted during the atmospheric river in mid-November. Passage from the lower mainland and the rest of British Columbia was not possible due to the destruction of portions of major highways and damage to railways (University of Calgary, 2021).

Panic buying, both due to the pandemic and weather events, were a concern among both urban and rural residents. Further short-term disruption of the British Columbia food supply chain resulted due to mass panic buying (University of Calgary, 2021). These unforeseen surges in demand further disrupted an already struggling supply chain.

To mitigate extreme fluctuations in food supply in both rural and urban communities each demographic should be considered on their own, as well as a whole. Rural and urban communities have unique challenges to food security, which should be addressed on a community-to-community basis. However British Columbia's food security and food supply chain should also be addressed holistically. Both demographics are influenced through climate change and the reliance on a global food supply. To minimize fluctuations in food security for residents, food security should be mitigated through environmental considerations and local food initiatives. British Columbia can improve food security for residents by establishing a sustainable, economical, and ecologically sound food supply.

Ability to grow food and perceived food security

Individuals who were able to grow their own food perceived themselves as more food secure when compared to individuals who could not grow their own food. As previously discussed, literature reviewed emphasised the importance of maintaining local food systems in both urban and rural communities (Fairbridge et al., 2021; Martin & Vold, 2018; Thompson et al., 2018; Ivanov, 2019). Participants stated that gardening, foraging, and hunting were methods

they provided themselves with food. The ability for survey participants to produce their own food ranged from small patio gardens to fully hunting, gathering, and producing their own food supply. Barriers to growing food included: unsuitable land, rental properties, lack of sunlight and lack of space.

The perceived food security of individuals able to produce their own food, may have been amplified by food shortages throughout 2020 and 2021. By having the ability to produce their own food, individuals would not be as heavily affected by these shortages. Mullins *et al.* (2021) suggests that Canadians have become more aware of the globalization of our food supply due to food shortages brought about by the COVID-19 pandemic. As a result, more Canadians have taken up home gardening to improve their food security and to establish a sustainable food supply.

Though actual food security is multi-dimensional and is influenced by more than the physical availability of food, by having the ability to grow food British Columbians perceive themselves as more food secure and are more confident in their ability to feed themselves during extreme events.

Ability to afford groceries and perceived food security

Though the ability to afford groceries is not the only determining factor of food security, the Food and Agriculture Association defines food security as "the physical and economic access to sufficient, safe and nutritious food to meet [an individual's] dietary needs and food preferences for an active and healthy life" (FAO, 2006). The economic access to food is a large determinant of food security as defined by the WHO.

There was an association found between an individual's ability to afford groceries and perceived food security. This indicates that participants' perceived food security is like their actual food security. Survey participants have an accurate perception of their own food security. As discussed, cost of living influence's ability of urban residence to afford food. Whereas cost of food itself is a barrier for rural residence. Depending on residence type, British Columbians face different economic barriers to accessing food.

Commute time and perceived food security

No association between commute time to get groceries and perceived food security was found during statistical analysis. Much like urban and rural residents, commute time is only one factor that influences food security. Though it may act as a barrier to accessing food for some, other factors such as cost of food, length of commute, cost of gas and type of market foods available will influence food security.

Knowledge translation

As discussed above, barriers to food security differ between rural and urban demographics.

Individuals in both areas can be food insecure, as a result food security initiatives and programs should be community specific. Programs, such as school lunch programs, community gardens, community food initiatives and others should address issues specific to each community. Rural food programs should address the physical distance to food and isolation of food supplies, whereas urban food programs should address cost of living and cost of food.

Furthermore, both urban and rural food security are influenced through social and environmental factors. These factors should be considered when establishing food programs. Food practices and programs going forward should be developed to create a sustainable food supply, less reliant on global food systems. Climate change and associated adverse whether events must be considered when establishing food systems in both rural and urban communities. The generation of local and sustainable food supplies will help mitigate challenges to food security in the event that global supply chains be disrupted. This can also be influenced top down, through the implementation of policy and legislation to discourage the reliance on foreign food supplies. On a smaller scale, educational programs to promote sustainable food practices could also be done. This may include buying in season produce, buying local, small scall production and discouraging panic buying.

Limitations

Limitations of this study include its distribution; it is difficult to get an accurate representation of British Columbia's population through surveys only distributed online. A large majority of the population either do not use Reddit, or do not own or use computers. Many residents of lower socio-economic status, who may have low food security, may not be reached by an online survey due to lack of technological resources. This could introduce sampling bias to the study and threaten its external validity. Finally, individuals who use Reddit and the Facebook forums where the survey was distributed, may differ from the general population, and there for may also influence external validity of the survey. For example, the majority of Reddit users in Canada are fall within the ages 18-39 and more men use the platform then women (Pajovic, 2022). Facebook's largest user demographic is also males between the age of 18 and 34 (Statistica, 2022). As both platforms host the same major user demographics, survey results may be skewed to represent the view of young men rather than Canada as a whole, consider: the median age of Canada being 42 (StatCan, 2021). Many public Facebook groups used were for job postings or "free stuff" in each a given of residence, by distributing the survey on these specific Facebook pages a demographic with lower socio-economic status may be targeted. Individuals who are actively searching for jobs may have less money available for food and there for lower food security. An effort was made to minimize these limitations and threats

to validity by distributing the survey on a wide variety of pages.

Future research

- How has food security in coastal vs. interior of British Columbia changed as a result of the 2021 atmospheric river?
- A comparison between the COVID-19 pandemic and the 2021 atmospheric river and their effect on British Columbia food security
- Have British Columbians changed the way they buy groceries because of the COVID-19 pandemic/2021 weather events?

Conclusion

Food security is a key determinant of community and public health. Both rural and urban residents face distinct barriers to achieving food security. Through an online survey conducted using Survey Monkey, no association was found between urban or rural residence and perceived food security in British Columbia. Though no statistically significant association was found, this study outlines the importance of community tailored food programs. Each urban or rural community has its own challenges and barriers to maintaining a sustainable, economical, and accessible food supply for its residents. This study suggests that maintaining personal food systems, and agricultural practices will improve food security among both rural and urban residents. Finally perceived British Columbia food security was heavily influenced by the COVID-19 and extreme whether events of 2021 and associated disruption of the global supply chain. Considering these two factors, British Columbians should aim to establish a sustainable local food supply, this can be done by shopping locally, creating local agriculture, and policy to discourage the reliance on foreign food supply.

Acknowledgments

The principal author thanks Dale Chen for his support as well as all survey participants.

Competing Interest

The authors have declared to have no competing interests.

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