

Growing together or growing apart? A study of food donation community garden programming during the COVID-19 pandemic

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Abstract


The COVID-19 pandemic worsened food insecurity by curbing the food supply chain, slowing the delivery of provisions to food banks and pantries, and magnifying the impact of the pandemic on those depending on such resources to meet their nutritional needs. The study's objective was to identify areas of resilience and vulnerability in food

security intervention programming during the COVID-19 crisis, with specific attention to fresh produce donation partnerships.

This study examined the cultivation and provision of fresh produce to food pantries in Iowa before and during the pandemic. It also analyzed the

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Conflict of Interest

The authors declare that they have no conflict of interest.

Author Note

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experiences of volunteers in a Master Gardener volunteer program in Iowa, which grew the donated produce. The study analyzes program data on donation quantities and labor hours and uses a time series analysis and content analysis to understand changes between the pre-pandemic and pandemic years. Findings include a significant decrease in labor hours during the pandemic years of 2020–2021, which volunteers attributed to multilevel government policies and social distancing requirements. Vulnerabilities revealed in this study were exacerbated by the pandemic rather than singly caused by it. Volunteer shortages, donation inconsistency, and exclusionary practices of community appeared to be inherent to the concept and structure of volunteer-based food donation partnership programs.

Keywords

food security, donation gardens, food emergency services, COVID-19, pandemic, fresh produce, cooperative extension, Master Gardener

Introduction

Food donation programs and charitable food organizations like Feeding America (2020) provide critical fresh produce donations to food pantries, aiming to meet patrons' nutritional needs. Distribution methods, however, vary due to the inconsistent nature of volunteer based, grant supported programming and fluctuations in garden harvests. The COVID-19 pandemic exposed the limitations of such partnership-based programs, as the number of food insecure individuals abruptly increased by from 8% in March 2020 to 10% in June 2020 (Nagata et al., 2021, p. 4); the pandemic circumstances also led to changes in social gatherings and increased financial strain (Manchia et al., 2022). Before the pandemic, one in nine Americans (35 million, 10.9%) and one in seven children (14.6%) experienced food insecurity (Feeding America, 2021, p. 2). In 2020, the first pandemic year, approximately 35 million people including 11 million children faced food insecurity (Feeding America, 2021; Rabbitt, et al., 2023).

Food insecurity is defined as a household or neighborhoods experiencing economic and social conditions characterized by limited access, availa-

bility, utilization, and stability of food (Coleman-Jensen et al., 2019). During the COVID-19 pandemic, food availability was affected in part by panic-buying due to disruptions in food supply chains, which raised concerns about long-term food availability (Aday & Aday, 2020). Accessibility was also hampered by rising food costs and changes in infrastructure, including shifts in food assistance programs, public transportation, and shortages of certain items (Chakraborty et al., 2023; Niles et al., 2020). Market reports highlight widespread shifts in food consumption and shopping behaviors due to the pandemic (McKenzie, 2020). The pandemic also posed significant challenges to both food banks and food pantries (Byrne & Just, 2022; Huang et al., 2023).

Kar et al. (2021) argue that the pandemic revealed the fragility and social injustices inherent in the current food and economic system. Their findings pertain not only to the pandemic years of 2020–2021, but also offer valuable lessons on the implementation and sustainability of fresh produce provision in future crises. While various studies have focused on the pandemic's impact on the food supply chain, food security, and nutrition, there is limited information about its influence on fresh produce donation programs. To understand this influence, it is critical to grasp the pandemic's ripple effect on charitable food donation more generally.

Before the pandemic, Feeding America (2019, p. 2) reported the lowest food insecurity rate in two decades. In 2020, the onset of the COVID-19 pandemic severely disrupted food supply chains. With the shift to prepackaged boxes, distribution of fresh produce became a challenge, as items selected for clients were not necessarily matched with client's preferences (Barman et al., 2021; Deconinck et al., 2020). This shift also required more volunteers for packing and distribution, coinciding with pantry labor shortages (Higgins et al., 2021; Huang et al., 2023). This disruption severely impacted food banks, which not only faced supply chain issues but also unprecedented demand from food-insecure households (Blessley & Mudambi, 2022). COVID-19 drastically altered consumption patterns due to closed restaurants, disrupted supermarket supply chains, increasing job losses, and

challenges in the movement of fresh produce from farms to processors, food banks, and consumers (Orden, 2020). Economic hardships created a surge in food demand from banks and pantries (Rabbitt et al., 2023), increasing from 50% to 140% (Kulish, 2020; Lakhani, 2020).

Food banks and pantries played a crucial role in serving 80% of the food-insecure population nationwide; however, volunteer numbers decreased further during the pandemic, with 58% of food banks reporting difficulties recruiting volunteers (Byrne & Just, 2022). Small-scale pantries and community-based organizations struggled to process goods, changing their operations, hours, and spatial capacity (Byrne & Just, 2022). The scale and source of donations also changed during the pandemic due to the U.S. Department of Agriculture (USDA) Farmers to Families Food Box Program (USDA, 2022b) and commercial surpluses, creating an influx that exacerbated ongoing volunteer shortages and spatial constraints (Huang et al., 2023).

The pandemic also led to operational alterations, resulting in food bank and pantry closures in food deserts, areas already lacking access to quality food sources (Kar et al., 2021). Food deserts are defined as areas where at least 100 households are located more than half a mile from the nearest supermarket without vehicle access or where at least 500 people, or 33% of the population, live more than 20 miles from the nearest supermarket regardless of vehicle availability (Dutko et al., 2012, p. 5; USDA, 2022c). As these areas already faced disparities in food access, the pandemic exacerbated household food and nutrition insecurity (Kar et al., 2021).

Programs supporting fresh produce provision to pantries were also affected. Growing Together, a program administered by Iowa State University Extension and Outreach and funded by the USDA's Supplemental Nutrition Assistance Program-Education (SNAP-Ed) initiative, was impacted in this way. Growing Together administers immigrants to county extension agents and Master Gardeners to grow and donate fruits and vegetables to their community food pantries (Chennault, 2019). As most of the Master Gardener Volunteers (MGVs) are older adult they often identified as high-risk during the pandemic and followed guidelines to

stay home or practice social distancing for their personal safety (Kingsley et al., 2022). In some places, volunteers' access to communal gardens at schools was forbidden or avoided (Kingsley et al., 2022). Although MGVs play a significant role in supporting food pantries with fresh produce donations to improve patron nutrition, there is a knowledge gap between how the COVID-19 pandemic disrupted MGV activities and how the disruptions altered the fresh produce distribution system.

Purpose and Aims

The primary purpose of this study was to understand how COVID-19 disrupted Growing Together's MGV fruit and vegetable distribution to food pantries. The study also aimed to use the findings to propose recommendations for increasing sustainable healthy food donations within existing food pantries. As most studies have focused on larger food supply chains, there is less knowledge and evidence on how protracted disasters could disrupt smaller or more localized supply chains, such as donation gardens and community food pantries. The COVID-19 pandemic created the opportunity to examine the impacts of these disruptions.

To learn more about these impacts, the study adopted a social-ecological model to understand food donation programming. It examined qualitative and quantitative data to understand how COVID-19 disrupted MGV activities and thus impacted fresh produce donation to food pantries during 2020 and 2021. This study sought to follow two main lines of inquiry:

- a) How did staffing and operating procedures and production shift from the nonpandemic year of 2019 to the COVID-19 pandemic years of 2020–2021, impacting Growing Together's fresh produce donations?
- b) What were the social implications of selected changes before and during COVID-19 in relation to the concept of the community donation garden?

Theoretical Framework

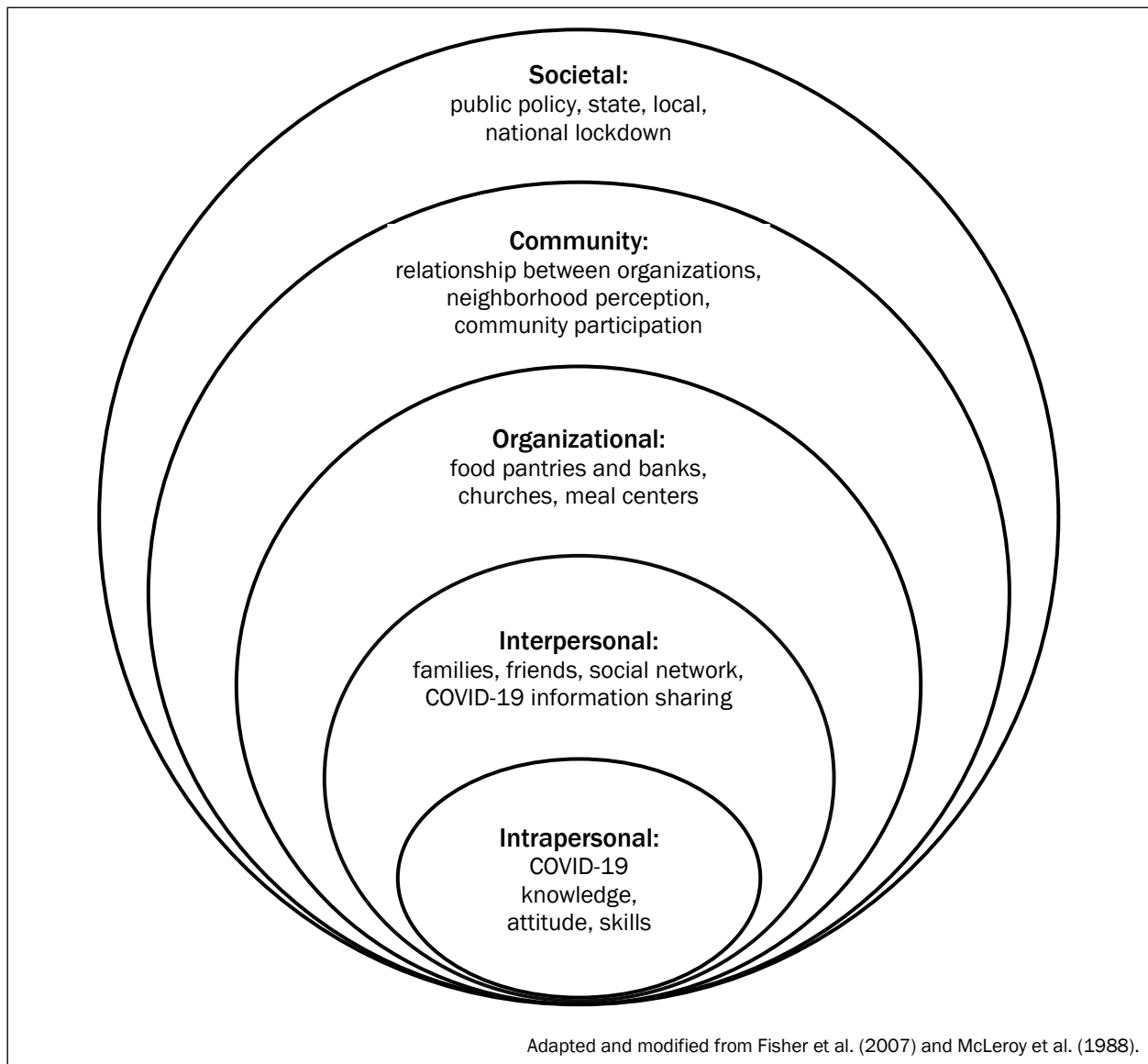
The social ecological model (SEM), originally de-

veloped by the scholar of human development Urie Bronfenbrenner in the 1970s (Figure 1) and widely utilized in public health research, posits that behavior is affected across multiple spheres of influence, which both determine and are determined by the social environment (Bronfenbrenner, 1976). The SEM allows a layered understanding of the impacts of COVID-19 on MGVs' fresh produce cultivation and donation to Iowa food pantries as well as the response strategies volunteers adopted to ensure program continuity. The SEM emphasizes that a myriad of exogenous factors can influence an in-

dividual to perform certain actions and, vice versa, the environment can be transformed by an individual's action (Dzimbiri et al., 2022). Exogenous activities include those in the categories of intrapersonal, interpersonal, organizational, community, and public policy (Anyanwu et al., 2022; Dzimbiri et al., 2022; Goldberg & Mawn, 2015). These categories are nested within a wider contextual perspective that includes policies that underpin certain values and individual behavior (Dzimbiri et al., 2022).

A number of studies have been conducted uti-

Figure 1. Relationships among the Strata of the Social Ecological Model (SEM)



lizing the SEM to examine issues related to food insecurity and public health in the U.S. and other countries. For example, Alaimo et al. (2016) examine the ways in which community gardens promote health in the U.S. The study utilized the SEM and found that individual, social, emotional, and environmental drivers promoted health via community gardening. Likewise, a study examining the perceived implications of COVID-19 policy on urban residents utilized the SEM and found that multiple intrapersonal, interpersonal, organizational, community, and public policy factors impacted food security among urban residents in Malawi (Dzimhiri et al., 2022).

The SEM can be adapted to the context of food donation programs such as Growing Together through analysis of these five spheres (Janssen et al., 2022). In the context of Growing Together, the intrapersonal sphere (Figure 1) includes the attitude, knowledge, and motivation of volunteers regarding COVID-19's impact on MGV participation and interactions among MGV. The interpersonal sphere refers to the ways in which the influence coming from friends, family, and relatives contributed to MGV participation during the COVID-19 crisis. The organizational level refers to operational procedures and protocols, including how these changed during the COVID-19 pandemic to accomplish several goals such as addressing the virus. The community sphere includes considerations of how organizations formed partnerships and collaborations during the pandemic to ensure continuity fresh produce donations to food pantries and food banks to meet the needs of low-income Iowans. The societal sphere addresses the county, state, and federal government policies, guidelines, and protocols for essential critical infrastructures to effect change during the pandemic.

Through these nested spheres, the SEM allows for an examination of which factors in each sphere facilitated or hindered the effective participation of MGVs and affected their donation of fresh produce to food pantries and food banks for low-income Iowans during the pandemic. In this study, we adopted the SEM to enable us to understand how COVID-19 affected MGVs at various levels of society as local, state, and federal government operating procedures disrupted fresh produce dis-

tribution to food pantries and curtailed patrons' access to healthy food.

Role of Master Gardeners in Food Donation Programs and Health

The Master Gardener program is a nationwide, state-administered initiative founded in the early 1970s (Gibby et al., 2008). The most active programs exist at land-grant universities. Typically, MGVs are an important component in extension strategy (Meyer, 2007).

For almost 50 years, Extension Master Gardeners (EMG) have educated millions about sustainable and environmentally friendly garden practices. USDA's National Institute of Food and Agriculture (NIFA) provides crucial support to the Extension Master Gardener program through capacity funding to Extension programs in all 50 states and the District of Columbia. (Lawrence, 2022, para. 1)

In some communities, MGVs share horticultural knowledge with community members, answer calls, create and care for demonstration gardens, and work with community members who are disabled, youth, and special groups (Dorn, 2019; The University of Tennessee Institute of Agriculture, n.d.).

These programs focus on expanding the number of MGVs to increase their impact. However, MGV programs and roles vary widely across land-grant universities. In Utah and California, MGVs participate in mitigating household water wastage (Muntz & Kopp, 2019; Regents of the University of California, 2024). In Pennsylvania, MGVs train communities in watershed management (Pennsylvania Master Gardener Program, n.d.). In Arkansas, MGVs run plant therapy programming and participate in horticulture education (Arkansas Master Gardener Program, 2021). In Iowa, Growing Together brings the Master Gardener program and community garden model together with food donation to increase fresh produce access at food pantries. A community donation garden is a piece of land set aside for collective gardening purposes to cultivate fruit, vegetables, and herbs for personal consumption (Egli et al., 2016). In addition to

providing fresh produce for community members, these gardens often function as teaching and demonstration opportunities for schools and the communities in which they exist.

Project Background: Growing Together

This article examines shifts in food availability through a case study Growing Together, which is funded by SNAP-Ed and the Iowa Master Gardener program (Chennault, 2021; Irish, 2018). Master Gardener programs primarily focus on educating the public about horticultural practices and garden production with a recent focus on increasing fresh produce access at food pantries (Gibby et al., 2008). Growing Together involves county Extension staff, MGVs, and non-Master Gardener volunteers, all operating within Iowa State University Extension and Outreach. The program aims to enhance fresh produce access for low-income Iowans and to address food insecurity through education programs. MGVs are pivotal in planting, managing, harvesting, and transporting produce to food pantries, often located at churches, low-income county public housing areas, or elsewhere on public lands.

Conceptualizing Community

Understanding how community garden volunteers experienced the pandemic requires understanding the concept of “community” in the context of gardening and donation programs. The contemporary sense of community as a social policy concept emerged during the 1960s to refocus political discourse and public programming away from top-down development approaches toward participatory models more inclusive of economically and racially diverse peoples (Fremaux, 2005). Community gardens are often perceived as a means of fostering unity and vitality within a conceptually established but materially underdeveloped “community” (Anderson, 2021; Fremaux, 2005). They are presumed to facilitate social bonds and create social capital (Firth et al., 2011). The concept of community often carries assumptions of cohesion, collaboration, and inclusion, which manifest through the portrayal of community as a space of shared interests, infused with beliefs in the public good (Dewey & Peters, 2001). On the other hand, commu-

nity donation garden programs, founded on this unitary understanding of community, also have the potential to perpetuate inequalities by simplifying and essentializing the concept of community, thereby neglecting those who do not neatly fit into this framework (Joseph, 2002).

Firth et al. (2011) argue that community is both a challenge and solution. For example, governance structures and rules controlling access to community donation gardens may inadvertently reinforce exclusion. Ghose and Pettygrove (2014) observed that gardens were marked by unequal power dynamics, hindering initiatives of certain groups. Exclusion within community donation gardens may extend beyond the distribution of produce, also encompassing the decision-making and distribution processes (Neo & Chua, 2017). Social support programs frequently adopt the term “community” without a deep understanding of its historical context, associated connotations, or underlying dynamics of linguistic, representational, and practical exclusion.

Fremaux (2005) emphasizes that programs promoting community without interrogating common monolithic assumptions risk overlooking and exacerbating dispossession and discrimination. In the case of Growing Together, the MGV program excludes patrons from planning, such as decisions regarding planting, budgeting, and harvesting. The COVID-19 pandemic demonstrated that the idea of community as common good may be a myth: as social distancing protocols operationalized, the MGVs could withdraw their gardening efforts without compromising their access to healthy, fresh food. Effective community gardening, however, became impossible (Huang et al., 2023). This is evidenced in the result sections in Figure 3, Figure 4, and Table 1. As the community of volunteers disintegrated, gardening reduced—resulting in dramatically lower yields. Pantry patrons, less likely to have access to fresh produce elsewhere (e.g., a grocery store), were more vulnerable to being affected by the stoppage of community donation gardening than the MGVs.

Methodology

This study used quantitative and qualitative methods to gather information about the community

donation garden operations and volunteering during the COVID-19 pandemic. The study was determined exempt from approval by Iowa State University's Institutional Review Board, but ethical procedures for human subjects were followed as professional practice. We employed a mixed-methods research design (Creswell & Plano, 2011), which collects data during a common period (Creswell, 2009, p. 214). We draw on primary method and secondary methods, with the latter supporting the process and being integrated into the predominant method (Creswell, 2009, p. 214).

Data Collection

Data provided for open-ended questions were obtained using Qualtrics software via an emailed link to 29 Growing Together MGVs and coordinators approved to participate in the program. The MGV coordinators lead and organize the MGVs. They also serve as liaisons with county Extension staff in the grant funding application process and grant reporting process, making them key professionals to include in the survey.

The MGV coordinators provided quantitative data by responding to the 15-question survey that focused on fresh produce donation quantities, demographics of coordinators, educational activities, engagement strategies, and time investments. Data were requested for the years 2016 to 2021. In 2020, short answer or open-end question was added concerning COVID-19 pandemic experiences from Master Gardeners; this question was only on the survey for the year 2020. The question prompt was: "Please share more details related to your responses above regarding how COVID-19 impacted your project." Responses to the open-ended question related to COVID-19 were received from 26 MGV coordinators.

Data Analysis

Content Analysis

Content analysis is a quantitative analysis of qualitative data (Bernard et al., 2016; Downe-Wamboldt, 1992). Text box responses were downloaded into an Excel sheet corresponding to each MGV coordinator. General descriptors/pseudonyms (i.e., MGV coordinator 1 to MGV coordinator 26) were

used to protect the privacy of the respondents.

The survey responses were entered into Microsoft Excel for management and analysis. The process included naïve reading of survey responses to learn MGVs' perspectives on operations of Growing Together during the COVID-19 pandemic years of 2020–2021 (Bernard et al., 2016; Lindseth & Norberg, 2004; Russomanno et al., 2019). We then conducted an iterative reading of all responses to develop a codebook for better understanding and to reduce biases. Responses were inductively analyzed following the guidelines of Bernard et al. (2016). Subsequently, we conducted the quantitative phase of content analysis using the code list to aggregate the number of times a word or phrase was mentioned. After all responses were coded, the codes were aggregated into five levels of influence, emulating aspects of the SEM framework (see Figure 1 and Bronfenbrenner, 1976). We analyzed the relationship between categories utilizing interpretative strategies with familiar sentiments, main ideas, and diversity of experiences manifested through summaries and essential quotes (Huang et al., 2023).

Time Series Analysis of Produce

We generated descriptive statistics to summarize the pounds of produce donated each year before the pandemic (2016–2018) and during the pandemic (late 2019–2022). We conducted a time series analysis on the pounds donated, number of MGVs, number of non–Master Gardener volunteers, and volunteer hours as the primary parameters of interest to assess changes between the pre-pandemic and pandemic years. To illustrate the direction of change, we fitted trend lines and linear trend line equations. Furthermore, we used simple linear regression to examine the relationship between pounds of fresh produce and MGV hours.

Validity and Analysis

Time series analysis designs have several control threats to validity, as described by Ary et al. (2018). Some validity threats merit particular attention. History often poses a significant threat to validity. There is the possibility that external phenomena may have influenced the observations in the time series. While in the case of this study another his-

torical event cannot be ruled out as the reason for the decline in participation and produce production, its qualitative aspect includes survey responses from MGVs who explicitly attribute these decreases to the pandemic. Additionally, similar studies on pandemic programming in other sectors and industries demonstrated similar issues. Therefore, history as a threat to the time-series analysis was minimal since the pandemic itself was the treatment and was experienced across all included counties, which were subject to similar state and federal public health constraints.

Instrumentation, the method of measuring the time series, represents another threat to validity, as noted by Ary et al. (2018). Issues with instrumentation might result from changes made in the instrument, potentially leading to errors in data collection. When there are changes in instrumentation, those changes should be documented. We controlled for this by using the same data collection instrument from 2016 to 2021 across all counties that participated in the program; the exception was the addition of a question concerning the COVID-19 pandemic. We collected the same variable data from the inception of the program and across counties. For a reliable measure of the pounds of fresh produce we used the pound scale, and weights were recorded in an Excel spreadsheet.

Findings

The aim of this study was to examine how COVID-19 impacted Master Gardener activities, specifically the production and distribution of fresh produce, across Iowa under the Growing Together program.

Content Analysis Results

Content analysis generated themes from the MGV COVID-19 short answer or open-end survey question, “Please share more details related to your responses above about how COVID-19 impacted your project.” These themes were volunteer availability, operating procedure changes, programming changes, and food patron attendance.

Theme 1: Changes in Volunteer Availability During COVID-19

COVID-19 significantly affected volunteer availa-

bility for Growing Together, impacting all SEM spheres (intrapersonal, interpersonal, community/organization, societal; Figure 2). The pandemic caused labor shortages as volunteers, particularly senior citizens and those in healthcare or public service, avoided participating due to health concerns. In the interpersonal sphere, volunteers reported that other volunteers missed social interactions and worried about virus transmission. MGV coordinator 2 pointed out, “volunteers, especially senior citizens, were impacted—they continued to practice social distancing and prioritized their safety. Additionally, some volunteers were part of the healthcare or public service sectors” (Table 1). A strong volunteer base is essential for the Master Gardeners program; their decreased participation due to social distancing delayed garden preparation, planting, and harvesting. Notably, 64% of Master Gardeners identified volunteer availability as the main challenge. MGV coordinator 11 reported that “the [p]roject had a delayed start due to the shortage of volunteers and the inability to align work schedules with the tasks that needed completion” (Table 1).

Theme 2: Changes in Operating Procedures: Organizational and Community Spheres

Historically, Growing Together MGVs played a key role in the broader community. MGVs formed relations with various entities in the community such as nurseries, churches, seed businesses, lumber, and landscaping businesses. MGVs utilized these partnerships to acquire free seedlings, timber, mulch, and seeds. However, during the pandemic, the community bond and interconnectedness disintegrated as many of these businesses closed. One MGV coordinator pointed out, “We did not purchase items for or do garden infrastructure projects that we had planned (such as fencing and raised garden beds). . . . We are unable to carry out all or part of the proposed connect strategy from our immigrant application.”

Approximately 52% of Master Gardeners reported that operating procedures posed a challenge to the effective performance of their activities. MGV coordinator 13 expressed, “The most significant way the pandemic impacted our project this year was through the ongoing restrictions imposed

Figure 2. Relationships among Social Ecological Model (SEM) Spheres and Levels of Understanding about COVID-19's Impact on Master Gardener Volunteers' (MGVs') Participation in the Donation Program

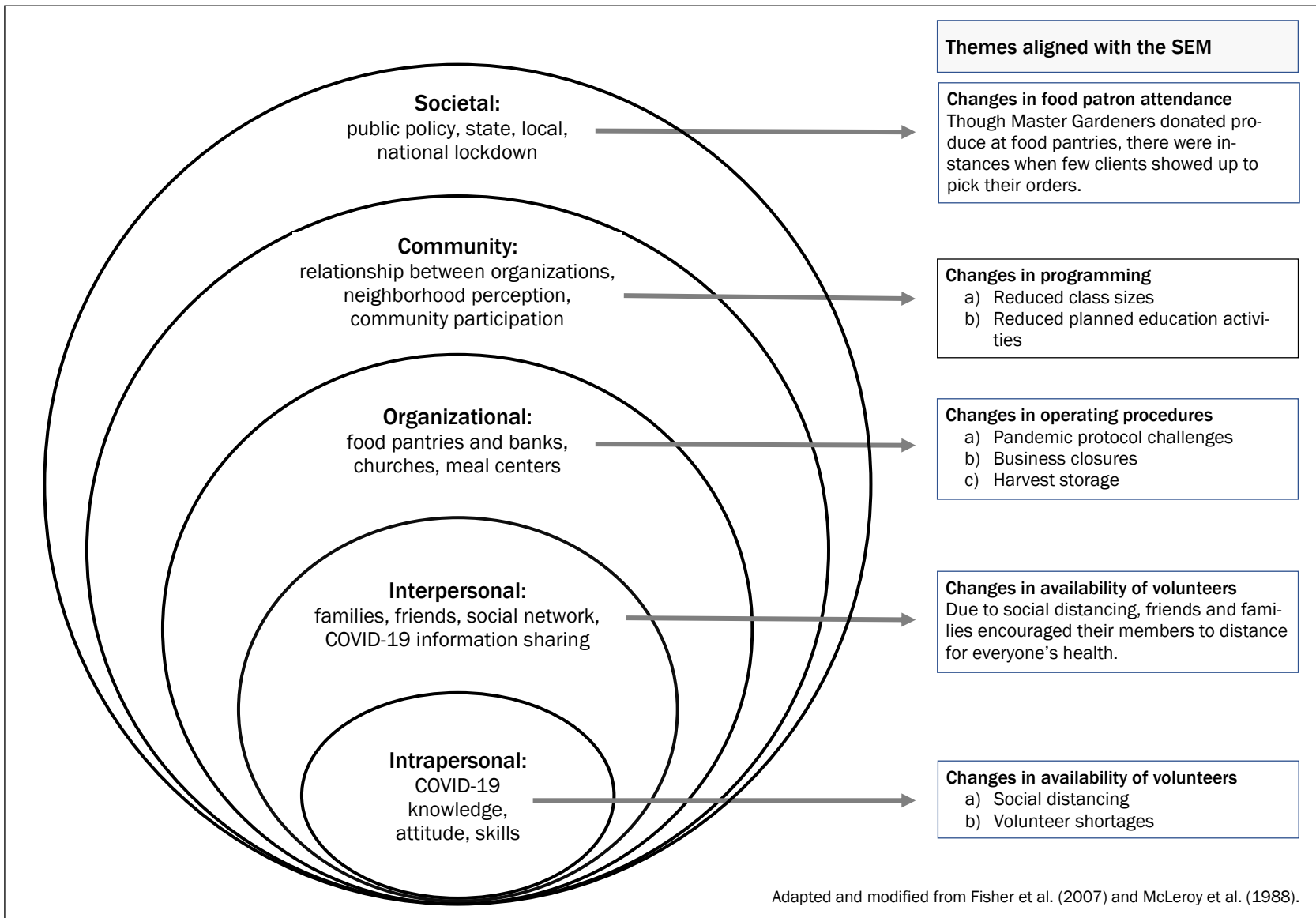


Table 1. Emerging Themes from Responses to Open-Ended Questions on Influence of COVID-19 on Experiences and Behaviors of Growing Together Master Gardeners (n = 26)

Themes	Operational Definition	Growing Together Master Gardeners' Verbatim Quotations	Code Frequency (%)
1. Changes in the availability of volunteers a) Social distancing b) Volunteer shortage	MGV explaining the challenges of finding volunteers during the pandemic	<p>Changes in the availability emerged as the overarching themes concerning the influence of COVID-19 on GT-MGVs.</p> <p>“The Project started later due to volunteer pool—and inability to have compatible dates with work needed to be completed ... by volunteers.” (MGV coordinator 11)</p> <p>“Some large groups that regularly volunteer in the Garden cancelled their events, and therefore, did not volunteer here. ... Volunteers were impacted from the senior citizen side—still social distancing and making sure they were safe. Other volunteers were in the health care or public.” (MGV coordinator 2)</p> <p>“Other volunteers in the health care or public service sector did not have additional time to give as many had been stretched in their regular employment working over-time or double shift. We had two people who helped before tell us they couldn't because of COVID and they had immune-compromised people at home.” (MGV coordinator 11)</p>	64
2. Changes in operating procedures a) Pandemic protocol challenges b) Business closures c) Harvest storage	Reporting the changes that happened to work within the pandemic guidelines	<p>Growing Together MGVs reported changes in operations and protocols that affected the operations of Master Gardeners.</p> <p>“They would not allow us to put up the shelving unit at their site with educational boxes as we had planned.” (MGV coordinator 13)</p> <p>“The [biggest] way the pandemic affected our project this year was in the continued restrictions imposed by one pantry to keep the produce outside their building, exposed to the covid.” (MGV coordinator 13)</p> <p>“[Also], we had planned to coordinate with a local church who offers free meals and do tastings, but the church changed their format to a drive-through so we weren't able to set up a tasting/information table like we had hoped.” (MGV coordinator 9)</p>	52
3. Changes in programming a) Reduced class sizes b) Reduced planned education activities	Participants report on the changes that happened to be able to conduct classes during the pandemic.	<p>Due to the challenges elaborated in the previous themes, programmatic changes also occurred. Respondents noted reduced class sizes resulting from COVID-19-related restrictions.</p> <p>“Produce Basics food pantry classes was reduced by both the uncertainty surrounding Covid-19 restrictions and the safety in attending a public class.” (MGV coordinator 6)</p> <p>“We had hoped to do programming at the food pantry, but because of this restriction we were not able to....[programming] was held at the county [Extension office]. MGV coordinator [I think] attendance would have been higher if it would have been held at the food pantry.” (MGV coordinator 16)</p>	20

“[In general], COVID just reduced our ability to offer face-to-face education.” (MGV coordinator 9)

“Our planned education directly to the food pantry clients was not possible so we would have liked more people to be reached in this way.” (MGV coordinator 5)

“We were unable to have planned engagement with the food pantries and the low-income senior living facilities due to COVID concerns and the changes made to their regular programming.” (MGV coordinator 19)

“We weren’t able to have the in-person classes at the pantry site that we had hoped to have that would have focused on using produce they received....[Instead], we had to rely on written information that was delivered with the produce.” (MGV coordinator 15)

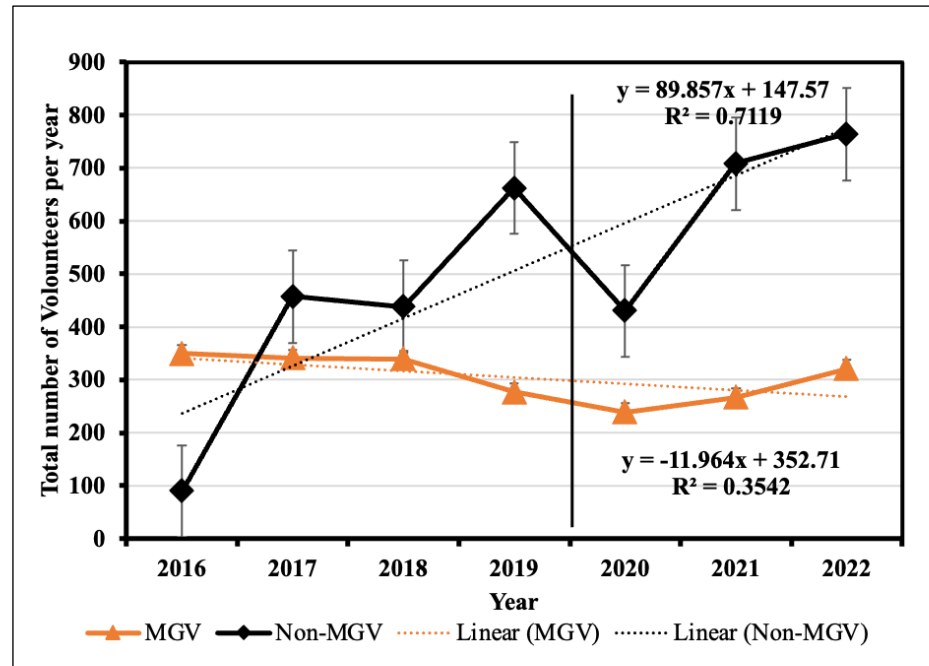
“The food pantry was open on a “pick up” option only. Patrons were not allowed to shop in the building and pick their own produce.” (MGV coordinator 16)

4. Changes in food patron attendance	Participants described the decline in patron attendance as due to changes in operation.	<p>Though Master Gardeners donated produce at food pantries, there were instances when few clients showed up to pick their orders.</p> <p>“[In August] very few clients were showing up at the food pantry when it reopened because of the trucks from one food bank making monthly deliveries at the high school. As well, [t]here were fewer volunteers than we expected.” (MGV coordinator 12)</p>	8
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by one pantry, which required produce to be kept outside their building” (Table 1). Storing produce outside contradicted the food safety knowledge and skills they acquired through training provided by Iowa State University Extension and Outreach. The pandemic prompted a paradigm shift in the operations of programs and food pantries due to social distancing policies. These policies restricted the number of people allowed to gather in the same space, which in turn affected Master Gardeners as fewer volunteers attended gardening activities. The limitations on gatherings subsequently hampered the efficiency of MGCV operations in meeting food pantry clients’ needs. Due to social distancing guidelines, the number of MGVs and non-MGVs declined as well (Figure 3). With fewer gardening volunteers, produce poundage decreased from 120,000 to 80,000 (Figure 4).

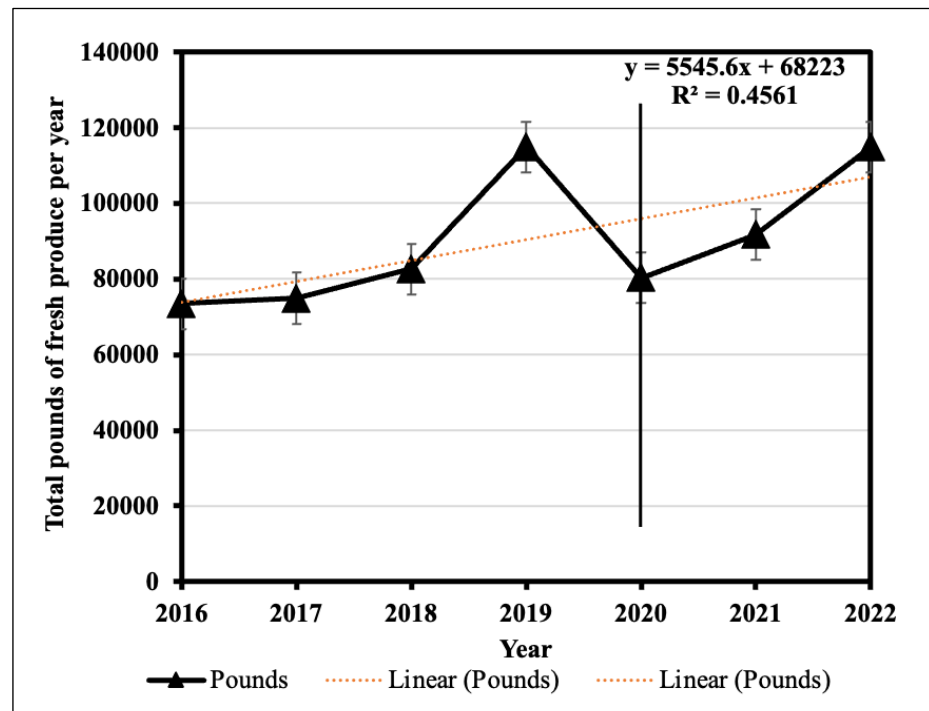
Theme 3: Changes in Programming: Organizational Sphere
Due to COVID-19 challenges, programmatic changes also occurred. The Growing Together programming originally

Figure 3. Trends of Master Gardener Volunteers in Iowa Since 2016



Note: A non-Master Gardener volunteer (non-MGV) is any member of the community who participated in volunteering but did not undergo a 10-week training course in gardening including participation in four in-person sessions through the county office. However, they are willing to volunteer to support

Figure 4. Trends of Total Fresh Produce Donated Each Year Since the Inception of the Master Garden Program in Iowa



engaged food pantries and low-income seniors. However, MGV coordinator 19 reported, “We were unable to engage as planned with the food pantries and the low-income senior living facilities due to COVID concerns and the alterations made to their regular programming” (Table 1). MGV coordinator 16 added, “We had hoped to conduct programming at the food pantry, but due to these restrictions, we were forced to hold our programming at the county [Extension office]. I believe attendance would have been higher if it had been held at the food pantry” (Table 1). Respondents noted that reduced class sizes resulted from COVID-19-related restrictions. Furthermore, given the high mortality rates from the pandemic, most clients hesitated to attend in-person classes, raising concerns about the long-term impact on class sizes. As one volunteer coordinator noted, “due to the challenges elaborated in the previous themes, programmatic changes also occurred. . . . Respondents noted reduced class sizes resulting from COVID-19-related restrictions.”

The reduced class sizes, attendance numbers, and programming were influenced as well by the volunteers’ social distancing (Figure 3). Food pantries were challenged with longer durations of receiving, storing, and distributing fresh produce during the pandemic years. As some MGVs observed, food pantries did not accept fresh produce due to storage constraints. Before the pandemic, the patrons knew when the fresh produce would be available and retrieved it on the same day. Food pantries’ declining to receive fresh produce donations posed a new challenge for the MGVs; previously, they did not have to worry about storing the produce. As community donation gardens do not have storage facilities, in some situations the produce was left outside on shelves at the food pantry premises, which risked compromising food safety rules.

Theme 4: Changes in Food Patron

Attendance: Societal Sphere

Despite Master Gardeners’ food pantry donations, there were instances when only a few clients came to collect their orders. In other cases, clients would arrive to find the pantries closed due to a shortage of volunteers. Changes in the location and delivery of food were not dominant trends, but their occur-

rence underscored how food needs dramatically surged during the pandemic. According to MGV coordinator 26, “There were fewer volunteers than we expected, but food pantry needs increased by 40%, so we redoubled our efforts” (Table 1). Despite the increased demand, patrons still struggled to safely retrieve food from the pantries or coordinate food pickups from various changing locations. The MGV leadership teams also faced communication challenges during the pandemic. As one volunteer noted, “we had fewer volunteers than planned—our project team had communication challenges. . . . [We] had to scale back the size of the garden unable to carry out proposed activities.”

These comments speak to communication gaps between patrons and MGVs or supervisors. Very few comments suggested volunteers knew patrons well or had relationships with them. The content primarily concerned patrons as users. The lack of a communication system between volunteers, pantries, and patrons affected whether patrons knew of closures or shifts in availability. Communication was usually conducted by the pantries but may need to be considered across the food donation system. The benefit for the garden program would be closer social contact with people experiencing food insecurity, which could benefit both the patrons and volunteers, strengthening community relationships.

Times-Series Analysis Results

The results of the analysis revealed significant differences in fresh produce donations between the pre-COVID-19 years (2016–2019) and the pandemic years of 2020–2021. The quantities of fresh produce increased from 85,000 to 110,000 pounds from 2016 to 2019. However, the increase in fresh produce donations stagnated when the pandemic hit in 2020 (Figure 4). The time series analysis also showed significant differences in activities and participation between MGVs and non-Master Gardener volunteers. The number of volunteers exhibited fluctuations, with a notable decline from 690 to 470 volunteers in the year 2020 (see Figure 3). Figure 3 illustrates the year-to-year variability in the linear trend and trend line equation for non-Master Gardener participants since the program’s inception.

Notably, there was a decreasing trend between 2019 and 2020, followed by an increasing trend after 2020. The trends were influenced by community togetherness and disintegration, respectively. The best-fit line equation was positive ($y = 89.857x + 147.57$). The number of MGV participants decreased from the inception of the trend line (Figure 3). The linear trend line equation was negative ($y = -11.964x + 352.71$). The most significant decrease occurred in the year 2020, during the height of the pandemic protocols. However, in the years following 2020, both trends showed increases with an overall upward trajectory. After the initial year of the pandemic, more counties applied for Growing Together immigrant funding, which led to an increase in the number of gardens and thus the number of volunteers.

As shown in Figure 4, the results indicated a positive trend in the amount of fresh produce donated since the program's inception. The trend equation, $y = 5545.6x + 68223$, suggested a steady annual increase in donations. Figure 4 also depicts fresh produce donation variability, with notable fluctuations observed in 2020, the pandemic's peak. However, following 2020, there was a significant recovery approaching pre-pandemic donation levels seen in 2019, particularly in 2021 and 2022.

When comparing MGV activities to participation data over three years, a conspicuous difference emerges. In the nonpandemic year of 2019, an average of 4,500 pounds (2,041 kg) of fresh produce was donated, whereas during the pandemic years the average dropped to approximately 2,136 pounds (969 kg) of produce donated. During this period, the MGV community had largely stayed at home. These trends identified in the quantitative analysis align with themes from the qualitative analysis, reflecting the volunteers' perceptions of the pandemic's impact on their operations and the decline in the pounds of fresh produce donated to food banks and pantries—highlighting reasons for decline in both.

After 2020, however, donations spiked from 65,000 to 85,000 pounds (29,500 to 38,600 kg), then rose to 110,000 pounds (49,900 kg) in 2021 (Figure 4). This correlated with an increase in volunteer numbers, indicating that volunteers had returned to gardening at the pre-COVID production level.

Nonpandemic Year 2019

The year 2019 preceded the pandemic and is considered a nonpandemic year. There were 300 MGVs, and activities did not appear to be disrupted (Figure 3). Between 2018 and 2019, yield was high because of sufficient volunteer labor. The increase was attributed to the popularity of the program, leading more counties and MGVs to apply and join the program. In 2019, MGVs offered nutrition, cooking, and food safety lessons. The MGVs' gardening, delivery of fresh produce to food pantry for clients, and educational programming were largely able to begin on time and proceed as anticipated.

Pandemic Years 2020 and 2021

During 2020 and 2021, the impact of COVID-19 protocols was evident, as both quantitative and qualitative analyses revealed disruptions in the participation and activities of the MGVs. These disruptions led to a decline in volunteer participation and fresh produce donation, as depicted in Figures 3 and 4. MGVs reported pandemic-related programming impacts. In Theme 4, some volunteers mentioned a decrease in the number of patrons. They also pointed out a significant drop in the number of volunteers, which coincided with a sharp increase in the demand for their services.

Coordinating volunteers in the face of cancellations and illness posed substantial challenges, particularly because many volunteers belonged to groups highly affected by the pandemic, including the older adults, healthcare workers, and those employed in the service industry. These disruptions made it difficult for MGVs to operate successfully to meet the needs of Iowans. This aligns with Graham (2020), who argued that the older adults and children were among the most vulnerable populations during the COVID-19 pandemic, and who were often forced to remain homebound.

Discussion

The purpose of this study was to gain a deeper understanding of how a statewide food donation and education program associated with a land-grant institution was affected by the changing protocols and constraints of the COVID-19 pandemic years (2020–2021). The results show the COVID-19

pandemic contributed to operational changes in MGVs' activities, bringing opportunities and challenges at individual, interpersonal, communal, organizational, and societal levels.

Prior studies note that COVID-19 impacted food supply chains and food security (Barman et al., 2021; Larison et al., 2021; Wolfson et al., 2020). However, none of these studies attempted to analyze the impact using the multilevel modeling of the social ecological model. This study is important because it examined the impact of COVID-19 on a fresh produce donation garden program—a program that depends on master gardener activities and volunteer participation to grow, harvest, and donate fresh produce to food pantries for low-income Iowans. Because this program operates at multiple levels and mutually affects a variety of stakeholders, using the SEM framework allows an analysis of each discrete sphere of interaction as well as the interactions between and across spheres.

The four themes generated during the qualitative analysis—changes in the availability of volunteers, in operating procedures, in programming, and in food patron attendance—represent the major factors that affected Master Gardener participation and hence food production. By comparison, the quantitative analysis indicated that there was a significant difference between the nonpandemic year and pandemic years on Master Gardener participation in the Growing Together program and the quantity of pounds of fresh produce donated. The themes align well with the five levels of the SEM framework.

The findings from the quantitative analysis indicate that COVID-19 impacted Master Gardener participation in the program and the quantity of pounds donated. However, when examining the individual means of MGVs and pounds donated each year, there is a bigger difference between 2019 and 2020 than between 2020 and 2021 (Figures 3 and 4). At the level of the interpersonal sphere of the SEM, COVID-19 disruptions contributed to the decline of MGV participation. Many MGVs were at high risk of severe infection due to age and thus decided to distance socially to avoid contracting or spreading the virus. While gardening prior to the pandemic provided opportunities for primarily

older adult MGVs to exercise and build relationships with their peers, COVID-19 disrupted these socializing opportunities. Similar results were noted in the study of food banks and COVID-19, where food banks experienced a decline in volunteers, many of whom were older adults and thus a high-risk population (Byrne & Just, 2022; Capodistrias et al., 2022; Crooks et al., 2022; Lioutas & Charatsari, 2021). The decline of MGV participation had ripple effects across stakeholders during the pandemic years—for example, reduced volunteering lowered donations, which in turn affected pantry patrons' access to fresh produce.

Despite the overall decrease, the MGVs did not disappear altogether. Several MGVs did participate, especially those with a strong service conviction about the program. This minimal participation ensured a sustained supply of fresh produce, but it was significantly lower than nonpandemic years. These results are consistent with Stephens et al. (2020), Capodistrias et al. (2022), Song et al. (2021), and Weersink et al. (2021), which showed issues with labor availability in the agri-food sector, attributing the decline in labor to sudden quarantine restrictions. Restrictions for Growing Together included MGV planting delays, yet fresh produce donation depends on timely MGV labor (Figure 1). Delays in planting affected yield output and the entire supply chain. This finding is validated by Barman et al. (2020) and Stephens et al. (2020), who reported negative impacts on the food supply chain, noting that delayed starting interfered with the production cycle in the agri-farming system in terms of timely planting, harvesting, packing, and delivery.

Pandemic circumstances necessitated a paradigm shift in the operation strategy to ensure continued program delivery (Lioutas & Charatsari, 2021; Mejia et al., 2020; Osafo, 2021). At the community/organization sphere of SEM, operational changes regarding the community could be attributed to employee sickness, disruptions in the supply and quarantine measures, and restrictions that impacted availability and cost of supplies (Mejia et al., 2020). County offices where the MGVs used to meet to plan for gardens and social interactions closed, which contributed to isolation.

When disasters happen, communities often

come together to support each other in providing and sharing food, transportation, and housing. However, the COVID-19 pandemic challenged common notions of sharing. Community often refers to bonds of interconnectedness, commitment to each other, and caring and trust among community members (Anderson, 2021). However, the community bond during the pandemic could not be expressed in-person. Instead of devising creative ways to continue to support and share with one another, MGVs were primarily concerned with their personal health and safety (which did not depend on the gardens they volunteered at). Therefore, the notion of community in the case of Growing Together community donation gardens dissolved. MGV social distancing created labor shortages and impacted fresh produce production (Figure 4; Kingsley et al., 2022). The pandemic challenged the concept of community: interconnectedness was embraced when volunteers were not experiencing crisis or faced with a mortal threat. The threat of the COVID-19 virus, however, exposed the precarious nature of community through exposing patrons' dependence for fresh produce on volunteer stability.

One way to mitigate the impact of such a pandemic on the donation gardening program would have been to engage patrons as part of the community as gardeners or volunteers. If patrons were involved in the gardens before the pandemic rather than during it, they would have been able to cultivate and harvest as well. Patrons spanned age levels more than volunteers, and their motivations were linked more directly to food procurement.

At the community level, before COVID-19, MGVs established partnerships with several organizations to support fresh produce donation to food pantries, including meal centers, nursery businesses, garden supply and lumber shops, and churches. These partnerships generated food donations, fundraising, and relationships with families in need. However, during the pandemic these partnerships stalled. Many partner organizations were considered inessential and thus closed.

At the organization level of SEM, operating restrictions in some counties created hardships accessing input supplies for timely planting, harvesting, and donation. Many businesses also faced

labor shortages, including agribusiness stores; some closed or changed operating hours. Similar to Chitraker et al. (2021), these study results found the COVID-19 pandemic impacted access to garden supplies. MGVs' belated access to inputs delayed the donation, reducing services to clients (Mejia et al., 2020). When donations were ready, MGVs faced difficulties storing the harvest until food pantries opened. Some produce went to waste, especially easily perishable foods like tomatoes and leafy vegetables. Not unique to Growing Together, agricultural systems worldwide faced the problem of processing capacity and storage, which led to produce wastage. Many food pantries closed or operated half-time, especially meal centers (Stephen et al., 2020). At the community/organization level of SEM, meal centers that used to take in large quantities of fresh produce closed due to a limited number of volunteers for meal preparation.

While many programs also adopted virtual programming, fresh produce donation programs did not have this option, contributing to reduced education opportunities. As volunteer and client numbers reduced, class sizes reduced too. Teaching and learning became inconsistent: some clients did not see the need to continue to attend. The study established that COVID-19 impacted not only MGV operations regarding fresh produce production but also the quality and availability of nutrition education. Despite such setbacks, some MGVs were committed to ensuring the presence of fresh produce in food pantries that remained open, while several others found creative ways around pandemic restrictions to deliver some form of nutrition education.

This study highlights the complex, interconnected impacts of COVID-19 on a fresh produce donation program and the MGVs and food pantries involved across Iowa. In some cases, fresh produce donations were no longer accepted, and instead, financial donations were requested to enable food pantries to buy large volumes of food boxes. In others, gleaning and rescue programs from farms and grocery stores were suspended (Larison et al., 2021). These impacts resulted in food pantry patrons receiving prepacked food bags instead of choosing according to preference (Byrne

and Just, 2022; Huang et al., 2023; Kingsley et al., 2022; Sánchez et al., 2024).

These impacts underline challenges faced at multiple levels of community and organization, emphasizing the need for adaptive strategies to maintain program effectiveness during crises to ensure that underserved communities have consistent access to fresh produce. Additionally, such adaptive strategies would shield the program participants from growing apart.

Limitations

There are several limitations to this study. One limitation is that the study uses secondary data. Primary data through interviews or focus groups, such as for the data from Master Gardener coordinators, could have permitted probes for key areas, but the nature of the pandemic did not encourage primary data collection. Secondary data collection also limits the degree of control of instrumentation. Additionally, the survey did not collect ideal demographic data from respondents. This created challenges in further contextualizing responses from the participants. Having such information would allow us to understand how the pandemic affected MGV according to age, location, income, education, and location.

Conclusion

This study explored the intersection of the COVID-19 pandemic on food insecurity and one of its anticipated remedies: fresh produce donation programming at the local, regional, and state levels in the U.S. The study asked how operational changes in a community donation gardening network in 2020–2021 may have been influenced by the pandemic in terms of its staffing and operating procedures and in production of fresh produce as donation tonnage. The study also probed a key and often neglected element: the social implications of selected changes prior to and during the pandemic related to donation gardens. The study focused on a fruit and vegetable donation program with some educational interventions run by MGVs associated with SNAP-Ed funding and Iowa State University Extension and Outreach. The donation program provided fresh produce mainly to food pantries and small-scale food distribution centers. Key find-

ings include disruptions coinciding with an increased nationwide demand for affordable fresh produce. Access to nutritious produce is crucial for addressing the health challenges of food pantry clients, but availability and other aspects of access were hindered by the pandemic.

Content analysis of Master Gardener survey comments identified four factors negatively affecting Growing Together operations: fewer volunteers and reduced availability, changes in procedures, reduced programming, and lower food pantry attendance. These factors hindered program functioning. Master Gardeners reported that most volunteers followed safety protocols and stayed home, which reduced labor availability for growing, harvesting, transportation, distribution, and educational programming, resulting in decreased garden output and donation. Growing Together's active programming also declined due to the suspension of field visitations, a suspension compelled by state and federal social distancing guidelines. With all operations transitioning to a virtual format, the impact was notable. The suspension of in-person visits posed a challenge for MGVs, who traditionally relied on direct guidance and interaction. The shift to virtual communication was particularly daunting for the volunteers, many of whom were older adults and less familiar with technology, requiring them to adapt to alternative means of communication with program leadership.

Furthermore, COVID-19 clarified how susceptible the current food system is to collapse during natural disasters and public health disruptions. As fewer volunteers were available to garden, people were also increasingly under more financial duress and their need for donated food rose. Those who did continue to volunteer to ensure the program realized its objectives were at risk of being exposed to the deadly virus, which exemplifies the contradictions during the pandemic between a functional fresh donation program and personal well-being (O'Hara & Toussaint, 2021). Failure to access healthy food should not be attributed to the MGV program alone, but to the larger food system that is structured by policies and regulations that support large corporate food industry actors. This system inadvertently acts as a barrier to vulnerable populations reliant on localized food supply chains, espe-

cially in times of crisis. The challenges identified in this study are not only relevant to the years following the pandemic and pandemic circumstances but offer continued lessons on the implementation and sustainability of fresh produce provision for future crises.

This study points to the importance of food organizations having contingency plans to mitigate challenging circumstances, such as public health emergencies like COVID-19. One example of this is contingency financing (i.e., allocated program savings) structured into the budget, which could allow for adjustment to dynamic circumstances. Such funding could support the purchase of power tools, making gardening with fewer volunteers more efficient; had this been the case with the Growing Together donation gardens, it could have resolved the issue of social distancing. Youth recruitment could also support gardening, harvesting, and distribution. This could be done as summer programming, as part of formal education, or as a community-service opportunity. Fresh produce donation programs reliant solely on older adults need to implement financial or in-kind incentives to attract underemployed rural young adults to community gardening. A broader volunteer base could result in higher yield and more consistent deliverables.

On an organizational level it is critical to assess the precarity or pretense of “community.” If community gardens were truly a site of interdependence, they would have stuck together and perhaps even strengthened when the pandemic hit—finding ways to creatively support each other. As sites composed of disparate and disconnected groups of people with asymmetrical dependence on one another (i.e., patrons relied on gardeners, but gardeners did not rely on patrons), the pandemic revealed this asymmetry: those who could stay at home did so to care for themselves. It is thus important to revisit the framework of the community garden itself, to interrogate what is meant by the term “community,” and to reconsider the role patrons play (or do not play) in the cultivation of fresh produce in the gardens and Growing Together programming.


Recommendations

This study underscores the vulnerable nature of the volunteer labor base associated with Growing Together and which is common among similar fresh produce donation programs. These programs depend almost wholly on volunteers who are mainly older adults and at a vulnerable stage of life, especially during public health crises. While Master Gardeners have long contributed to gardening education in many states, the move to the direct provision of fresh produce to underserved families changes their responsibility profile and might prompt Master Gardener organization and organizations like it to consider shifting the current volunteer strategy. This would not only ensure a more stable labor base but also foster intergenerational learning, aligning with the Master Gardener initiative’s educational vision. The organization might look to other organizations that have experienced something similar.

It might also be important to critically reevaluate the concept of “community” within volunteer-run community programs like Growing Together donation gardens. The title of this article asks whether the community food donation program examined here experienced growing together or growing apart during the pandemic. The article concludes that the pandemic exposed and exacerbated disconnections among groups of people rather than fostering improved communication and community cohesion. As noted in the discussion, MGV survey respondents explained that COVID-19 protocols disrupted programming that would have connected them to patrons at food pantries. Nutritional education classes were often cancelled, moved online, or shifted to a less accessible venue off-site; in-person donation drop-off and patron pick-up was frequently cancelled; and both pantry and garden volunteer groups declined in size or withdrew from programming, which shifted the availability of fresh produce for patrons. Volunteers stayed home from both gardens and pantries to protect their health, sourcing their food from elsewhere. However, pantry patrons, likely to be food-insecure and suffering from diet-related chronic diseases that increased their susceptibility to serious infection, still needed the produce and could not necessarily access another source. If pa-

trons had access to the garden site directly rather than just the food pantry, they could have worked with garden coordinators and pantry staff to assist with cultivation, harvest, and consumption. A critical mutual review would assist the community in establishing togetherness and identifying and meeting each other's needs. This work focuses on issues related to inclusion, diversity, and belonging due to racial, ethnic, and class differences between patrons, volunteers, and programmatic staff.

A challenge facing food pantries regarding community is demographic data collection (Martinchek, 2020; Sánchez et al., 2024). Pantries are often understaffed with part-time workers and thus lack the labor capacity to collect data. Food pantries also have limited resources to invest in data collection; they dedicate their primary resources to obtaining food most needed by their patrons. Martinchek (2020) observed patrons are constantly moving, which makes it challenging to track and collect follow-up data from them. This, in turn, creates difficulties in analyzing program impact. Additionally, many food pantries collect no client

data out of respect for patron privacy, to foster broader access, and to combat the persistent stigma associated with utilizing pantries. Because of these challenges, there was no demographic data available to analyze the demographic composition of patrons and volunteers for this study. Future research should examine demographics of patrons who consume fresh produce from Iowa's pantries. Further research on pantry client levels of participation in decision-making process and planning for community gardens is also critical. 

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