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Original Research Article

Growing local: Gardening for community food security, preliminary results

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Abstract

Home food gardening has seen a resurgence since the start of the COVID-19 pandemic. This article presents preliminary findings from the first six months of a twenty-two month home food gardening study in Nova Scotia, Canada. Participant home food gardeners were asked to log their weekly gardening activities and their household food expenses. Diary entries show how their home food production fostered community connections, occasioned new social interactions, and fed households. Diaries show that participants enjoyed growing food and felt a sense of accomplishment in their gardening. Growing food from seed is not an easy endeavour, especially in Nova Scotia: it is time consuming and often involves manual labour in addition to having expertise. Home food gardening presents an opportunity to impact household and community food security, albeit in specific ways. This is timely research, as the COVID-19 pandemic has brought household food supply into renewed focus for many Canadians.

Keywords: Home food gardening; COVID-19; Canada; food security; local food; fresh food

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Résumé

Les potagers domestiques ont connu une résurgence depuis le début de la pandémie de COVID-19. Cet article présente les découvertes préliminaires faites au cours des 6 premiers mois d'une étude de 22 mois sur les jardins potagers domestiques en Nouvelle-Écosse, au Canada. Les jardinières et jardiniers participants ont dû tenir un registre de leurs activités hebdomadaires au potager et des dépenses de leur ménage dédiées à l'alimentation. Les entrées de leur registre montrent comment leur production alimentaire domestique a favorisé les liens communautaires, a donné lieu à de nouvelles interactions sociales et a nourri les ménages. Les journaux des participants montrent aussi qu'ils ont pris plaisir à faire croître leur nourriture et en ont retiré un sentiment d'accomplissement. Cultiver des aliments à partir des semences n'est pas une tâche facile, surtout en Nouvelle-Écosse : cela prend beaucoup de temps et implique souvent du travail manuel en plus de nécessiter une certaine expertise. Faire un potager à la maison a des effets sur la sécurité alimentaire des ménages et de la communauté, bien que ce soit de différentes manières. C'est une recherche d'actualité, alors que la pandémie de COVID-19 a mené à un renouvellement de la vision de l'approvisionnement alimentaire pour de nombreux ménages canadiens.

Introduction

Home food gardening holds many opportunities for individual households and communities. It can foster social empowerment, impact food security, and re-establish citizens' relationship to the land that may have been lost in our modern society, especially in urban areas. The COVID-19 pandemic has brought household food supply into focus for many Canadians. Overall, this has led to increased media attention on gardening (Goodwin, 2020), changes in the role of municipal policy toward gardening (Dionne, 2020), increased food prices (Boynton, 2021), and charitable food giving (Draaisma, 2021). Overall, more people turned to home food gardening as a form of leisure (Mullins et al., 2021) or out of concern for their food security (Music et al., 2021).

Nova Scotia has high rates of food insecurity (Tarasuk & Mitchell, 2020). Yet, there is virtually no information on how and by how much Nova Scotians are supplementing their intake of fruits and vegetables with those grown produced at home. As part of a larger study analyzing the scope and scale of home food production, this paper presents the first six months of data from a longitudinal, diary study. The overall goal of the project is to determine how citizens can be supported and empowered to impact household food security. This paper will outline the gaps in the literature on the topic, present the study's methodology and qualitative results that reveal common themes among Nova Scotia gardeners. A discussion of these themes will be followed by conclusions and recommendations for further study.

Household gardening

There could be a variety of motivations for growing food at home. Few studies on home food production have showed a consistent interest in their contribution to family food security. When asked why they grow food at home, gardeners may cite environmental concerns and a desire to participate in responsible food production, a desire to engage with their community, a need for food security, the physical and emotional advantages of being in the garden, or a combination of these factors (Mullins et al., 2021). Self-sufficiency gardening has also been cited as a driving motivator, particularly among low-income gardeners (Kortright & Wakefield, 2011). In general, however, low-income and poverty do not appear to be motivators for urban gardening. Gardeners with a higher income have broader motivations, such as food quality and environmental concerns, self-sufficiency, living in an environmentally responsible manner, and having fresh, healthy products (Mullins et al., 2021). Previous food gardening experience and knowledge are also predictors that a family will choose to grow its own food (Huisken et al., 2016). People who grew up in a rural area or on a farm, or in a community where home food production is engrained in the culture, are more likely to grow their own food (Born & Purcell, 2006). Even in areas where gardening is common, the poorest Canadian households are the ones least likely to grow their own food (Loopstra & Tarasuk, 2013). Food gardening is becoming more popular as a healthful hobby rather than a way to save money on groceries, despite the reality that more families than ever are facing food insecurity (Mullins et al., 2021). Many food insecure households do not have the necessary conditions to grow their own food, including adequate indoor/outdoor space and required light conditions (Kirkpatrick & Tarasuk, 2009). However, even with the right conditions, food insecure households are less likely to grow food at home, while home food gardening is unrelated to the likelihood of food poverty (Huisken et al., 2016; Kortright & Wakefield, 2011; Mullins et al., 2021).

COVID-19 effect on gardening

The COVID-19 pandemic has disrupted the food chain in a variety of ways. It has hampered people's capacity to obtain food by lowering their income and increasing their job insecurity (Statistics Canada, 2020, 2021; Wakefield, 2021). Urban gardening has developed into a viable concept with the goal of supplying cities with enough fresh and safe food to ensure long-term food security. During the COVID-19 pandemic, the Canadian food supply network proved to be resilient, although exceptional customer behaviour exposed various vulnerabilities in the current system (Brewster, 2020; Deaton & Deaton, 2020; Hobbs, 2020). The COVID-19 pandemic and its various lockdowns have benefited long-time urban food gardeners and presented opportunities for people to start growing fruit and vegetables at home, increasing overall participation in urban agriculture (Duchemin, 2020; Helmer, 2020; Mullins et al., 2021; Smith, 2021). People, planners, and governments are all reconsidering

strategies to exploit idle areas in cities for food production in this dynamic state—several municipal governments across Canada organized and/or funded free home food gardening programs for their residents in 2020 and 2021 (Music et al., 2022). Given the popularity of municipal gardening programs, several municipalities have committed to running them every year for the foreseeable future, even when the COVID-19 crisis is over (Music et al., 2022).

Food security in Nova Scotia

In 2016, Nova Scotia had a population of 923,598 people. It is the second-most densely populated and second-smallest province in area in the country. Nova Scotia's Gross Domestic Product (GDP) growth lags behind the Canadian average. In 2016, per capita GDP was $44,924, significantly lower than the national average of $57,574. In 2017, Nova Scotia's median household income was $85,970, which was lower than the national average of $92,990. However, in the Halifax Regional Municipality (HRM), the largest provincial municipality, median household income was $98,870 (Statistics Canada, 2019).

Nova Scotia has a high rate of household food insecurity. Roughly one in six (17.7 percent) of Nova Scotian households experience food insecurity multiple times a year (Tarasuk et al., 2021)—in HRM the number is one in five (HRM, 2023). Not surprisingly, Nova Scotia has the second-highest percentage of low-income individuals among the provinces, at 12.1 percent, after Saskatchewan at 12.4 percent (Statistics Canada, 2021). Food price inflation is greatly outpacing general inflation, more so in Nova Scotia than other provinces (Charlebois et al., 2022). Contributing to the high cost of food is the fact that close to 87 percent of all food consumed in Nova Scotia is imported (HRM 2020). Nova Scotians, and Haligonians especially, face low wages and a lack of affordable housing, with limited industry and employment (Egbe et al., 2020; FoodARC, 2017).

Compiling a demographic profile of individuals dealing with food insecurity is an extremely difficult task: there are food insecure individuals in every part of HRM, food insecurity can be a cause or an effect of their inclusion in marginalized communities. Food insecurity is not a condition that is obvious. Most food insecure adults are employed, have the same grocery shopping habits and same food literacy skills as food secure individuals (Egbe et al., 2021; Ramen & Hart, 2017a). Nearly all food insecure individuals—adults and children—attempt to hide their food insecurity from family and friends, and almost all feel ashamed and fearful because of their food situation (FoodARC, 2021; Godrich et al., 2019; PROOF, 2019; Ramen & Hart, 2017b).

Methods

This paper presents preliminary findings from the first six months of a larger twenty-two month project, "Home Food Gardening in Response to the COVID-19 Pandemic: Lessons for Food Security Considerations." The project's objective is to discover ways in which the government can encourage and support home food production, increase consumption of locally grown foods, and reduce food insecurity.

This diary study was inspired by home food gardeners in two neighbourhoods in Toronto. Kortright and Wakefield (2011) conducted twenty-three semi-structured in-depth interviews with gardeners in 2007 to explore the interviewees' motivations for and attitudes about growing food. Qualitative diaries are a form of participatory research (Harvey, 2011). Solicited diaries, as presented in this study, require specific information collected on the researchers' account (Harvey, 2011; Smit et al., 2020). Researchers are dependent on participants to give full information while remaining cognizant of the time and effort put forth by diarists (Unterhitzenberger & Lawrence, 2022). While researchers are reliant upon respondents' memory and compliance (Unterhitzenberger & Lawrence, 2022), online diary studies provide flexibility in the diversity of participants in terms of time and location (Braun et al., 2021). In this case the researchers were able to obtain rich qualitative data over the period of many months, in a vast regional area without having to disrupt participants' lives through constant interviewing or surveying. The diary study was appropriate for this research as the length and time required to grow food and to see the impact of food from the garden impacting household grocery budget is months. Using diaries as data collection method was the most practical option.

The project team sought 100 Nova Scotian home food gardeners to log their weekly gardening activities and their household food expenses. In the gardening diary, participants were asked to record the following: time spent tending to home food gardens; money spent on home food gardens (seeds, soil, tools, preserving jars, etc.); gardening activities (weeding, watering, etc.) and any activities done with garden products (like preserving and canning); harvest yields; and any information that provided context for their activities, like bad weather and pest infestations. In their food expenses diary, participants were asked to log their total weekly household food expenses, including grocery shops and restaurant meals. The project research design calls for representation from all geographic regions of Nova Scotia that reflect age and gender divisions in the province.

Recruitment took place through local gardening Facebook groups, local radio, a gardening centre's email list, and researchers' personal social media accounts. There was an element of self-selection for participants in the diary study, which was amplified by our recruitment methods. The study posted calls for participants on Facebook groups for Atlantic Canadian gardeners and on researchers' social media accounts. Lastly, a popular local garden centre sent the call for participants to all their email listserv subscribers. Participants had to be eighteen years of age or older and must have resided in Nova Scotia for the last twelve months or more.

Recruiting 100 participants proved to be untenable and the diary study was launched in late May 2021 with twenty participants. There were several barriers to recruitment—first and foremost, the time commitment and organizational skills needed to participate were beyond many potential respondents. Similarly,

respondents needed to be comfortable with technology and have access to reliable internet. Parts of rural Nova Scotia still do not have access to high speed, reliable internet. Finally, casual gardeners may have felt that they did not garden *enough* to be considered home food producers. However, from May to mid October 2021, only ten participants completed regular diary entries. Each participant had a shared Google Sheet document, with tabs for gardening and household food expenses.

Diary studies generate a large volume of qualitative data that may not be standardized across participants. Insights into activities may vary and themes are not present in all logs. In order to analyze the material, researchers organized responses. As these were logged online, answers were not anonymous, but were anonymized for the purposes of publication. As answers were already typed into an excel spreadsheet under specific headers, there was no need to transcribe or group responses.

A research assistant read through responses and assigned descriptive tags to themes that were both present in the text. Simultaneously, the researcher performed the same analyses on a copy of the texts. This is done as the replication of thematic analysis methods to ensure validity and reliability. This combination helps determine the trustworthiness of a project. The researcher will ensure consistency of both ideas and interpretation of the meanings from the data through comparison.

Themes were developed by combining data based on similar descriptions and interpretations across participants. The researcher ensured consistency of both ideas and interpretation of the meanings from the textual data through comparison. Once themes were established, specific categories that describe the experience of gardeners looking to use home food production to impact food security were established and are presented in the results and discussion sections of the paper.

Results

Participants in this diary study reflect some larger provincial population demographic trends but are atypical in others (see Table 1). The urban/suburban/rural divide does reflect the province's population distribution, with one-third of participants living in an urban centre, just under a quarter in small towns, and just over 40 percent living in rural areas. Four of our participants have children still living at home, and most are married or in a common-law relationship, which reflect provincial trends. All participants have an annual household income of over $75,000, while the provincial average household income is $77,000. However, our participants have higher levels of education than the provincial average: seven participants have at least one university graduate degree, while the other three have an undergraduate university degree; provincially, 45 percent of Nova Scotians have no postsecondary degrees or diplomas (Statistics Canada, 2019). All participants are homeowners who live in the Central or South Shore region on mainland Nova Scotia.

Table 1: Simple demographic portrait of diary study participants

how long food gardening	gender	marital status	year of birth range	# people in household	highest level of education	annual household income (thousands)	neighbourhood
10-15 years	female	single	1982-1996	2	graduate degree	$75-99	urban
5-10 years	female	married	1982-1996	3-6	graduate degree	$100-149	urban
10-15 years	female	widowed	1948-1969	1	graduate degree	$100-149	rural
5-10 years	female	married	1970-1981	3-6	graduate degree	more than $150	urban
since 2020	female	married	1948-1969	2	graduate degree	more than $150	rural
2-5 years	male	married	1948-1969	2	university	$100-149	small town
new this year	female	married	1982-1996	2	university	$75-99	suburban
2-5 years	male	married	1982-1996	2	university	more than $150	rural
10-15 years	female	married	1948-1969	3-6	graduate degree	more than $150	rural
2-5 years	female	married	1970-1981	3-6	graduate degree	$100-149	urban

From May to October, the growing season in Nova Scotia, participants spent an average of six hours a week gardening or on gardening-related activities like canning. This correlates with national data on food gardening, as 43 percent of gardeners spend less than ten hours a week on gardening activities (Mullins et al., 2021). One participant spent significantly more time at 14.5 hours a week on a larger garden that includes in-ground beds, containers, and a greenhouse; they also constructed a rainwater-catching system in the spring.

Harvests

Table 2: Prevalence of crops grown by diary study participants (prevalence=number of participants who grew crops in 2021)

vegetable	Prevalence	fruit	prevalence	Herb	prevalence
Peppers	7	Strawberry	3	Chives	3
Lettuce	4	Raspberry	3	Peppermint	2
Beans	8	Blueberry	1	Oregano	2
Tomato	10	Blackcurrant	1	Thyme	2
Cucumber	8	Redcurrant	1	Cilantro	3
Zucchini	7	Blackberries	2	Sage	2
Carrots	6	Cherry	1	Basil	3
Parsnips	2			Parsley	3
Peas	8			Dill	2
Beets	3			Rosemary	1
Spinach	7				
Brussels sprouts	3				
Pumpkin	1				
Squash	7				
Kale	3				
Leeks	4				
Arugula	1				
Lovage	2				
Radish	5				
Potato	5				
Turnip	3				
Celery	1				
Rutabaga	1				
Broccoli	4				
Onion	5				
Bok choi	2				
Rhubarb	3				
Garlic	8				
Eggplant	5				
Cauliflower	1				
Asparagus	3				
Swiss chard	3				
Mizuna	1				
Sweet potato	1				

Corn	1
Cabbage	3
Collard greens	1
Edamame	1
Melon	4
Loofah	1
Kohlrabi	2

Participants grew an average of eight different vegetables. Given the climate and length of growing season in the study area, only four participants grew fruit in their home gardens. All four of the fruit-growing gardeners had very little success with raspberries in 2021, showing the impact of weather across the province. Not surprisingly, all participants grew tomatoes, one of the easiest crops to grow and all reported that it was an excellent year for tomatoes. Most participants grew similar produce. This is likely a necessity of both climate and soil conditions, but also food produced is valued by the culture of the province in which the participants live. Only two participants cited the pandemic as the primary reason for starting to grow food at home. The other participants have been growing food for a longer period, suggesting that the degree of difficulty was not a deciding factor in choosing which produce to grow. In addition, wildfires in California in 2020 and 2021 caused a seed shortage in Canada, making it more difficult for gardening centres to carry a diverse array of seeds at retail. Interestingly, one participant enjoyed the challenge of successfully cultivating more exotic crops, including bitter melon and loofah.

For the love of gardening

It is clear from the first round of entries that participants enjoy working in their garden and harvesting food they have grown themselves. One participant expressed satisfaction that they were able to incorporate home-grown food into a major holiday meal, "Thanksgiving dinner had nine types of veg all from the garden, very satisfying" (Participant 3).

Other participants expressed a delayed gratification in future harvests, anticipating harvests in the future, suggesting that the emotional effects of gardening are not fleeting. Significantly, participants are more than financially engaged in growing food. This could offer opportunities to appeal to those with time to become involved in the practice. As the COVID-19 has led to dissatisfaction in many areas of modern working life, gardening could offer reprise as feelings of anxiety and despair that threaten to overwhelm sub segments of society (Chakraborty et al., 2021). Gardennig appeared to offer a distraction, "My tomatoes are coming along, and because of the weather are huge! I have to continue to prune them because last year they got a little wild. I have so much kale, and the spinach is looking great. I planted 'perpetual spinach' this year, so I can continually harvest it, and the leaves are really full and wonderful. Tastes great too!" (Participant 2). Another participant appeared undaunted by limited success, "Nothing is thriving in my veggie bed, but the

asparagus popped despite being planted late, too. Two years until harvesting, but still. Blueberries are full of green fruits; raspberries are starting to ripen. Plant more garlic next year! And peas!" (Participant 6) Even small garden dividends were celebrated among participants, "I saw my first tomato this week! The intense heat at the beginning of the week followed by the rain really made everything shoot up" (Participant 5).

There is evidence that participants are not only growing for food but using gardening to relieve stress. Here we see a participant taking the emotional rewards of growing food from the garden to the computer, "Harvesting peas, transplanting, cutting garlic scapes, and spraying watermelons for aphids. Also, some time spent just walking around checking on things (sometimes do this as stress relief). Probably spent one hour watching YouTube videos for fun or research" (Participant 8).

The so-called "great resignation" reveals the stress of working through the pandemic that has ultimately changed participants views towards their responsibilities or obligations towards their employers (Sheather & Slattery, 2021). Of course, stress from the pandemic is not solely the domain of office workers who were able to transition to work from home. Yet, the significance of people turning to growing food from the career obligations demonstrates that priorities, among at least some demographics, may be shifting.

Challenges of growing food on non-agricultural zoned land

Growing food on non-agricultural lands presents challenges to gardeners. Unlike farmers who have access to large-scale equipment and pest control, participants were forced to employ non-invasive methods to control pests. On participant had neighbourhood cats trespassing in their gardening, changing the pH balance of the soil. These problems offer insights into potential program support by governments looking to bolster urban agriculture. In addition, the data collected from this study suggests at least a base level of knowledge is required to be successful in growing food, beyond that of putting seeds in soil. While these issues were manageable for committed participants, it suggests that simply suppling seeds and rakes to citizens will not generate success. Further, more interventionist program mechanisms are required, "The cats are back. I put the bird netting down, but they managed to get in it. So, I'll have to do a better job, or possibly buy new bird netting" (Participant 2).

Another participant used dog hair to stop deer from eating their harvest, "Deer munched on first two feet of yellow beans; added a row of dog hair, about four" wide, continuous, may be two" thick. Problem solved" (Participant 8).

A participant questioned whether growing more popular crops that are attractive to pests was worth the effort, "EARWIGS, ugh. Shady too. Things are not robust. We'll see. Strawberries petering out. Not worth the effort, really. Do haskap [berries] or gooseberries instead" (Participant 1).

Other participants suspect the soil nutrient level is not at peak condition. Unlike farmers, who have access to sophisticated testing equipment, participants turned to home remedies and advice from local garden centres to address the problem. Interestingly, participants who

lacked a specific knowledge turned to private sector service providers, not local governments for advice. This suggests that community building in the gardening space centres around those that sell gardening equipment. Of course, this does not need to be case, it's simply a product of urban gardening not prioritized by governments to date, "I have worms on my kale again. They are such a pain, and I don't really know how to get rid of them.... I put crushed Tums tablets on the squash and pumpkins—as some of the fruit is dying on the vine. I might go to Halifax Seed to inquire about solutions, as this is a regular occurrence for me. I am fairly certain it's calcium deficiency but want to hear other ideas" (Participant 6). Another participant spoke about issues with their attempts, "Pests, fluctuating extremes of temps, weak sun in that spot and [soil] nutrition all seem to be a problem. Need to compost but need to move those bins somewhere better first.... Happy with established berries and garlic. Feel like nothing is happening with anything I put in. May pull stuff in a few weeks and try with a later crop. Want to get worm casings, but store was out. May try more things in pots on deck too" (Participant 7).

Environmental challenges

Growing conditions for farmers and gardeners alike were difficult in 2021. Adverse weather events brought on by climate change such as flooding, droughts, and wildfires are making fall harvests difficult across the globe. In the study area, there were several months of dry, hot weather followed by excessive rain. Participants adapted their strategies in dealing with weather to maximize their harvests. Climate change may be the most significant factor for the health of the food supply chain, whether it is local or global (Chakraborty & Newton, 2011). Food security will depend on optimal growing conditions for any size yield. Participants adapt to the changing conditions, but the scale of the impacts of climate change need to be assessed in further research, "DRY weather so daily watering was absolutely necessary. No obvious loss from the wet weather the week before" (Participant 3). Another participant revealed, "Increasingly worried about the lack of rain, I need more than one decent shower every two weeks for the garden" (Participant 4). In some cases, the effect of weather was different, "Worried that garlic may be rotting after heavy rains. We have 4000 litres of rainwater stored which is a positive" (Participant 6).

Impact on food security

Participants stopped buying fresh produce from grocery stores, aside from the occasional bunch of bananas. However, they are cognizant of both short-term impacts and saving harvests for the coming months. This is the key stumbling point for any program looking to foster home food production or urban agriculture. The perceived return on investment, in terms of time and financial resources may not make it a tenable approach to impacting community food security. Significantly, there is a type of gardener that would indeed spend time growing food for the community. These gardeners would need to be identified, engaged, and supported. To our knowledge, this work is not taking place in the Nova Scotia context,

"The garden is looking very full, and we are already having to cut down on our market shops to try and make sure we eat everything that is ready! I also now have flowers on my beans" (Participant 3).

One participant is feeding her baby fresh vegetables from the garden, cutting back on buying processed baby food. In addition, the participant is saving the harvest of one vegetable for winter use, "I cleaned and cooked down beet greens and kale to feed to our baby.... I cooked the beet greens down for baby food and pickled three jars of beet stems. Hopefully they turn out! My zucchini are finally starting to grow, so I am making zucchini relish. I usually make one batch each year and it lasts until the next year (I am just about out from last year)" (Participation 10).

A later entry, "I harvested the two pumpkins that grew (I am so disappointed in my gourds this year—I think it just got too wet for them to really flourish), roasted them and saving a bunch for my baby, and will freeze the rest for the winter" (Participant 10).

A participant with a larger garden is also saving harvest for the coming months, "Fifteen meals for winter in the freezer now plus the peas and carrots. We also made a batch of zucchini fritters and eggplant chips which were awesome. The majority of what we eat now comes from the garden including a rather fine Gazpacho soup" (participant 2).

Interestingly, participants are not just gardening, but stretching their harvests by processing them in some way, by pickling, canning, or freezing, "Freezer continues to fill up and [wife's name] also made pickles from our first growth of cucumbers. Thirty-two meals done along with veg" (Participant 3). Another participant revealed, "I picked more tomatoes and canned them. I now have about nine litres canned for winter.... I froze some more spinach and picked beans and canned three jars of Dilly beans" (participant 1). Tomatoes appeared to be a popular item for canning, "I picked the rest of the tomatoes and canned my final batch. I made tomato cucumber salad with the final cucumbers. That's three meals this week where everything came from the garden! I spent some time pulling weeds and dead beans and cucumbers this week" (participant 6).

Community

Participants used their gardens to connect with neighbours and family in sharing both food and information. Participants shared harvests with neighbours, family, friends, strangers, and in some cases, people with whom they shared a quasi-professional connection. Significantly, gardening does allow people to form communal bonds around food. Indeed, in the early days of the pandemic there was a virtual call-to-arms as citizens turned to social media to promote pandemic victory gardening (Music et al., 2021). Having pride in the gardens' yield may overcome the frustration of post pandemic life and connect participants in a perceived meaningful manner, "I made kale chips for my in-laws who are visiting from the kale I picked Saturday" (Participant 3). Another participant also shared their harvest, "I harvested kale, spinach, and lettuce to give away to friends" (Participant 2).

Participants were rewarded emotionally for sharing harvest with neighbours. Interestingly, at least two

participants were growing produce they did not intend to consumer themselves; rather, these harvests were intended for donation or waste, "My neighbour took some squash blossoms out of my garden, it's nice to be able to give her something she likes so much, especially since they would be wasted otherwise" (Participant 7). Squash blossoms appeared to be a popuar sharing item, "I picked and bound beet greens, spinach, squash blossoms and kale to give away to neighbours and friends. I love sharing the goodies in my garden!.... I had a conversation with my neighbour about recipes for dal bhat (lentils with rice). She shared some of her tips with me. I also told her to take as many squash and pumpkin blossoms as she wants, as I don't like them" (Participant 1).

Another participant had a family member tend the garden while they were away. Here we see two separate third parties in contact with the garden, a family member, and a neighbour, "My cousin checked on garden every couple of days, watered it and picked produce in our absence. Planted all remaining transplants (tomatoes, peppers, cucumbers, and basil) and shared tomato transplants with neighbours" (Participant 10).

Another participant experienced a reciprocal exchange with a neighbour, "I was able to get out into the garden to give it some love Monday night. I ended up chatting with my neighbour and giving him some beets. He gave me a jar of his pickled beets in return!" (Participant 2).

Interestingly, one participant donated to a point of contact that was emotionally farther away than family, friends, and neighbours. The participant learned of interest in her harvest and shared accordingly, "I picked some carrots for hummus, picked beets, tomatoes, kale, mint, parsnips, and chives for my massage therapist because we chat about gardening each time I go for a massage" (Participant 5).

One of the main objectives of this research is to understand how citizen driven food production can impact community food security. Participants were donating surplus harvest to their local food banks. They donated a variety of produce and felt that the donations were substantial. Food bank donations have declined as the rise inflation has stretched grocery bills in Canada and around the globe, while visits to food banks have increased since 2019 (Food Banks Canada, 2021). Therefore, the impact of fresh, local produce on the impact of community food security, though for only a brief timeframe, is important, "Gave carrots, onions, lettuce, kale, beans, and zucchini to local food bank. Foodbank collected enough lettuce and kale for all. Hope to supply excess tomatoes as well next week" (Participant 2).

Participants appeared to take pride in the garden donations to their local food bank, "Food bank was able to take 200 tomatoes as well as lettuce, kale, beans, peppers, chilis, eggplant, and cucumber" (Participant 3). Later in the season, "Bumper donation to the food bank, it has been a spectacular year for produce" (Participant 3). Another participant wrote, "Good donation to food bank, added garlic this time" (Participant 6). The variety of produce that made up the food bank donation was worth noting for participants, "We also gave the foodbank a dozen butternut squash as well as five kgs of tomatoes, peppers, chillis, lettuce, kale, celery, carrots, fresh herbs" (Participant 1).

Discussion & conclusion

Many participants opened their private spaces to extended family and neighbours, if they needed the garden tended to while they were away. Gardens that neighbours tend together can bring them closer (Glover et al., 2005). Gardens have been shown to help older persons integrate into social networks in the inner city (Kweon, 1998; Robbins & Seibel, 2020). Intuitively, community gardens bring members together in a more direct way than perhaps individual gardens (Glover, 2004). Yet both have the potential to reduce isolation through information sharing and sharing of seeds, tools, and harvest as demonstrated by the study participants.

Most participants did not grow food at home to donate to food banks or food programs. Yet many did share their harvest with unfamiliar neighbours and food banks. Most donated produce is considered excess harvest, not grown specifically with donation in mind. However, one participant in the diary study decided to grow excess produce specifically for charitable donation. At the end of 2020, they planned a garden extension for the 2021 growing season, including renovations to their greenhouse—all to help alleviate their community's food insecurity caused by the COVID-19 pandemic. They started growing excess produce without a clear idea of what organization to donate to and were fortunate to discover that their neighbour volunteered at the local food bank, which would be more than happy to accept donations of fresh produce. Over the course of the summer and fall, this participant's garden produced more than 315.5 kg of fresh produce for the food bank, in addition to providing hundreds of pounds of food for household consumption and preserving. This suggests that some home food gardeners would be able to contribute directly to community food security. However, this is not a province wide situation: food banks that that are not within a reasonable distance of gardeners make donations difficult, and those that do not advertise the need for excess locally grown produce are not benefitting from household food production. In addition, because producers tend to be socio-economically advantaged, and recipients are often not, there is no real long-term impact on food distribution patterns.

While these data are only preliminary, six months into a twenty-two month study, some interesting patterns are emerging. There is an opportunity to maximize community potential to positively impact food security at least some months of the year, as we can see through donation patterns. More support was provided to citizens with time and inclination, programs, and mechanisms in place to streamline donations, especially in urban spaces, to allow for easy donations. For participants of this study, word of mouth appears to have the biggest influence on donations. For example, the City of Brampton established a home gardening initiative to help citizens become more food-secure (City of Brampton, 2021; Dionne, 2020; Music et al., 2022). This program promotes residential gardening as a pandemic response. The municipality provides program participants with free seeds, seedlings, and soil, as well as information on how to grow produce and social media channels to share successes and challenges. In just two years, 9,000 households have participated in the program, with over 4536 kg of fresh produce donated to local food banks in 2020 alone (City of Brampton, 2020).

The data shows that committed gardeners who already have personal and social advantages that enable them to build a sense of community through gardening, will work to overcome barriers to growing food. The research objective, to understand gardeners' behaviors,

activities, and experiences as citizens who grow food to supplement their household food budget demonstrates that very committed gardeners are impacting both their own household yields, but also donating to local food banks. For instance, gardeners with resources such as time and growing skills benefitted with more yields than those with less accommodating resources. While the small sample size in this study requires further investigation into the typology of gardeners that would yield the best results for urban agriculture programs that would impact community food security, the data indicates that committed gardeners could assist in developing communities around food security, facilitating municipal policy makers and urban planners to advantage citizen food production through implementation and practice.

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