



More Than Food: The Social Benefits of Localized Urban Food Systems

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Localized urban food systems are gaining attention from policy makers, planners, and advocates for benefits that go well beyond food production and consumption. Recognizing that agriculture, and food systems more broadly, provide multiple, integrated services, this study measures the social, educational, civic, and nutritional impacts of four common types of local food system activity in an urban setting. Specifically, we examine the outcomes of two common types of urban agricultural production (home gardens and community gardens) and two common types of direct markets (farmers' markets and Community Supported Agriculture programs or CSAs) through a survey of 424 gardeners and 450 direct market shoppers in California's San Francisco Bay Area. Our comparative analysis focuses on four commonly discussed functions of agricultural production and direct marketing in urban areas: access to high-quality, fresh produce; food and agriculture education; social connections; and civic engagement. While impacts on nutrition were consistently high, some of the largest differences between types of local food system activity were in social interaction and civic engagement. For example, gardeners had a mean score of 3.77 on the social interaction scale compared to direct market participants, who had a mean score of 3.03. These findings confirm that different types of local production and direct marketing have distinct impacts on participants. Generally, gardens, which involve more sustained engagement with other people and the natural world, were sites of greater learning, connection, and civic participation than either type of direct marketing.

Keywords: urban agriculture, community gardens, home gardens, community supported agriculture, farmers' markets

INTRODUCTION

Localized urban food systems are gaining attention from policy makers, planners, and advocates for benefits that go beyond food production and consumption to include community building, diversified economies, civic engagement, and climate resilience (Pothukuchi and Kaufman, 1999; Horst et al., 2017; Ballamingie et al., 2020). In addition, urban consumers are a significant source of sales for much US local food system activity (Low et al., 2015). Also referred to as alternative agrifood initiatives and civic agriculture, local food systems aim to create an alternative to the existing food system by rooting food production and marketing in a particular place in a way that is economically viable, ecologically sound, and socially just (Allen et al., 2003).

To account for the social, cultural, educational, and environmental impacts of localized urban food systems, a framework is needed that incorporates the multiple, integrated services that agriculture can provide. Lovell (2010) and Poulsen et al. (2017) have argued for multifunctionality, a concept that recognizes agricultural land uses can provide, within a particular space, many functions beyond the production of food and fiber (Wilson, 2008; Lovell, 2010; Zasada, 2011). When a multifunctional lens is extended to urban food systems, this framing allows us to incorporate the social, educational, and environmental functions of local food production and marketing. Furthermore, a comprehensive examination of urban agriculture's many functions helps to move beyond the debate over whether urban agriculture should be celebrated for its many benefits or critiqued for reinforcing neoliberalism by examining how it actually functions in different contexts (McClintock and Simpson, 2018).

In cities, common manifestations of local food systems include direct markets, like farmers' markets and CSA programs, and alternative types of production such as community gardens and urban farms. Taken together, these types of alternative food practice have the potential to make local food available, support the local food economy, educate people about food and agriculture, and build community (Poulsen et al., 2017). Notably, stakeholders often value these other functions as much as the capacity to produce food or generate revenue (Lovell, 2010; Vitiello and Wolf-Powers, 2014; Poulsen et al., 2017). While multifunctionality is a hallmark of localized production systems, there are few tools for measuring or communicating its social functions and explorations of how various functions relate to one another are relatively rare.

This study takes a comparative approach, examining the intersection of localized urban food systems' diverse forms and functions in the southern San Francisco Bay Area in California. We assess four commonly discussed functions of agricultural production and direct marketing in urban areas—access to high-quality, fresh produce, food and agriculture education, social connections, and civic engagement—and we compare these impacts across two types of urban agricultural production, home gardens and community gardens, and two types of direct markets: farmers' markets and CSAs. Specifically, we ask:

1. What are the demographic characteristics of people who participate in the four types of urban production and direct marketing?
2. What are the motivations of people participating in the four types of urban production and direct marketing?
3. What are the impacts of the four different types of urban production and marketing on participants? Are there differences between direct production and marketing practices?

THE MULTIPLE FORMS AND FUNCTIONS OF LOCALIZED URBAN FOOD SYSTEMS

Urban residents can participate in the local food system in many ways: by volunteering, by participating in farm- or garden-based

community events, and as gardeners or farmers themselves. They can also access and support local and regional farmers at farmers' markets, through CSAs, and at other outlets that carry or serve regionally grown food. While at its core, urban agricultural production is about growing food in the city, food distribution is essential for urban agricultural products to reach people, particularly if it is to improve food access (Siegener et al., 2018). Urban agricultural products are distributed through both formal and informal channels, including donations, gifting to others, and personal consumption. More formal distribution channels, like farmers' markets and CSAs, bring produce and other agricultural products to a wider audience (Opitz et al., 2016). Farmers' markets and CSAs are important outlets for urban farms (Rangarajan and Riordan, 2019), but do not exclusively serve urban farms, so shoppers or CSA members also encounter peri-urban and rural farms in these venues. Below we describe characteristics of local food production and marketing in urban areas, while acknowledging that these elements of the food system are interconnected.

Production: Urban Agriculture in Community and Residential Gardens

An umbrella term, urban agriculture contains within itself diverse actors, organizational types and practices (e.g., McClintock, 2014; Bosco and Joassart-Marcelli, 2017; McClintock and Simpson, 2018). It includes many types of production, such as urban farms; home, community, educational, and institutional gardens; vertical and indoor farming systems; aquaponics and hydroponics; and urban beekeeping and backyard chickens (e.g., Santo et al., 2016). Our focus is on home and community gardens, the two most widespread forms of urban production. Community gardens are places where a group of people garden within a shared space. While these spaces can be cultivated collectively, at all the sites included in our study, gardeners managed individual plots. Assessments of community gardens find that they are more widespread and, in aggregate, produce larger quantities of food than urban farms (Vitiello and Wolf-Powers, 2014). As defined by Taylor and Lovell (2014, p. 286), a home garden is “a fruit and/or vegetable garden on leased, owned, or borrowed land directly adjacent to the gardener's residence.” While less discussed in the literature because they are more difficult to study, home gardens are an even more extensive urban land use than community gardens. A study in Chicago found that there was three times as much land in home gardens as community gardens (Taylor and Lovell, 2012) and the National Gardening Association (2014) survey estimates that 35% of urban residents participate in some kind of food gardening.

Direct Marketing: Farmers' Markets and CSAs

Like other alternative food practices, direct markets socially embed aspects of the food economy by cultivating relationships between producers and consumers (Galt et al., 2019). Just as social relationships are a defining characteristic of urban farms and gardens, direct markets—as alternatives to the

conventional food supply chain where relationships are distant and anonymous—are characterized by, and compete on, close social relationships between regional producers and urban consumers (Hinrichs, 2000). Hinrichs (2000) argues that farmers' markets and CSAs are the quintessential types of direct local markets and share four key features: (1) a structured organizational form, (2) people congregating and meeting in particular settings, (3) a strong identification with a particular place, and (4) personal encounters between farmers and consumers. The relationship between farmer and consumer, involving reciprocity and trust, is the basis for claims that these market types are socially embedded.

A common feature of the local food movement, the number of farmers' markets has quadrupled in the last two decades, reaching more than 8,700 in the United States (Bosco and Joassart-Marcelli, 2017). CSAs make up a smaller segment of the local food market than farmers' markets, accounting for 6.4% of direct sales compared to farmers' markets, which represent 35.8% of direct sales (Smith et al., 2019). However, several authors theorize that CSAs are a more socially embedded form of direct market (Hinrichs, 2000; Obach and Tobin, 2014). CSAs are a “direct-to-consumer farm share membership/subscription program” (Galt et al., 2016, p. 492). The roots of the American CSA model are usually traced to two New England farms in the 1980s, but Booker T. Whatley, a professor at the Tuskegee Institute, was a pioneer of the CSA concept, promoting the idea of a “clientele membership club” as part of the formula for a successful small farm. At least a decade earlier, women in Japan, concerned with mercury poisoning, created the “Seikyou Movement” purchasing milk directly from farmers in the 1960s (Wallace, 2003; Bowens, 2015; Penniman, 2018). CSAs now number more than 4,000 and serve hundreds of thousands of members (Galt, 2011). Particularly in the past 10 years, CSAs have changed their models in response to market conditions and customer demand for local produce and convenience (Smith et al., 2019). Initially, customers shared the risk of production with farmers by paying upfront at the start of the season for a regular supply of the farm's harvest (Feagan and Henderson, 2009; Galt et al., 2019). Now farmers have adopted more flexible payment systems (e.g., monthly, biweekly, pay-as-you-go), online order systems, increased customization, and at-home delivery. While farmers continue to see CSA as a useful strategy to improve farm viability and to educate consumers about farming's importance, challenges, and impacts (Smith et al., 2019), the changes to the model have the potential to reduce members' long-term commitment to the farm and have changed both the financial and social relationship between farmer and consumer.

Local Food System Functions: Growing Food, Education, Community, and Engagement

Food

While local food system leaders consciously evoke the multiple, intersecting goals of their projects, access to high-quality, fresh food is a common thread that runs across types and organizations (McClintock and Simpson, 2018). Studies of home

and community gardeners demonstrate that gardeners prize their produce for its freshness, taste, and quality (Pourias et al., 2016) and show that gardening has a positive effect on fruit and vegetable consumption (Litt et al., 2011; Carney et al., 2012; Gray et al., 2014; Algert et al., 2016). Farmers' market shoppers also prioritize access to fresh, high-quality produce, although they also appreciate other social interactions and other aspects of the market (Lockeretz, 1986).

Education

Education is a specific goal of many local food systems projects, which set out to reconnect people to their food, food production, and food producers. Education is one of the motivations for CSA farmers (Smith et al., 2019), who may provide information to members through regular newsletters and farm visits. While this type of learning is more focused on the acquisition of content by an individual (Krasny and Tidball, 2009), gardens can create a setting where interactive learning takes place. As described by Krasny and Tidball (2009, p. 2), this type of learning occurs “through the participation of the learner in the social and biophysical processes taking place in a particular environment.” A novice gardener may become more skilled “through interaction with the environment and with more experienced gardeners during the act of gardening” (ibid., 2). Social learning may also take place among a group of gardeners or other stakeholders who come together to address management and policy issues. Thus, the education that takes place in gardens can be a precursor to greater food advocacy and democratic engagement with the food system.

Community

The emphasis placed on community building in different forms of urban production is evident in the tagline of the American Community Gardening Association: “Growing Communities Across the US and Canada” (American Community Gardening Association, 2000). Through the process of creating and using community gardens, gardeners have extensive interactions with other community members, often making new social connections and strengthening social ties (Glover, 2004; Alaimo et al., 2010). Some community gardeners value gardens more as sites for social and cultural gatherings than as sites of agricultural production (Saldivar-Tanaka and Krasny, 2004). Both community and home gardens can provide participants a connection to their cultural heritage, in particular helping immigrants to maintain farming traditions and uphold traditional foodways in their new communities (Schmelzkopf, 1995; Baker, 2004; WinklerPrins and de Souza, 2005; Carter et al., 2013). Thus, cultivation can deepen social and cultural relationships in the construction of place-based identities (Mares and Peña, 2011).

Just as home and community gardens are not only sites of production, CSAs and farmers' markets are not only spaces of economic exchange. The social experience of the market is one of the factors that motivates farmers to participate in farmers' markets (Hinrichs, 2000). Similarly, CSA farmers are motivated in part by a desire to build community and foster connection (Perez, 2004). Farmers' markets are often social spaces that bring people together and represent a venue where the strong bonds

of community can be formed and performed (Obach and Tobin, 2014). When compared to shopping experiences at grocery stores, exchanges at farmers' markets are "embedded in social ties, based on proximity, familiarity, and mutual appreciation" (Hinrichs, 2000, p. 298). CSAs also forge ties between farmers and their customers, and provide additional opportunities for socializing at CSA pick-up sites and at occasional farm work days or community events.

Civic Engagement

Some types of localized food systems lead to political engagement and activism. Community gardens have a history of grassroots political activism against capitalistic forces of development that threaten garden spaces (Schmelzkopf, 1995; Ernwein, 2014). Community garden membership can also empower some gardeners to become more active in their communities (Blair et al., 1991; Saldívar-Tanaka and Krasny, 2004; Wakefield et al., 2007). Barron (2017, p. 7) asserts that community gardeners "cultivate a variety of social and political skills as well as critical perspectives that enable them to participate in promoting food democracy, and also motivate and enable democratic engagement at other scales." This political activity extends to home gardeners as well; Gray et al. (2014) provide a case study of home gardeners organizing for food justice. Direct markets can also have a political edge. Studies of what motivates farmers to offer a CSA reveal that they are moved by an "intense desire to positively change societal and environmental relationships" (Smith et al., 2019, p. 5).

In the next section, we look at how these four functions of local food system play out in a particular place.

CONTEXT AND METHODS

Study Area

This study took place in Santa Clara County, the southernmost part of the nine-county San Francisco Bay Area and the geographic heart of California's Silicon Valley. An agricultural center in the late 19th and early 20th centuries, much of the area's farmland has been lost to residential and commercial development since World War II (Diekmann et al., 2013). Despite these losses, the county retains a significant agricultural economy; the gross value of agricultural production was \$896 million in 2018 (County of Santa Clara Division of Agriculture, 2019). Particularly since the 2007–2009 financial crisis, local food activities in Santa Clara County have increased. Local educational institutions have developed their own farms and gardens to educate students and provide fresh produce to their food service programs; non-profit organizations have developed urban farms to engage neighbors around food production; and urban garden networks have arisen to teach food insecure residents to grow their own vegetables and advocate for food system change.

Santa Clara County is diverse, with no majority racial or ethnic group. The county is roughly one-third Asian, one-third Latinx, and one-third white. Home to many immigrants, 38% of the population was born outside the US and 53% speak a language other than English at home (Data USA, 2020). As part of Silicon Valley, Santa Clara has enjoyed a strong economy driven by the

high-tech industry. However, the benefits of this economy are not shared evenly and income inequality is growing. Several of the county's urban agriculture projects specifically aim to address persistent food insecurity.

Participants and Procedures

To investigate the relationship between participation in different types of local production and marketing, we surveyed home gardeners, community gardeners, farmers' markets shoppers, and CSAs members. We fielded three different versions of the survey for gardeners, farmers' market shoppers, and CSA members. Each version of the survey had questions that were similar, but with wording tailored to the specific type of local food system activity (e.g., "Since you started gardening..." vs. "Since you started shopping at a farmers' market..."). A survey question asking which other local food system activities (e.g., gardening, belonging to a CSA, composting, etc.) respondents engaged in showed that respondents typically engaged in more than one local food system activity. We did not control for this because each participant was independent of one another and because the version of the survey they completed (for gardening, farmers' markets, or CSAs) was considered their primary form of local food system engagement. Since respondents answered questions about the impacts of a specific type of local production and direct marketing, we expect their responses pertain to that type, regardless of whether they also participated in other local food system activities.

To create a sampling frame for local food system activities, we generated a list of all 16 CSAs, 36 certified farmers' markets, and 32 public community gardens operating in the county in 2015. Our inventory of community gardens leaves out those that take place at churches, schools, workplaces, housing developments, or other locations, which are harder to identify and can be more ephemeral. To compile a list of CSAs serving the county, we consulted Local Harvest's online database (localharvest.org) and CAFF's Buy Fresh, Buy Local Guide (2014) for Santa Clara Valley. CSAs that sold limited specialty products or were large third-party aggregators were excluded. There is no list of home gardeners, so we used three gardening networks—Master Gardeners, La Mesa Verde, and Valley Verde—to contact home gardeners in our study area. Master Gardeners are community volunteers who receive training through the County Cooperative Extension Office. La Mesa Verde and Valley Verde are programs focused on community food security and food justice that provide gardening materials and education to help low-income families grow their own organic vegetables.

We stratified the county geographically, and selected 8 farmers' markets and 10 community gardens to survey. Five farmers' markets were selected randomly. We also sampled three farmers' markets within San Jose that specifically aim to serve low-income neighborhoods. We surveyed four CSA programs. We invited both urban farms that had a CSA to participate and also randomly selected two other CSAs, growing outside of the county but delivering to customers in Santa Clara County. If a randomly selected CSA declined to participate, we went back to the list and selected another. Community gardeners received the survey via email. Farmers' markets shoppers were contacted

at the market and asked to complete a paper survey. Members of three CSA programs completed surveys online, while at the fourth, members completed the survey on paper while picking up their farm share. To reach home gardeners, we distributed the survey to Master Gardeners via email, recruited gardeners in person at the Master Gardeners' spring seedling sale, and gave paper surveys to members of La Mesa Verde and Valley Verde. This study complied with Santa Clara University's Institutional Review Board (IRB) Protocol (Protocol ID: 15-04-671) for the protection of human subjects and all survey respondents gave their consent to participate.

Surveys included both closed- and open-ended questions. Closed-ended questions assessed the impacts of participation, while open-ended questions gave respondents an opportunity to describe their local food system experiences in more depth.

Limitations

Because of the limitations of our sampling strategy, the home and community gardeners included in our study are not representative of all gardeners in Santa Clara County. By using email to recruit community gardeners, our sample is biased toward gardeners who are fluent English speakers and have reliable online access. As a result, immigrant and lower-income gardeners are likely underrepresented among our respondents relative to their presence within the community gardening population as a whole. By relying on gardening groups to reach home gardeners, the demographic profile of home gardeners in the study may be a better reflection of group membership than of home gardeners in the county. Master Gardeners tend to be older, college-educated adults (e.g., Tarkle et al., 2017). Members of La Mesa Verde and Valley Verde are more likely to be lower-income and immigrants. (A more detailed demographic profile can be found in Diekmann et al., 2020.) While there are limits to this way of sampling home gardeners, it does provide a cross-section of gardeners that cuts across gradients of experience, income, and race.

The same concern of representativeness also applies to the farmers' market shoppers. Our purposive sampling strategy of selecting three farmers' markets (of the eight total) in low-income neighborhoods may have skewed the demographics of our sample of farmers' market shoppers. We believe that the oversampling of this demographic provides insight into the impact that farmers' markets have in communities that may not traditionally be represented in the literature and provides a more representative cross-section of the Santa Clara County's diverse population.

MEASURES

Independent Variables

Type of Local Food System Activity

We coded the surveys by type of local food system activity: garden, farmers' market, and CSA. Garden surveys were further separated into community gardener or home gardener. If gardeners indicated that they gardened both at home and in a community garden, they were counted as community gardeners.

Production vs. Direct Marketing

We created a variable that grouped types of local food system activity into production (community gardening and home gardening) and direct marketing (CSAs and farmers' markets).

DEPENDENT VARIABLES

Motivations

We asked survey respondents to select reasons that best describe why they participated in a specific type of production or direct marketing. Options included saving money, relaxation, spending time outdoors, having fresh fruits and vegetables, getting produce not available in the store, knowing where food comes from, spending time with families and friends, learning from others, teaching children. Possible motivations were adapted from other studies that have examined reasons for participating in urban agriculture, such as food attributes, household economics, physical and mental health, connections to nature and culture, education, and interpersonal relationships (e.g., Armstrong, 2000; National Gardening Association, 2014; Taylor and Lovell, 2014). Direct market shoppers could select a few additional options specific to the market experience—knowing farmers personally, supporting local agriculture, convenience, and community atmosphere—that were adapted from previous studies of direct markets in California (e.g., Perez et al., 2003; Galt et al., 2017). Finally, an “other” option allowed respondents to indicate any reasons for participating that were not already provided.

Outcomes

Nutrition

To gauge the nutritional contributions of the types of local food system engagement, survey respondents were asked questions about changes to their eating habits and preferences. Participants responded to the following six statements: “Since I started [gardening/shopping at a farmers' market/joined a CSA program] I eat more fruits and vegetables that are organically grown; I eat different types of vegetables depending on what is in season; I enjoy trying new fruits and vegetables; I eat more than one kind of vegetable each day; I eat more fruits and vegetables; I encourage my family to eat more fruits and vegetables” with response options ranging from Strongly Disagree (=1) to Strongly Agree (=5) on a 5-point Likert-scale. A reliability analysis showed that the items were related (Cronbach's alpha=0.89); thus a scale score was created by taking the averages of the items for each participant.

Social Connection

To assess how local food system participation affected socializing and social relationships, survey respondents answered the following question: “Has [gardening/shopping at a farmers' market/participating in a CSA program] affected your relationships with other people? Please indicate to what extent you agree or disagree with the following statements: I have met new people; I have met a community leader; I have met people from different backgrounds; I look forward to socializing and interacting with other people; I feel a stronger sense of belonging in the community.” Response options ranged from

Strongly Disagree (=1) to Strongly Agree (=5) on a 5-point Likert-scale. The five items were combined to create an average score (Cronbach's $\alpha=0.873$).

Food and Agricultural Knowledge

To assess what respondents had learned since they began participating in a particular type of local food system activity, we asked participants to indicate the extent to which they agreed with the following statements: "I have learned more about healthy eating; I have learned more about how food is grown; I have learned more about sustainable agriculture; I have learned more about policies and food systems that affect the food we eat; and I have learned more about the local environment, including things such as soil, insects, or plants." Response options ranged from Strongly Disagree (=1) to Strongly Agree (=5) on a 5-point Likert-scale. A scale score was created from the five items (Cronbach's $\alpha=0.883$).

Civic Engagement

To assess participation in their communities, we asked respondents to indicate whether or not they had participated in a particular civic/political activity: "Since you started [gardening/shopping at a farmers' market/joined a CSA program], "Have you done any [activity]?" Activities included volunteering, working on a community project, signing a petition (including online), attending a public meeting, writing a letter to a legislator or policy maker, organizing an event, class, or project; attending a class, workshop, or lecture (see Obach and Tobin, 2014). Responses were dichotomous (yes=1/no=0), and a summary score was created to compute the total number of activities participants engaged in for a total possible score of 7.

Produce Proportion by Season

To assess the contributions of each type of local food system activity to food access, participants responded to the question: "What portion of the produce that your family eats comes from the [farmers' market/CSA/garden]? Please select the closest amount for each season." Four seasons were listed—Spring (April–June), Summer (July–September), Fall (October–December), and Winter (January–March)—and the following response options were available for each season: none, very little, 25, 50, 75%, all.

Sociodemographics

We assessed standard sociodemographics including gender; age; race/ethnicity; employment status; household income; and education. We grouped household income by \$50,000 increments (<\$50 K, \$50 K–\$99 K, \$100 K–\$150 K, >\$150 K). Households earning <\$50,000 annually in the San Francisco Bay Area are considered very low-income (Galt et al., 2017). Households earning from \$50,000 to \$99,000 are above the federal poverty level for a family of four, but are still earning less than the median income for Santa Clara County as well as the minimum income necessary to cover basic expenses for a family of four.

Analytic Strategy

We used descriptive statistics to characterize the sample across each type of local food system activity. A chi-square test was

run for each demographic variable across the four types. For motivations, we used descriptive statistics to characterize reasons for participating. Open-ended responses provided in response to the "other" option for motivations were categorized thematically. For outcomes, we conducted two sets of analyses: the first, using the type of local food system activity; and the second, production vs. direct marketing. To assess differences between types in the four outcome areas of nutrition, social connection, food and agricultural knowledge, and civic engagement, we used one-way ANOVAs to compare mean scores for the scales or summary score for each domain area across the four types of local food system activity. To assess differences between production and direct marketing in the four outcome areas of nutrition, social connection, food and agricultural knowledge, and civic engagement, we used independent sample *t*-tests to compare mean scores for the scales or summary score for each domain area across the two groups. To assess the proportion of produce each type of local food system activity provides to participants, we generated descriptive statistics. Analyses were conducted using SPSS 25.

RESULTS

Local Food System Participants

Between April and October 2015, 160 home gardeners, 264 community gardeners, 242 farmers' market patrons, and 208 CSA members completed the survey. There were statistically significant differences between the four types of local food system activity participants based on income level, race/ethnicity, employment status, and educational attainment (Table 1). Home gardeners and farmers' market shoppers were roughly evenly distributed between the four income brackets, with just over 25% having annual household incomes of <\$50,000 and just over 25% having annual household incomes >\$150,000. CSA members were generally high-income earners, with nearly 60% of CSA members reporting a household income >\$150,000 annually and only 5% reporting a household income of <\$50,000. Gardens had a higher percentage of retired participants, 32% and 33%, respectively, than the direct markets. Among farmers' market shoppers and CSA members, 71% were working and approximately 15% were retired. In keeping with the greater percentage of retired gardeners, gardeners also had a higher median age than direct market participants. Respondents were overwhelmingly female, ranging from 90% of CSA members to 61% of community gardeners.

The population of Santa Clara County is roughly one-third Asian, one-third Latinx, and one-third white. The demographics of farmers' market shoppers most closely resembled that of the county as a whole: 30% of farmers' market patrons were Asian, 16% were Latinx, and 47% were white. Home gardeners were also diverse, although less so than the county as a whole: 14% were Asian, 23% were Latinx, and 58% were white. With approximately 75% of community gardeners and CSA members identifying as white, these local food system types were less racially diverse than home gardens and farmers' markets. The portion of participants born outside of the US was similar for the four local food system types (20–28%). Across all types,

TABLE 1 | Demographics of home gardeners, community gardeners, farmers' market shoppers, and CSA members.

	Home garden (n = 160)	Community garden (n = 264)	Farmers' market (n = 242)	CSA (n = 280)	p-value
Education					$p = 0.0004$
High school or less	9%	1%	8%	3%	
Some college	12%	9%	12%	5%	
College degree	43%	42%	41%	42%	
Graduate degree	36%	49%	40%	50%	
Income					$p < 0.0001$
<\$50 K	29%	17%	27%	5%	
\$50 K–\$99 K	24%	29%	23%	17%	
\$100 K–\$150 K	21%	16%	22%	20%	
>\$150 K	27%	38%	28%	58%	
Employment					$p < 0.0001$
Working	48%	59%	71%	71%	
Unemployed	16%	6%	12%	15%	
Retired	32%	33%	15%	14%	
Disabled	4%	2%	2%	0%	
Race/ethnicity					$p < 0.0001$
Asian	14%	13%	30%	9%	
Latino	23%	8%	16%	10%	
White	58%	74%	47%	76%	
All others	6%	5%	7%	5%	
Foreign-born	25%	21%	28%	20%	$p = 0.159$
Home ownership					$p = 0.005$
% renting	20%	19%	30%	17%	
Age (median)	55	58.5	50	48	
Gender (% Female)	83%	61%	66%	90%	$p < 0.0001$
Household size (mean)	3	2.4	2.9	3.2	

educational attainment was high. Thirty-six percent of home gardeners had a graduate or professional degree, compared to 40% of farmers' market shoppers, 49% of community gardeners, and 50% of CSA members.

Survey takers reported their participation in multiple local food system activities (Table 2). Shopping at a farmers' market was the most commonly reported other local food activity (roughly two-thirds of gardeners and CSA respondents indicated that they shopped at a farmers' market). Gardening at home was also a common activity, with approximately 60% of farmers' market patrons and CSA members reporting that they gardened at home and 66% of community gardeners reporting that they also had a garden at home. Belonging to a CSA program and community garden were much less common, with about 10% of survey takers indicating they were CSA members, and 5% or less reporting that they gardened at a community garden.

Other common activities were composting and food preservation (e.g., canning, freezing, and/or drying). However, within these categories there were significant differences: while about half of gardeners and CSA members composted, only 29% of farmers' market shoppers did. Farmers' market shoppers were also significantly less likely to preserve food: just 50% reported putting away food compared to 64% of CSA members and roughly 70% of gardeners.

Motivations

Table 3 shows reasons for participating in localized urban food systems. All local food system participants were motivated: (1) To have fresh fruits and vegetables and (2) To know where their food comes from and how it is grown. Open-ended responses confirmed their enthusiasm for the freshness and flavor of both home-grown produce and produce purchased from small farmers. Representative comments from gardeners include, "Food is fresh, organic, and delicious!" and "garden grown veggies taste better than even Farmer's Market produce." CSA members and farmers' market shoppers also touted the quality of the produce they received, writing "CSA food is much fresher and tastier than any store bought food" and "because the produce has a really good taste." Farmers' market shoppers (47% of open-ended responses), CSA members (22% of open-ended responses), and gardeners (8% of open-ended responses) used the other option to express a preference for organically produced food. Additionally, 35% of CSA members who provided an open-ended response indicated that they enjoyed being exposed to new fruits and vegetables in their CSA shares. As CSA members wrote, "there is some adventure in this as well. Unknown food arrives, then I figure out what I might do with it" and it is "Fun to get surprised by something new."

A greater percentage of CSA members were motivated by a desire to support local agriculture (95%) than farmers' market shoppers (69%). Representative comments from CSA members about why they participate include "to support organic farmers and reduce the amount of pesticides my family and I ingest" and to "support small businesses and buy local and seasonal." A greater percentage of home gardeners (43%) than participants in other local food system types cite saving money as a motivation. Community gardens had the largest percentage of participants (44%) interested in learning from others. Teaching, personal satisfaction, and sharing with others also emerged as an important theme in gardeners' open-ended responses. Typical responses to why they garden were "there is something just very gratifying about growing a significant portion of the food that I eat" and "to share high quality, organic (heirloom when possible) produce with the community and friends." CSA members (5%) were least motivated by spending with family and friends.

Outcomes Across Four Types of Localized Urban Food Systems

We computed mean scores for the scales from the outcome areas of nutrition, social interaction, and knowledge, and from the summary score for civic engagement for each food system activity (see Table 4). For nutrition, CSA respondents reported generally strong agreement with statements about dietary intake

TABLE 2 | Other local food activities that urban agriculture participants engage in.

Activity	Home gardeners	Community gardeners	Farmers' market shoppers	CSA members	p-value
Shop at a farmers' market	68%	72%	–	65%	$p = 0.258$
Participate in a CSA	11%	11%	10%	–	$p = 0.812$
Garden at home	–	66%	59%	62%	$p = 0.124$
Garden in a community garden	–	–	5%	2%	$p = 0.221$
Shop at a farm stand	24%	26%	35%	25%	$p = 0.045$
Volunteer at community farm	4%	3%	4%	5%	$p = 0.873$
Compost	58%	55%	29%	44%	$p < 0.0001$
Raise chickens	11%	8%	6%	7%	$p = 0.391$
Grow native plants	52%	22%	27%	36%	$p < 0.0001$
Forage	4%	7%	5%	4%	$p = 0.496$
Can, freeze, or dry	68%	71%	50%	64%	$p < 0.0001$

TABLE 3 | Participants' reasons for gardening, shopping at farmers' markets, or belonging to a CSA.

Motivation	Home gardeners	Community gardeners	Farmers' market shoppers	CSA members	p-value
Have fresh fruits and vegetables	91%	89%	88%	90%	$p = 0.810$
Know where my food comes from and how it is grown	63%	67%	50%	87%	$p < 0.0001$
Save money	43%	25%	25%	21%	$p < 0.0001$
Get produce that I can't buy in the store	40%	36%	34%	31%	$p = 0.362$
Teach my children	34%	24%	17%	22%	$p = 0.001$
Learn from others	31%	44%	17%	14%	$p < 0.0001$
Spend time with family and friends	20%	24%	28%	5%	$p < 0.0001$

and changes in eating habits (mean = 4.20, SD = 0.92), followed by home gardeners (mean = 4.15, SD = 0.93), farmers' markets shoppers (mean = 3.97, SD = 1.07), and community gardeners (mean = 3.95, SD = 0.97). With regard to social interaction, community gardener respondents reported the strongest agreement with statements about interacting with different kinds of people and meeting new people (mean = 3.83, SD = 0.77), followed by home gardeners (mean = 3.67, SD = 1.04), farmers' market patrons (mean = 3.44, SD = 1), and CSA members (mean = 2.56, SD = 1.01). The greatest knowledge gains were seen among home gardeners (mean = 4.12, SD = 0.84) and the lowest by farmers' market patrons (mean = 3.42, SD = 1.05). For civic engagement, community gardeners reported participating in the most civic engagement activities [mean=3.44 (out of 7), SD = 2.15], while farmers market patrons participated in the fewest (mean = 1.82, SD = 2.04).

One-way ANOVA's showed that all of these differences between the four types of local food system activity across the four outcome areas were statistically significant at the $p < 0.05$ level. *Post-hoc* tests (Tukey) were conducted, given that the ANOVA results were significant. For the nutrition outcome, a comparison between community gardeners and CSA members showed significance ($p = 0.036$). For knowledge, significant results were shown for community gardeners and home gardeners ($p = 0.033$), home gardeners and farmers' market shoppers, and for home gardeners and CSA members. For social interaction, comparisons between home gardeners

and CSA members, farmers' market shoppers and community gardeners, community gardeners and CSA members, farmers' market patrons and CSA members were all significant. For civic engagement, significant differences were seen for farmers market shoppers vs. home gardeners, CSA members and home gardeners, community gardeners and farmers' market shoppers, and community gardeners and CSA members.

In **Table 5**, we also compared the outcomes between production and direct marketing. There are no significant differences in means for nutrition between production (mean = 4.02, SD = 0.96) and direct marketing activities (mean = 4.08, SD = 1.01). There are significant results ($p < 0.0001$) for all the other scales from the outcome areas of knowledge, social interaction, and the summary score for civic engagement. Producers had higher scores than those participating in direct marketing activities for knowledge, social interaction, and civic engagement.

Portion of Food Acquired From Each Type of Local Food System Activity by Season

The various types of local food system activity differed in the quantity of fresh produce provided and the consistency with which it was available. In general, farmers' markets and CSAs supplied greater portions of the produce respondents consumed more consistently throughout the year (**Figure 1**). For instance, CSA members typically obtained 75% (median) of their produce from their CSA share in spring and summer, and 50% (median) in fall and winter. Farmers' markets provided 50% (median) of

TABLE 4 | One-way ANOVAs comparing outcomes across four types of UA.

	Home gardeners Mean (SD)	Community gardeners Mean (SD)	Farmers' markets Mean (SD)	CSAs Mean (SD)	p-value
Nutrition	4.15 (0.93)	3.95 (0.97)	3.97 (1.07)	4.20 (0.92)	$p = 0.016$
Knowledge	4.12 (0.84)	3.85 (0.91)	3.42 (1.05)	3.62 (1.00)	$p < 0.0001$
Social interaction	3.67 (1.04)	3.83 (0.77)	3.44 (1.00)	2.56 (1.01)	$p < 0.0001$
Civic engagement	3.43 (2.18)	3.44 (2.15)	1.82 (2.04)	2.26 (2.19)	$p < 0.0001$

TABLE 5 | T-tests comparing outcomes between production vs. direct marketing.

	Direct production Mean (SD)	Direct marketing Mean (SD)	p-value
Nutrition	4.02 (0.96)	4.08 (1.01)	0.441
Knowledge	3.96 (0.89)	3.51 (1.03)	$p < 0.0001$
social interaction	3.77 (0.89)	3.03 (1.09)	$p < 0.0001$
Civic engagement	3.44 (2.16)	2.03 (2.12)	$p < 0.0001$

the produce participants consumed in spring, summer, and fall, and 25% (median) in winter. Garden contributions were more seasonal on average, producing 50% (median) of the produce gardeners consumed in summer, 10% (median) in winter, and 25% (median) in spring and fall.

DISCUSSION

Results from this study confirm that urban agriculture and direct markets have multiple functions, which contribute to a variety of outcomes associated with localized urban food systems, including food access, food and agriculture education, community building, and civic engagement. Furthermore, different types of local production and direct marketing have distinct impacts on participants. In general, types of production had a greater impact on participants' self-reported food and agricultural knowledge, social interaction, and civic engagement than direct marketing activities.

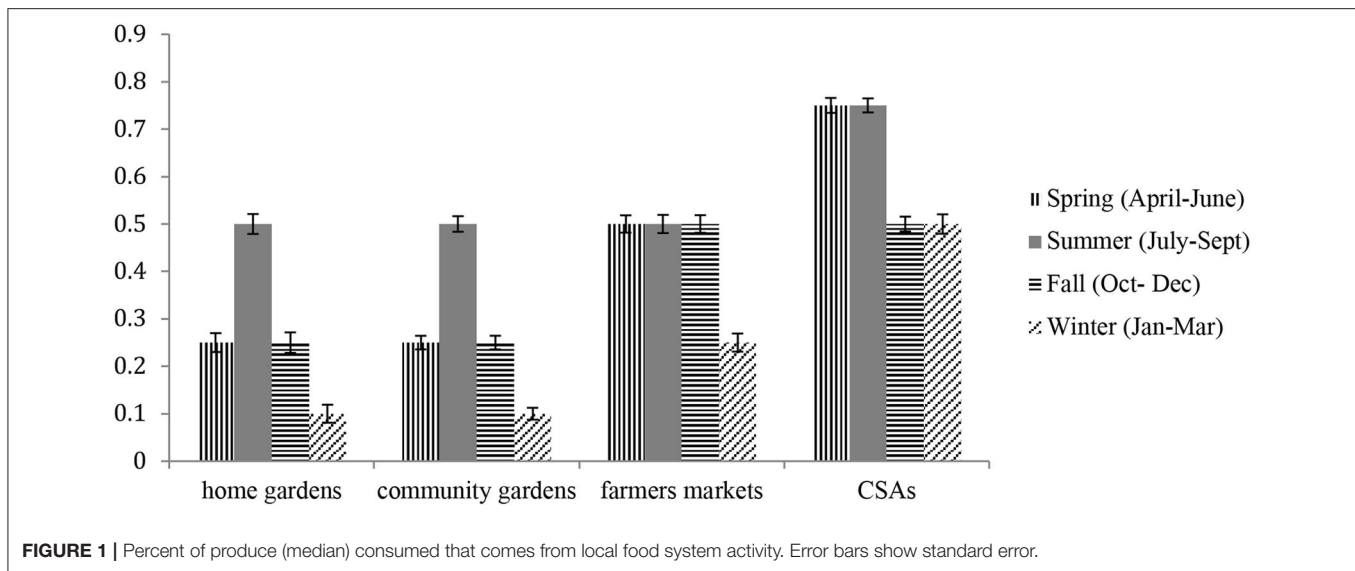
Food Access and Nutrition

For participants in all four types of local urban food activity food and nutrition were a central motivation for and outcome of participation. For approximately 90% of all survey respondents having fresh produce was a reason for taking part in gardening or direct markets. Gardeners in this study and elsewhere prize the quality—including freshness and taste—of the produce they grow (Pourias et al., 2016; Porter, 2018; Diekmann et al., 2020). Similarly, produce quality and freshness are important food attributes for direct market shoppers (e.g., Brehm and Eisenhauer, 2008; Thilmany et al., 2008). Consistent with the larger scale of production on urban, peri-urban, and rural farms than urban gardens (Opitz et al., 2016) and the structure of direct markets where multiple farmers can sell or aggregate their product, farmers' markets and CSAs supplied survey respondents with a greater share of produce throughout the year than gardens. While a few gardeners were able to provide

for most of their produce needs, for most gardeners, garden output was strongly seasonal (e.g., Vitiello and Wolf-Powers, 2014; Pourias et al., 2016). Although direct markets generally supplied more produce than urban gardens, survey respondents reported very similar impacts on dietary intake and food choices across all types. Moreover, nutrition was the highest scoring of the four scaled dependent variables, with mean scores ranging from an average of 4.2 for CSA members to 3.95 for community gardeners. Looking at the individual elements of the scaled scores, a majority of participants reported an increase in quantity of produce consumed, dietary diversity, and encouraging family members to eat more produce. In open-ended survey responses, CSA members in particular described eating a greater variety of produce, eating more seasonally, and consuming greater quantities of produce. As one CSA member wrote, "Our CSA effortlessly puts me on a schedule of buying fresh veggies regularly. We eat more veggies this way." Although food production may be a means to other social ends, these survey results are a reminder that food and agriculture remain central to efforts to encourage broader social and environmental change by localizing urban food systems.

Food and Agricultural Knowledge

Local food system initiatives often strive to overcome the alienation from food production associated with the global food system by reconnecting consumers to food production and restoring knowledge about food and agricultural traditions. Among urban food producers, a focus on education is common. In the San Francisco Bay Area, for instance, Siegner et al. (2019) found that 40% of urban agriculture operations identified primarily as educational farms or gardens and nearly all had some educational offerings. Our survey asked respondents about changes in their knowledge of food production, local environment, healthy eating, and food systems and policies since they began participating in local food production or direct markets. Reported knowledge gains were greatest among home gardeners. The statistically significant difference in knowledge gain between gardeners and direct market shoppers speaks to the physical and social space of gardens that facilitates learning through active, sustained engagement with the natural world and other people (Macias, 2008; Litt et al., 2011). Gardening requires ongoing interaction with the natural world in a way that shopping at a farmers' market or picking up a CSA box does not. Gardeners build experiential knowledge of the natural world and put it into practice as they manage their gardens in response to local conditions. Gardens also provide multiple pathways for teaching and learning—among gardeners, across



generations, and with members of the public who pass by gardens in public or semi-public spaces (Macias, 2008; Porter, 2018). Somewhat surprisingly, knowledge was the only impact area in which there was a significant difference between home and community gardeners. This difference may be due to the educational opportunities offered by local gardening programs, whose members were heavily represented in our sample as a result of our strategy for reaching home gardeners.

Among direct markets participants, CSA members reported learning more than farmers' market shoppers. These findings suggest that the information CSA farmers provide to their members is effective in increasing knowledge about local agriculture. In open-ended survey responses, CSA members mentioned how much they enjoyed learning about the way their food is farmed and receiving recipes for using produce in weekly newsletters. In addition, for some CSA members, receiving an unfamiliar fruit or vegetable was an opportunity to learn how to prepare something new. Looking across the four types of local production and marketing, these results indicate that organizations can play an important role in supporting and offering educational opportunities. In spaces without intentional educational opportunities, such as the farmers' markets included in our study, learning is less likely to happen. Elsewhere farmers' markets may include cooking demonstrations or booths where shoppers can learn about gardening.

Social Interaction

The greatest differences in impact among the four different types of local food system participation were for measures of social interaction and civic engagement. The mean score for social connection was greatest among community gardeners (3.83), followed by home gardeners (3.67) and farmers' market shoppers (3.44), and lastly by CSA members (2.56). These results support the idea that community gardens create a space where community ties can be created and strengthened

through cooperation, socializing, and social support (Glover, 2004; Kingsley and Townsend, 2006; Litt et al., 2011). As Taylor and Lovell (2014, p. 295) outline, gardens foster the development of social networks and social capital in three main ways. First, by providing a setting for social activities, gardens facilitate social interaction with other gardeners as well as friends and family (Pourias et al., 2016; Poulsen et al., 2017). As one community gardener stated, "my garden plot gets me out of my home and into nature and a community of like-minded people." Although home gardens may offer fewer opportunities to engage with other gardeners who are not part of the same household, they otherwise enable opportunities similar to those provided by community gardeners for social connection with family, friends, and neighbors, even sometimes becoming the gathering place for household social events (WinklerPrins and de Souza, 2005). Second, sharing food, germplasm, knowledge, and labor is another mechanism for building social relationships in the garden. It is common for gardeners to emphasize sharing (Pourias et al., 2016; Porter, 2018). The act of sharing reinforces a network of interaction and support among gardeners and others in their social orbit (WinklerPrins and de Souza, 2005; Taylor and Lovell, 2014). Finally, gardeners develop their social networks by engaging non-gardeners who either are interested in learning more or who are important sources of support (e.g., providing needed resources like compost). Some home gardeners who garden in their front yards report that they enjoy interacting with their neighbors and have the opportunity to model certain nutritional and environmental practices. It is possible that direct market settings offer fewer of these avenues for social interaction, particularly sharing food and engaging with non-participants, helping to explain their lower scores in social interaction.

Recognizing that social networks are not unidimensional (e.g., Alaimo et al., 2010), our questionnaire asked about horizontal linkages with people who are not like survey respondents in terms of their social identity or socio-demographic characteristics

["I have met people from different backgrounds"] and vertical linkages across gradients of power or authority ["I have met a community leader"]. Following the pattern for the mean social scores, a greater percentage of gardeners agreed with these statements than CSA members. These types of network connections may be especially helpful for taking action in the community. Consequently, gardeners may be especially well-positioned for civic engagement as an outgrowth of the learning and connecting that happens in the garden.

Social connection is the only impact category where a statistically significant difference between direct market types emerged: farmers' market shoppers had a significantly higher mean score for social interaction than did CSA members. The structure of these two markets offers some explanation for the difference. Farmers' markets are a site of regular social gathering (Macias, 2008), where people come to shop, but also to mingle, listen to music, and get food to eat. CSA members may pick up their farm share at a drop-off site where they might rarely encounter another member or they may have home delivery, completely removing the opportunity for social contact. Who is present in these spaces also affects the types of social interactions that take place. Given the relative homogeneity of CSA members in our study—primarily white, upper income, and well-educated—it is not surprising that they were also least likely to report meeting people from different backgrounds. Furthermore, as CSA models have shifted over time from membership to subscription models, where consumers pay less upfront and share less of the risk, some of the community-oriented goals of the original model have been harder to achieve (Center for Agroecology Sustainable Food Systems, 2015; Galt et al., 2016). While the high percentage of CSA members who say they belong to a CSA to support local agriculture suggests that the commitment to some of the ideals of CSA (e.g., farm viability, environmentally sustainable agricultural practices) remain, community building among members themselves or between members and farmers is less evident. Brehm and Eisenhauer (2008) concluded that CSA members do not see socializing or building social connections as either a motivation for or an outcome of participating in a CSA. Research by Galt et al. (2016) on CSAs in California has found that the demands placed on farmers by increased competition in the CSA space has also undermined some socially embedded practices—such as holding events for members, socializing at the pick-up point, and writing newsletters—and consequently, some of the social bond between farmers and members.

Civic and Community Engagement

Impacts on civic engagement had the lowest mean scores of all the functions examined in this study. Nevertheless, there were still large and significant differences between gardeners (mean score 3.44, on a scale of 0–7) and direct market shoppers (mean score 2.03). To some extent, these results support Obach and Tobin's (2014) findings that civic engagement is positively associated with a greater degree of social embeddedness, although a much larger percentage of farmers' market shoppers and CSA members in their study in New York reported participating in community and political activities than did respondents to

our survey. In the literature, gardens in particular are framed as spaces of resistance and empowerment (e.g., Taylor and Lovell, 2014). One manifestation of this is the long-standing tradition of urban gardening as a constructive response to conditions of repression. Gardening for survival, self-reliance, resistance, and self-determination has been a part of urban Black communities for generations (White, 2018; Reese, 2019). In these instances, gardeners may be motivated to garden as part of a larger process of community resilience, healing, and liberation. Approximately 12 percent of gardeners in our study belonged to garden programs that promote community activism around food justice, community resilience, and self-sufficiency. Community gardens are also associated with activism as gardeners have had to organize to defend their garden sites from development (Schmelzkopf, 1995; Ernwein, 2014). Barron (2017) has outlined two other forms of agency through which gardeners seek to improve the city or the food system. First, gardeners as food producers exert greater control over their food choices and express some of their environmental and social values for the food system as a whole. Second, gardeners as citizens, see their role in the food system not just as that of a consumer but as someone who exercises their rights and responsibilities to create a better food system by engaging in political processes.

By combining new social relationships and heightened awareness of social and environmental issues, gardens may create a context for spurring collective action (Porter, 2018). Interestingly, in our case study, these attributes were somewhat split between the two types of direct marketing: farmers' markets had a higher mean score for social interaction than CSAs, and CSAs had a higher mean score for food and agricultural knowledge than farmers' markets. While direct markets do not have the same association with activism as gardens, for some direct market shoppers, participating in an alternative market may be a civic act in and of itself. As Galt et al. (2019) theorized, "CSA people" are willing to subordinate their personal preferences to support a more environmentally and socially beneficial system of farming. However, deLind (2002) has leveled a larger critique that the civic aspect of local agriculture has been overshadowed, and consequently underdeveloped, by the focus on developing markets and entrepreneurship. To realize the civic aspect of local food system activities will require "the development of collective activities that prioritize public interests" (Poulsen et al., 2017, p. 137). The generally low mean scores for participants in all four types of local production and marketing suggest that more organizational support may be needed to activate these spaces as venues for civic engagement and community mobilization. The reckoning with American racial injustice in summer 2020 sees more direct market farms in the San Francisco Bay Area (the larger region in which our case study is situated) publicly grappling with historic and ongoing racism. An interesting subject for future research could be to examine if and how the public acknowledgment and calls to action taking place at this moment will lead to sustained civic action by these farms and their customers.

Various types of local urban food systems provide a spatial, cultural, and political framework for food production and

consumption activities (Reese, 2019). The potential impacts of these food system alternatives reflect the interplay of the individual and collective agency of the actors involved, organizational structures, local context, and larger-scale processes that structure city life and the food system. Though we separated different impacts in our analysis, it is important to note that participants do not experience the various functions of urban food system activities as separate. For example, one community gardener on a fixed income commented that her garden allowed her to have access to many more vegetables than she could otherwise afford and that she loved the social aspect of gardening and sharing with her neighbors. She described her gardening experience as being a like a spiderweb, with “benefits stretching out in different directions like fingers.” The distinct outcomes of local urban food system activities call our attention to their different social relations and temporal and spatial configurations, which have the potential to contribute to particular social, economic and environmental outcomes. For instance, farmers’ markets may be less likely to engender civic engagement than gardens, partly because of their ephemeral nature. Similarly, the temporality of farmers’ markets, which are open only for a few hours at weekly intervals, may limit participants’ ability to develop deep relationships with farmers or other shoppers. In contrast, as spaces of production with little or no restriction on hours for members, community gardens offer more opportunities for prolonged contact and more sustained exchanges. Gardeners may share knowledge and experiences around a mutually valued activity (gardening) or work together in a more structured environment to manage the collective aspects of the garden.

Future Research

While not explicitly tested in our survey, the results of this study suggest that gardening networks or programs like La Mesa Verde, Valley Verde, and the Master Garden Program play an important role in realizing the potential benefits of gardening because they offer program-based opportunities for education, social networking, and civic engagement. Porter (2018) notes that community-based organizations’ (CBOs) support for gardens is likely to be particularly important for social connections and social change and for facilitating participation by people who need additional resources or support to garden. She writes, “The broad set of benefits in culture and spirit, people and relationships, and healing and transformation reported here, appear to be entwined with and emerging from CBOs’ strategies for supporting gardening and gardeners.... These CBOs extensively use organizing strategies to achieve transformational goals with their communities” (2018, p. 198). Future research should examine which strategies employed by CBOs, farmers’ market associations and other organizations support particular outcomes of local food system activities.

It is well-established that the environmental, cultural, and economic costs and benefits of the food system and food system alternatives are not equally distributed (Ammons et al., 2018). Similarly, we do not expect that the impacts of urban agriculture and direct markets benefit all people equally. An extensive literature documents disparities in access to urban agriculture, farmers’ markets, and CSAs (e.g., Reynolds, 2015; Galt et al.,

2017; Horst et al., 2017). In this case study, farmers’ markets participants and home gardeners were the most racially and economically diverse; though we acknowledge that our purposive sampling strategy of selecting three farmers’ markets in low-income neighborhoods to include in the study may have skewed the results in this direction. The literature also demonstrates the ways in which urban agriculture and alternative food have been coded as white cultural spaces (e.g., Slocum, 2007; Guthman, 2008; Alkon and McCullen, 2011). In addition, to understanding how various functions of localized urban food systems differ between type, it is important to understand how they differ in which participants are engaged and which benefit, taking into consideration race and ethnicity, income, culture, and language.

CONCLUSION

Our findings in Santa Clara County, California expand on previous work on the multifunctionality of urban agriculture to show that community gardens, home gardens, farmers’ markets, and CSAs each have a distinct set of impacts on participants’ lives. The creation of these alternative food system spaces creates multiple possibilities for change, so the impacts reported here are not fixed but rather a snapshot of a particular place at a particular moment in time (Allen et al., 2003). Engaging with the various impacts of local food system activities is one way to look at the intersection of food projects and their local context. Similarly, a focus on functions can help to reconcile debates about whether these activities uphold the status quo or promote change (see McClintock, 2014) by focusing on their functions in a specific context. Yet explorations of how various functions relate to one another are relatively rare. Observing various types of local food system activity in relationship to one another helps to situate these efforts in the broader context of food system change. In many urban regions, for example, networks of policymakers and community-based organizations are investing in urban food systems to create a healthier food landscape. A better understanding of which types of local urban food system activity, actors, and strategies deliver the desired results could help to inform these planning processes. Finally, urban gardens and direct markets are an important source of food for a large number of urban residents, but they are equally important as sites of education, social connection, and food justice (Siegner et al., 2018; Valley and Wittman, 2018). While pounds per square foot is a tangible metric, a better set of tools and evaluation processes could also help urban food system organizations to communicate the value that their multifunctionality provides to cities and their residents.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

ETHICS STATEMENT

Study procedures involving human participants were reviewed and approved by Santa Clara University Human Subjects

Committee. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LD and LG developed and conceptualized the study together. CT and LD conducted the data analysis. All authors contributed to writing and revising the article. All authors contributed to the article and approved the submitted version.

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REFERENCES

- Alaimo, K., Reischl, T. M., and Allen, J. O. (2010). Community gardening, neighborhood meetings, and social capital. *J. Community Psychol.* 38, 497–514. doi: 10.1002/jcop.20378
- Algert, S., Diekmann, L., Renvall, M., and Gray, L. (2016). Community and home gardens increase vegetable intake and food security of residents in San Jose, California. *Calif. Agric.* 70, 77–82. doi: 10.3733/ca.v070n02p77
- Alkon, A. H., and McCullen, C. G. (2011). Whiteness and farmers' markets: performances, perpetuations contestations?. *Antipode* 43, 937–959. doi: 10.1111/j.1467-8330.2010.00818.x
- Allen, P., FitzSimmons, M., Goodman, M., and Warner, K. (2003). Shifting plates in the agrifood landscape: the tectonics of alternative agrifood initiatives in California. *J. Rural Stud.* 19, 61–75.
- American Community Gardening Association. (2000). *Home Page*. Available online at: <https://www.communitygarden.org/> (accessed September 14, 2020).
- Ammons, S., Creamer, N., Thompson, P. B., Francis, H., Friesner, J., Hoy, C., et al. (2018). *A Deeper Challenge of Change: The Role of Land-Grant Universities in Assessing and Ending Structural Racism in the US Food System*. *Inter-Institutional Network for Food, Agriculture, and Sustainability*. Available online at: <http://asi.ucdavis.edu/networks/infas/a-deeper-challenge-of-change-the-role-of-land-grant-universities-in-assessing-and-ending-structural-racism-in-the-us-food-system> (accessed September 14, 2020).
- Armstrong, D. (2000). A survey of community gardens in upstate New York: implications for health promotion and community development. *Health Place* 6, 319–327. doi: 10.1016/S1353-8292(00)00013-7
- Baker, L. E. (2004). Tending cultural landscapes and food citizenship in Toronto's community gardens. *Geogr. Rev.* 94, 305–325. doi: 10.1111/j.1931-0846.2004.tb00175.x
- Ballamingie, P., Blay-Palmer, A., Knezevic, I., Lacerda, A., Nimmo, E., Stahlbrand, L., et al. (2020). Integrating a food systems lens into discussions of urban resilience. *J. Agric. Food Syst. Commun. Dev.* 9, 1–17. doi: 10.5304/jafscd.2020.093.021
- Barron, J. (2017). Community gardening: cultivating subjectivities, space, and justice. *Local Environ.* 22, 1142–1158. doi: 10.1080/13549839.2016.1169518
- Blair, D., Giesecke, C. C., and Sherman, S. (1991). A dietary, social and economic evaluation of the Philadelphia urban gardening project. *J. Nutr. Educ.* 23, 161–167. doi: 10.1016/S0022-3182(12)81191-5
- Bosco, F. J., and P., Joassart-Marcelli (2017). "Spaces of alternative food: urban agriculture, community gardens, and farmers' markets," in Joassart-Marcelli, P., & Bosco, F. J. (2018). *Food and Place: A Critical Exploration*. Lanham, MD: Rowman and Littlefield.
- Bowens, N. (2015). *CSA is Rooted in Black History*. *Mother Earth News*. Available online at: <https://www.motherearthnews.com/organic-gardening/csas-rooted-in-black-history-zbcz1502> (accessed February 13, 2015).
- Brehm, J. M., and Eisenhauer, B. W. (2008). Motivations for participating in community-supported agriculture and their relationship with community attachment and social capital. *J. Rural Soc. Sci.* 23:5.
- Carney, P. A., Hamada, J. L., Rdesinski, R., Sprager, L., Nichols, K. R., Liu, B. Y., et al. (2012). Impact of a community gardening project on vegetable intake, food security and family relationships: a community-based participatory research study. *J. Commun. Health* 37, 874–881. doi: 10.1007/s10900-011-9522-z
- Carter, E. D., Silva, B., and Guzman, G. (2013). Migration, acculturation, and environmental values: the case of Mexican immigrants in Central Iowa. *Ann. Assoc. Am. Geogr.* 103, 129–147. doi: 10.1080/00045608.2012.696231
- Center for Agroecology and Sustainable Food Systems. (2015). *Teaching Direct Marketing and Small Farm Viability*. Available online at: <https://casfs.ucsc.edu/about/publications/Teaching-Direct-Marketing/units-1-9.html> (accessed September 14, 2020).
- County of Santa Clara Division of Agriculture. (2019). *Santa Clara County Crop Report 2018*. Available online at: [https://www.sccgov.org/sites/ag/news/Documents/2018%20Crop%20Report%20v14\(Interactive\).pdf](https://www.sccgov.org/sites/ag/news/Documents/2018%20Crop%20Report%20v14(Interactive).pdf) (accessed September 14, 2020).
- Data USA (2020). *Santa Clara County, CA*. Available online at: <https://datausa.io/profile/geo/santa-clara-county-ca#demographics> (accessed September 14, 2020).
- deLind, L. B. (2002). Place, work, and civic agriculture: common fields for cultivation. *Agric. Hum. Values* 19, 217–224. doi: 10.1023/A:1019994728252
- Diekmann, L., Algert, S., Gray, L., Hutcheson, J., Scheer, J., and Sponsler Clements, S. (2013). *Santa Clara County Food System Assessment*. Sebastopol, CA: Ag Innovations Network.
- Diekmann, L. O., Gray, L. C., and Baker, G. A. (2020). Growing 'good food': urban gardens, culturally acceptable produce and food security. *Renew. Agric. Food Syst.* 35, 169–181. doi: 10.1017/S1742170518000388
- Ernwein, M. (2014). Framing urban gardening and agriculture: on space, scale and the public. *Geoforum* 56, 77–86. doi: 10.1016/j.geoforum.2014.06.016
- Feagan, R., and Henderson, A. (2009). Devon acres CSA: local struggles in a global food system. *Agric. Hum. Values* 26, 203–217. doi: 10.1007/s10460-008-9154-9
- Galt, R. E. (2011). Counting and mapping community supported agriculture (CSA) in the United States and California: contributions from critical cartography/GIS. *ACME Int. E J. Crit. Geogr.* 10, 131–162.
- Galt, R. E., Bradley, K., Christensen, L., Fake, C., Munden-Dixon, K., Simpson, N., et al. (2017). What difference does income make for community supported agriculture (CSA) members in California? *Comparing lower-income and higher-income households*. *Agric. Hum. Values* 34, 435–452. doi: 10.1007/s10460-016-9724-1
- Galt, R. E., Bradley, K., Christensen, L., van Soelen Kim, J., and Lobo, R. (2016). Eroding the community in community supported agriculture (CSA): competition's effects in alternative food networks in California. *Sociol. Ruralis* 56, 491–512. doi: 10.1111/soru.12102
- Galt, R. E., Bradley, K., Christensen, L. O., and Munden-Dixon, K. (2019). The (un) making of "CSA people": member retention and the customization paradox in community supported agriculture (CSA) in California. *J. Rural Stud.* 65, 172–185. doi: 10.1016/j.rurstud.2018.10.006
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- Glover, T. D. (2004). Social capital in the lived experiences of community gardeners. *Leisure Sci.* 26, 143–162. doi: 10.1080/01490400490432064
- Gray, L., Guzman, P., Glowa, K. M., and Drevno, A. G. (2014). Can home gardens scale up into movements for social change? The role of home gardens in providing food security and community change in San Jose, California. *Local Environ.* 19, 187–203. doi: 10.1080/13549839.2013.792048
- Guthman, J. (2008). Bringing good food to others: investigating the subjects of alternative food practice. *Cult. Geogr.* 15, 431–447. doi: 10.1177/1474474008094315
- Hinrichs, C. C. (2000). Embeddedness and local food systems: notes on two types of direct agricultural market. *J. Rural Stud.* 16, 295–303. doi: 10.1016/S0743-0167(99)00063-7
- Horst, M., McClintock, N., and Hoey, L. (2017). The intersection of planning, urban agriculture, and food justice: a review of the literature. *J. Am. Plann. Assoc.* 83, 277–295. doi: 10.1080/01944363.2017.1322914
- Kingsley, J., and Townsend, M. (2006). ‘Dig in’ to social capital: community gardens as mechanisms for growing urban social connectedness. *Urban Policy Res.* 24, 525–537. doi: 10.1080/0811140601035200
- Krasny, M. E., and Tidball, K. G. (2009). Community gardens as contexts for science, stewardship, and civic action learning. *Cities Environ.* 2:8. doi: 10.15365/cate.2182009
- Litt, J. S., Soobader, M. J., Turbin, M. S., Hale, J. W., Buchenau, M., and Marshall, J. A. (2011). The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. *Am. J. Public Health* 101, 1466–1473. doi: 10.2105/AJPH.2010.300111
- Lockeretz, W. (1986). Urban consumers’ attitudes towards locally grown produce. *Am. J. Alternat. Agric.* 1, 83–88. doi: 10.1017/S0889189300000941
- Lovell, S. T. (2010). Multifunctional urban agriculture for sustainable land use planning in the United States. *Sustainability* 2, 2499–2522. doi: 10.3390/su2082499
- Low, S. A., Adalja, A., Beaulieu, E., Key, N., Martinez, S., Melton, A., et al. (2015). *Trends in US Local and Regional Food Systems: A Report to Congress*.
- Macias, T. (2008). Working toward a just, equitable, and local food system: the social impact of Community-Based agriculture. *Soc. Sci. Q.* 89, 1086–1101. doi: 10.1111/j.1540-6237.2008.00566.x
- Mares, T. M., and Peña, D. G. (2011). Environmental and food justice. *Cultivating Food Justice: Race, Class, and Sustainability*, Cambridge, MA: MIT Press, 197.
- McClintock, N. (2014). Radical, reformist, and garden-variety neoliberal: coming to terms with urban agriculture’s contradictions. *Local Environ.* 19, 147–171. doi: 10.1080/13549839.2012.752797
- McClintock, N., and Simpson, M. (2018). Stacking functions: identifying motivational frames guiding urban agriculture organizations and businesses in the United States and Canada. *Agric. Hum. Values* 35, 19–39. doi: 10.1007/s10460-017-9784-x
- National Gardening Association. (2014). *Garden to Table: A 5-Year Look at Food Gardening in America*. Williston, VT: National Gardening Association.
- Obach, B. K., and Tobin, K. (2014). Civic agriculture and community engagement. *Agric. Hum. Values* 31, 307–322. doi: 10.1007/s10460-013-9477-z
- Opitz, I., Berges, R., Piorr, A., and Krikser, T. (2016). Contributing to food security in urban areas: differences between urban agriculture and peri-urban agriculture in the Global North. *Agric. Hum. Values* 33, 341–358. doi: 10.1007/s10460-015-9610-2
- Penniman, L. (2018). *Farming while black: Soul Fire Farm’s Practical Guide to Liberation on the Land*. White River Junction, VT: Chelsea Green Publishing.
- Perez, J., Allen, P., and Brown, M. (2003). *Community Supported Agriculture on the Central Coast*. Santa Cruz, CA: The CSA member experience.
- Perez, J. (2004). “Community supported agriculture on the central coast: the CSA grower experience,” in *Center for Agroecology and Sustainable Food Systems*. Santa Cruz, CA.
- Porter, C. M. (2018). What gardens grow: outcomes from home and community gardens supported by community-based food justice organizations. *J. Agric. Food Syst. Commun. Dev.* 8, 187–205. doi: 10.5304/jafscd.2018.08A.002
- Pothukuchi, K., and Kaufman, J. L. (1999). Placing the food system on the urban agenda: the role of municipal institutions in food systems planning. *Agric. Hum. Values* 16, 213–224. doi: 10.1023/A:1007558805953
- Poulsen, M. N., Neff, R. A., and Winch, P. J. (2017). The multifunctionality of urban farming: perceived benefits for neighbourhood improvement. *Local Environ.* 22, 1411–1427. doi: 10.1080/13549839.2017.1357686
- Pourias, J., Aubry, C., and Duchemin, E. (2016). Is food a motivation for urban gardeners? Multifunctionality and the relative importance of the food function in urban collective gardens of Paris and Montreal. *Agric. Hum. Values* 33, 257–273. doi: 10.1007/s10460-015-9606-y
- Rangarajan, A., and Riordan, M. (2019). *The Promise of Urban Agriculture: National Study of Commercial Farming in Urban Areas*. Washington, DC: United States Department of Agriculture/Agricultural Marketing Service and Cornell University Small Farm Program.
- Reese, A. M. (2019). *Black Food Geographies: Race, Self-Reliance, and Food Access*. Washington, DC: UNC Press Books. doi: 10.5149/northcarolina/9781469651507.001.0001
- Reynolds, K. (2015). Disparity despite diversity: social injustice in New York City’s urban agriculture system. *Antipode* 47, 240–259. doi: 10.1111/anti.12098
- Saldivar-Tanaka, L., and Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: the case of Latino community gardens in New York City. *Agric. Hum. Values* 21, 399–412. doi: 10.1023/B:AHUM.0000047207.57128.a5
- Santo, R., Palmer, A., and Kim, B. (2016). *Vacant Lots to Vibrant Plots: A Review of the Benefits and Limitations of Urban Agriculture*. Baltimore, MD: John Hopkins Center for a Livable Future.
- Schmelzkopf, K. (1995). Urban community gardens as contested space. *Geogr. Rev.* 85, 364–381. doi: 10.2307/215279
- Siegner, A., Sowerwine, J., and Acey, C. (2018). Does urban agriculture improve food security? Examining the nexus of food access and distribution of urban produced foods in the United States: a systematic review. *Sustainability* 10:2988. doi: 10.3390/su10092988
- Siegner, A. B., Acey, C., and Sowerwine, J. (2019). Producing urban agroecology in the East Bay: from soil health to community empowerment. *Agroecol. Sustain. Food Syst.* 44, 566–593. doi: 10.1080/21683565.2019.1690615
- Slocum, R. (2007). Whiteness, space and alternative food practices. *Geoforum* 38, 520–533. doi: 10.1016/j.geoforum.2006.10.006
- Smith, D., Wang, W., Chase, L., Estrin, H., and van Soelen Kim, J. (2019). Perspectives from the field: adaptations in CSA models in response to changing times in the US. *Sustainability* 11:3115. doi: 10.3390/su1113115
- Tarkle, B., Haynes, C., and Schrock, D. (2017). Using demographic survey results to target master gardener volunteer recruitment. *J. Extension* 55:3RIB8. Available online at: https://www.joe.org/joe/2017june/pdf/JOE_v55_3rb8.pdf
- Taylor, J. R., and Lovell, S. T. (2012). Mapping public and private spaces of urban agriculture in Chicago through the analysis of high-resolution aerial images in Google Earth. *Landsc. Urban Plan.* 108, 57–70. doi: 10.1016/j.landurbplan.2012.08.001
- Taylor, J. R., and Lovell, S. T. (2014). Urban home food gardens in the Global North: research traditions and future directions. *Agric. Hum. Values* 31, 285–305. doi: 10.1007/s10460-013-9475-1
- Thilmany, D., Bond, C. A., and Bond, J. K. (2008). Going local: exploring consumer behavior and motivations for direct food purchases. *Am. J. Agric. Econ.* 90, 1303–1309. doi: 10.1111/j.1467-8276.2008.01221.x
- Valley, W., and Wittman, H. (2018). *Beyond feeding the city: The multifunctionality of urban farming*. Vancouver, BC: Culture and Society. doi: 10.1016/j.ccs.2018.03.004
- Vitiello, D., and Wolf-Powers, L. (2014). Growing food to grow cities? *The potential of agriculture foreconomic and community development in the urban United States*. *Commun. Dev. J.* 49, 508–523. doi: 10.1093/cdj/bst087
- Wakefield, S., Yeudall, F., Taron, C., Reynolds, J., and Skinner, A. (2007). Growing urban health: community gardening in South-East Toronto. *Health Promot. Int.* 22, 92–101. doi: 10.1093/heapro/dam001
- Wallace, A. (2003). *The Origins of CSA: Japan’s Seikyoku Movement Then and Now. The Maine Organic Farmer and Gardener*. Unity, ME: The Maine Organic Farmer & Gardener.
- White, M. M. (2018). *Freedom Farmers: Agricultural Resistance and the Black Freedom Movement*. Chapel Hill, NC: UNC Press Books. doi: 10.5149/northcarolina/9781469643694.001.0001

- Wilson, G. A. (2008). From 'weak' to 'strong' multifunctionality: conceptualising farm-level multifunctional transitional pathways. *J. Rural Stud.* 24, 367–383. doi: 10.1016/j.jrurstud.2007.12.010
- WinklerPrins, A. M., and de Souza, P. S. (2005). Surviving the city: urban home gardens and the economy of affection in the Brazilian Amazon. *J. Latin Am. Geogr.* 4, 107–126. doi: 10.1353/lag.2005.0033
- Zasada, I. (2011). Multifunctional peri-urban agriculture—a review of societal demands and the provision of goods and services by farming. *Land Use Policy* 28, 639–648. doi: 10.1016/j.landusepol.2011.01.008

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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