The Role of Public Gardens in American Urban Agriculture Programming

American Public Gardens Association

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Table of Contents

Executive Summary

The United States Botanic Garden (USBG) commissioned the American Public Gardens Association (the Association), to report on urban agriculture as an instrument of social, economic, and environmental change in America's urban centers. Over 57% of public gardens are in American urban centers or mixed urban settings, and our industry is dedicated to connecting people to plants. These factors make public gardens a natural fit to establish themselves as leaders in urban agriculture.

With urban agriculture being a new phenomenon, there is not a lot of evidence that suggests it can meaningfully increase healthy food access in underserved urban areas and provide job training while generating sustainable revenue. A majority of urban farmers from multiple sectors identify financial stability as their greatest challenge because food production sales alone do not support the operation of their farms. While the intention of many urban agriculture programs is workforce development in the same sector, instead they predominantly function as a conduit for transferable job skills to other industries. In this report, we discuss public gardens and other key organizations that are active in the urban agriculture sector and can serve as replicable models nationwide.

The Association performed a literature review of urban agriculture impacts and programs across the nation. After researching a diverse group of cross-sector urban agriculture programs, we then narrowed down and targeted a group of 50 non-profits, for-profits, federal agencies, and community-based organizations to survey and interview, all of which were referenced in relevant publications concerning urban agriculture. Although not necessarily a statistically representative sample, the results show that 67% of surveyed urban agriculture programs target low-income individuals and families, but only 44% focus on nutrition education. Our findings also demonstrate that for the programs surveyed, a primary source of income for urban agriculture is grants, with only 19% of revenue coming from program services and urban agriculture-related sales. Although many survey respondents and interviewees mention focusing on nutrition education and serving underserved communities in food desert areas, only 15% collect or plan to collect data on nutrition outcomes.

The Association also reviewed previous research, data, and surveys on food-related programs, activities, and educational topics at public gardens. Food programs are increasingly part of public garden identities, which may indicate potential success in future urban agriculture endeavors. Analysis of survey results suggests growth potential for food programs, and interviews reflect how gardens recognize the social, educational, economic, and environmental sustainability rewards associated with food systems programs and activities. Food-related programs positively impact a diversity of garden audiences, fundraising goals, sustainable operations, and media coverage. They have a strong effect on expanding relationships with outside organizations.

Findings here suggest that urban agriculture programs at public gardens can be made more successful when gardens partner with agricultural research-based institutions (such as land-grant universities), local food policy councils, and parks and recreation departments. Garden success is also more likely when they engage in cross-departmental collaboration, develop strategic partnerships (with healthcare providers, K-12 schools, food distributors, social workers, etc.), re-engage program participants, and use improved data tracking methods to explore inter-related community health, economic, and environmental benefit measurements.

Introduction

"There is so much discussion about urban farming right now, but we really don't know what is happening and where it is happening."
~Carolyn Dimitri (Associate Professor, NYU)

The American Public Gardens Association (the Association) and the United States Botanic Garden (USBG) set out to collaborate and conduct this study to understand the extent of urban agriculture program impacts. The goals of this research were to investigate viable urban agriculture program models that are self-sustaining and environmentally, socially, and economically enriching. To that end, we focused on specific job training impacts and nutrition outcomes for underserved communities in American urban centers. In a broader sense, this study examines whether urban agriculture is socially and economically viable. The Association used a three-pronged research approach by exploring literature, surveying, and subsequently interviewing community-based non-profit and for-profit organizations, government agencies, urban agriculture research experts at universities, and several public gardens about their urban agriculture initiatives and related educational programming.

In recent years, Americans have become significantly more interested in their food – where it is grown, how it is grown, its genetic makeup, and its environmental impact. Certain agriculture-related industries have boomed under this new interest, from farmer's markets and certified-organic produce to newer ventures such as aquaponics, hydroponics, controlled environment agriculture, and vertical farming. These ventures are of particular interest in urban areas where food systems are being discussed alongside social justice and access to proper nutrition.

Urban agriculture has been swept up in a food renaissance. Over 80% of the U.S. population lives in urban areas (Berg, 2012), and yet U.S. urban farming has historically been at such a small scale that no reliable statistics exist for how much food is produced in urban areas. Public gardens in particular have taken a keen interest in supporting urban agriculture in their communities. Many public gardens are located in urban areas, have an education-based mission, and have decades (and in some cases, hundreds) of years of plant expertise, making them perfectly poised to become leaders in the urban agriculture conversation.

USBG formed a collaboration with the Association to conduct this study. The purpose was to identify successful urban agricultural education programs, especially those with a focus on workforce development and nutrition. The USBG is an independent federal agency under the administration of the Architect of the Capitol (AOC) and is uniquely situated at the heart of the U.S. government at the base of Capitol Hill. This public garden is also an accredited museum, and its National Mall location includes the Conservatory, the National Garden, and Bartholdi Park. It also has an extensive 25-acre propagation nursery facility with 85,000 square feet of glasshouse space in the Blue Plains area of Washington, D.C. USBG's strengths lie in its ability to offer engaging and educational horticulture and plant science displays, exhibits, and programs to over one million visitors per year and to partner with other organizations to effect positive change in the horticulture, agriculture, conservation, and education sectors.

As part of its educational mission, the USBG desires to increase public education and awareness of plant diversity and the importance of plants to the wellbeing of the American people. Critical to this effort is leveraging the public's interest in agriculture, food systems, and food plants. As people become more and more aware of where their food comes from, there has been an increase in the public's desire to grow their own food or source locally grown food. Unfortunately, there are many urban areas ("food deserts") in which significant food shortages exist, particularly for fresh fruits and vegetables. The USBG desires to partner with other organizations to better connect people to food plants, and to enhance plant- and agriculture-based educational and economic opportunities, particularly in underserved communities.

The Association is a 501(c)(3) organization headquartered in Kennett Square, Pennsylvania, with over 600 member gardens in the U.S. and other countries. Their mission is to serve public gardens and advance them as leaders, advocates, and innovators. The Association is the leading professional organization for the field of public horticulture and it advances the field by encouraging best practices, offering educational and networking opportunities, and serving as a connector, protector, and champion on behalf of its members, their programs, and all public gardens worldwide. The Association works together with members and others to strengthen and shape public horticulture, providing the tools and support industry professionals need to better serve the public, while preserving and celebrating plants creatively and sustainably. Since 1940, the Association has been committed to increasing cooperation and awareness among gardens. To tackle agriculture-related topics at public gardens and increase education and awareness of pivotal food issues, the Association created a Food and Agriculture Professional Community in 2016 with the following stated goals:

- Goal 1: Connecting with leaders in the food and agriculture sector
- Goal 2: Advancing informal education about food and agriculture
- Goal 3: Community engagement around food systems and food literacy
- Goal 4: Crop wild relative (CWR) research and education
- Goal 5: Research into biodiversity in food system planning and design

The research in this report is comprised of a comprehensive literature review, previous research pertaining to public garden agriculture programing in urban areas, a survey undertaken in 2018, and phone interviews that same year with other organizations doing urban agricultural programing. The literature review was conducted by Association staff to identify knowledge gaps and to find programs that focus specifically on job training and nutrition outcomes. The survey was then distributed with the primary goals of generating a basic understanding of program components, sources of funding, partnerships, target audiences, and what data and evaluations have been collected by respondent programs. The survey was sent to 50 non-profit and for-profit community-based organizations, and respondents were asked to participate in a more in-depth conversation with an Association staff member on the intended impacts and barriers connected to their urban agriculture program.

This report integrates current research with the survey and interview findings to:

1. Identify successful urban agriculture models, and
2. Outline key elements of successful urban agriculture collaborations.

Literature Review

Methodology:

This literature review includes previous Association research, data, and surveys, such as *An Evaluation of Food Systems Education and Interpretation in U.S. Gardens* (Kinley, 2017) and *Food-related Programming at Public Gardens* (Benveniste, 2016). The Benveniste study is an analysis of 104 public garden survey responses on food-related programming (see full list of gardens in Appendix), many of which are near or in urban centers. The literature review presented here also includes a broader array of publications by urban agriculture and agricultural economics experts in diverse sectors, and literature found when examining current urban agriculture data and information from organizations and initiatives like the National Initiative for Consumer Horticulture, National Institute of Food and Agriculture, USDA's Food Insecurity Nutrition Incentive Grant Program, and the Natural Resources Conservation Service.

Urban Agriculture in the United States:

What "is" urban agriculture? Despite new, widespread interest in urban agriculture, the term has varying definitions among organizations and even between different agencies in the U.S. government. One of the most comprehensive definitions comes from the University of California, Davis, which states that urban agriculture is the "production, distribution, and marketing of food and other products within the cores of metropolitan areas and at their edges" (2017). However, urban agriculture can have different practical definitions based on the urban center. Cities, for example, will individually define urban agriculture from a zoning standpoint for the purposes of allowing or disallowing specific agricultural practices within city limits (such as raising livestock).

At the federal level, the United States Department of Agriculture (USDA) does not have a standardized definition of urban agriculture. Their description references the kinds of locations where urban agriculture occurs, but does not specify what it is: "city and suburban agriculture takes the form of backyard, rooftop and balcony gardening, community gardening in vacant lots and parks, roadside urban fringe agriculture and livestock grazing in open space" (USDA, 2018). This creates limitations for how data is tracked on the federal level, specifically through the U.S. Census of Agriculture. This census collects information based on the definition of a farm, "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the Census year" (USDA, 2017a), so urban farms may be included in it, but their results are not sorted out from their rural counterparts (Pressman et al., 2016). This is the first of many factors that create knowledge gaps to gleaning cumulative, quantitative data on urban agriculture programs and businesses.

Beyond producing food within city limits, urban agriculture is also unique in its business structures and demographics. Previous researchers concluded that 32% of urban agriculture enterprises were non-profits, 31% were sole proprietorships, and the

remaining third was a mix of corporations, cooperatives, or family-owned businesses (Pressman et al., 2016). For comparison, traditional farms are almost 99% family owned with the remaining 1% owned or operated by private individuals or corporations (USDA, 2017b). By gender, urban farm primary operators are 53% female and 44% male, whereas their traditional farm counterparts are 86% male and 14% female (Pressman et al., 2016; USDA, 2014). Urban farmers are also younger and more diverse than the national averages for farmers (Pressman et al., 2016; USDA, 2014).

What makes urban agriculture enterprises most distinct is that the vast majority are simultaneously seeking to produce food locally while addressing social justice issues in their cities and communities (Daftary-Steel et al., 2015; Dimitri et al., 2016). A study by New York University estimated that up to two-thirds of urban farmers have a "social mission that goes beyond food production" (Dimitri et al., 2016). These social goals aim to address a wide swath of challenges in U.S. cities, such as food security, access to nutritious food, education, community building, preservation of open spaces, mitigation of stormwater impacts, promotion of health, and job creation (Daftary-Steel et al., 2015; Dimitri et al., 2016; O'Hara, 2017).

Social and Environmental Impacts:

Little data exist yet to demonstrate whether urban agriculture is accomplishing its social goals, or whether it has an appreciable impact on urban food systems. A recent comprehensive literature review on the subject found that urban agriculture cannot increase healthy food access while simultaneously providing job training and financial sustainability without significant long-term funding investments. The study's authors termed this challenge "the unattainable trifecta of urban agriculture" (Daftary-Steel et al., 2015).

Specific to health-related goals, research shows that the presence of urban agriculture enterprises within a community increases fresh fruit and vegetable consumption, and that community gardens promote mental health and physical activity (Golden, 2013; Santo et al., 2016). However, few studies or organizations have long-term data on nutrition outcomes for participants in urban agriculture programs or their communities. In fact, some studies show health risks associated with urban agriculture, such as exposure to contaminants often found in urban soils and improper disposal of inputs such as fertilizer and pesticides (Santo et al., 2016).

There are a few urban agriculture programs that are rigorously evaluating nutrition outcomes. Denver Urban Gardens (DUG) partnered with the University of Colorado in 2015 to evaluate the impact of DUG's Healthy Seedlings Program. The Healthy Seedlings Program is an "elementary school garden-based education program" that provides "experiential learning opportunities for student inquiry and investigation into nutrition and health, earth and life sciences, math and literacy" (Denver Urban Gardens, 2017). Students complete a pre- and post-survey to measure nutrition and gardening

knowledge, attitude, and behavior. Parents complete a post-survey to assess the program's reach to the home environment. DUG publishes up to three years of data online, allowing them to make powerful statements about the impact of this program on influencing healthier eating habits in their community.

Research shows that the most viable programs are those seeking to build capacity in their communities by using urban agriculture and green infrastructure to create jobs, offer education, and improve public health (Phillips & Wharton, 2016; O'Hara, 2017). Tools such as the Sustainable Livelihoods Framework (originally created by the United Kingdom to alleviate poverty in poorer nations) emphasize the importance of developing urban agriculture programs that focus on people living in the nearby community (Phillips & Wharton, 2016). Directly engaging community members is an integral component of initiating and advancing urban agriculture (Reynolds & Cohen, 2016), as well as working with or initiating city food policy councils (Phillips & Wharton, 2016; Reynolds & Cohen, 2016). The University of the District of Columbia's College of Agriculture, Urban Sustainability, and Environmental Sciences (CAUSES) has incorporated all of these principles into their new Urban Food Hubs plan (O'Hara, 2017). Like many such programs, however, CAUSES is too new to have generated significant data about its long-term impacts and viability (See CAUSES profile in Models to Emulate section).

Regarding the creation of jobs and businesses, urban agriculture shows mixed results. As of 2013, USDA-funded community food projects had generated 2,300 jobs, incubated over 3,600 micro-businesses, and trained an estimated 35,000 individuals in farming, sustainable agriculture, business management, and marketing (Golden, 2013). Many of these community food projects employ youth to run gardens and farms, provide paid stipends in addition to skills training, are located in neighborhoods where unemployment is high, and serve as viable employment catalysts or the basis for entrepreneurial endeavors. Many participants of city farming projects report that the job-related skills they developed were the most significant outcome of their experience (Golden, 2013). However, further research is needed to evaluate the quality of jobs generated, such as full-time options, access to benefits, and seasonality (Santo et al., 2016).

Despite the difficulties (zoning, land use policies, private versus public land, cost, etc.) associated with acquiring large tracts of land for urban agriculture use, urban agriculture does appear to have valuable environmental benefits for cities. While still relatively small, the increasing development of community gardens and vacant lot projects has both environmental and social benefits. There are an estimated 18,000 community gardens in the U.S. (American Community Gardening Association, 2018) and in New York City alone there are 550 gardens. Organizations like NYC Parks GreenThumb track and estimate food production outcomes for each of these gardens (B. LoSasso, personal communication, June 25, 2018).

The establishment of community gardens and converted vacant lots can also have positive social and environment benefits to underserved communities. There are differing opinions on whether community gardens, repurposed land, and urban farms contribute to the gentrification of historic and culturally rich neighborhoods and create

self-sustainable models for healthy food consumption in underserved areas (Golden, 2013; Santo et al., 2016). Many community engagement efforts have also led to mapping of vacant lots that have the potential to be converted to spaces for food production purposes, which helps increase the knowledge and accessibility of food in urban areas. NeighborSpace in Chicago, Illinois, for example, partnered with DePaul University to build an interactive online map of urban farms in the city. Lastly, by maintaining or adding permeable surface (for converted lots), growing on rooftops (green roofs), and growing diverse plant species, urban farms reduce stormwater runoff, filter air pollution, reduce heat island effects, and provide habitat for pollinators and wildlife (Santo et al., 2016).

Economic and Financial Sustainability:

The economic viability of urban agriculture enterprises appears mixed. In two separate surveys from 2013 and 2014, a majority of both for-profit and not-for-profit urban farms reported financial stability as their greatest challenge, even over other factors that were previously more commonly associated with urban agriculture (land access, security, and community relations) (Pressman et al., 2016; Hunold et al., 2017). Furthermore, the results from the 2014 survey supports research “that urban agriculture cannot meet important and ambitious food justice, social capital, and job creation goals while also being financially sustainable without outside funding” (Hunold et al., 2017; Daftary-Steel et al., 2015).

From another perspective, some evaluations have shown that certain types of urban agriculture may be more economically viable than others. A 2013 study estimated the economic feasibility of vertical farming (a production method that uses high-rise-like greenhouses and cutting-edge technology to grow food, while minimizing space and inputs such as water and fertilizer), with mixed results. The systems are highly efficient, but start-up costs are tremendous (Banerjee & Adenaeuer, 2013). On the other hand, in a review of small-scale market farming in Philadelphia, researchers found that an entrepreneur growing microgreens in his garage had the most profitable enterprise out of several different types of both for-profit and not-for-profit urban agriculture businesses in the city (Hunold et al., 2017). This was attributed to two factors: production of a high-value specialty crop and the rent-free facility: a pre-existing garage (Hunold et al., 2017). While this particular business does not fit a model that could be scaled up or easily replicated, it does exhibit two important components of urban agriculture programs that are successfully building capacity in their communities: taking advantage of profits in niche markets and creatively using space in an area with high-pressure land use.

There are also economic benefits found in green roof projects nationwide. In Chicago, Illinois, there are a total of 7 million square feet of green roofs, and in Washington, D.C., the city set a goal of 20% green roof coverage by 2020 (Stutz, 2010). Portland, Oregon, provides incentive grants of $5 per square foot to reduce the burden on city costs for

building bigger and additional pipes to carry stormwater for storage or treatment (Stutz, 2010). While our research could not find conclusive data on the percentage of food production associated with green roof projects, the potential is there in populated urban areas to produce and distribute food locally.

Methods

Data Gathering:

We were able to identify a broad list of close to 100 community-based for-profit and non-profit organizations engaged in urban agriculture in the U.S. This list was distilled down to 50 enterprises based on evaluating individual organization's websites to find who was collecting data, targeting underserved urban areas, had urban agriculture job training components, and focused on nutrition education and outcomes. We excluded programs that were specifically engaging rural and suburban landscapes. We then sent a preliminary email with the survey and a request for a follow-up interview to the list of 50.

Public Gardens Information Gathering:

Prior research, such as *An Evaluation of Food Systems Education and Interpretation in U.S. Gardens* (Kinley, 2017), *Food-related Programming in Public Gardens* (Benveniste, 2016), and the *Public Gardens Benchmarking Study* (the Association's platform for members to enter their demographic, geographic, and financial information for comparison with other gardens), helped identify public gardens that were active in food systems education and near or in an urban environment. The Benveniste study provided data on 104 public gardens' food-related programming. The Kinley study included interviews from public garden leaders and an analysis of public gardens that have robust agricultural educational programming, and highlighted the challenges and future potential for such programs (though not specific to only gardens in urban environments). Other research included a review of resources gathered by the National Initiative for Consumer Horticulture (NICH).

Surveys:

The survey was designed by the Association using Qualtrics (see survey questions in Appendix). The survey included eight questions with the ability for respondents to select multiple answers, write in a response, and/or write in an additional answer not listed (Other). The survey covered organization and program name (Q1), program start date (Q2), target audiences (Q3), program specific [training] components (Q4), data collected (Q5), funding sources (Q6), partnerships (Q7), and willingness of respondents to be interviewed (Q8). The survey was administered by Association staff. It was initially sent as a link embedded in an introductory email to the 50 identified organizations. The survey and interviews yielded 27 responses in total, a 54% response rate.

Interviews:

Broader mission-based organizations with several programmatic focuses related to urban agricultural education and organizations that were described as a conglomerate, collective, alliance, or network were sent a separate introductory email requesting an in-

depth interview with no survey link. They were instead provided with the survey questions in advance of the interview. In total, 21 interviews were conducted with organizations, who were represented mainly by Executive Directors/CEOs, Directors of Education, Program Managers, Farm Managers, or Chief Administrative Officers. Twenty of the organizations interviewed had established urban agricultural education programs, while one was still completing the design and associated operations for what will be the largest urban farm in America (Hilltop Urban Farm, Pittsburgh, PA). Organizations were selected for interviews according to the following criteria: they were clearly working on nutrition impacts and job training, mentioned in multiple literature reviews and/or referenced in interviews by others/organizations within the region (i.e., university extension educators), displayed a commitment to serving underserved communities on their websites/communications, or were potentially successful urban agriculture models.

The interviews provided a richer understanding of the organizations, their program(s), strategies, and processes. Those interviewed were asked what types of skills participants gained, their greatest achievements to date, innovations, how participants were recruited, intended program impacts (especially for newer programs), urban agriculture economic models they believed could be replicable nationally, any unforeseen challenges to success, and shifts in their organization/program direction since its inception. Where possible, efforts were made to gather a more in-depth understanding of how policy, zoning, and land acquisition (e.g., leasing of a city owned lot) were impacting their urban farm and its contributions to city-wide fresh fruit and vegetable consumption.

Public Gardens and Urban Agriculture

Public gardens are ideally situated to use urban agriculture as a conduit for addressing urban needs for workforce development, food access, and nutrition improvement. The Association's *Public Gardens Benchmarking Study* (163 public gardens participated) found that over 40% of public gardens identified as being located in urban areas, with another 17% claiming to be situated in a mixed-use developed environment, which serve large populations. A separate study identified 75% of public gardens as located in close proximity to a central business district (Gough & Accordino, 2013). These institutions serve as centers for education, research, and access to plants and their various uses and benefits. As many American urban centers formulate sustainability and economic revitalization plans that tackle land and food security issues in underserved areas, opportunities are expanding for public gardens to participate in this process, form partnerships with city officials, and increase engagement in urban agriculture programming. Education and programming around food systems are central to what many public gardens strive to do for their visitors in order to foster a stronger connection to their communities and support environmental stewardship and appreciation for plant sciences.

Food systems programming at public gardens yields mixed results. Public gardens vary widely in the topics and challenges on which they hope to educate the public. While some public gardens are working to educate the public on food security (19.5%), food systems' impact on the environment (19.5%), and organic versus non-organic production (21%), there are few that focus on feeding a growing population (11%), biotechnology (5%), or do not focus on any food-related topics or challenges (9%) (Benveniste, 2016). This also includes a small number of public garden food-related program activities that address conventional farming (4%), hydroponics (2%), aquaponics (2%), and permaculture (8%) (Benveniste, 2016). However, many public gardens have programs that engage their communities through urban agricultural education with a focus on nutrition education onsite or job-training/community-based programs (31%), some of which (28%) extend beyond garden walls (Benveniste, 2016). The following are a few examples of urban agriculture programs at public gardens. More in-depth descriptions of public garden programs appear in the later section, Selected Successful Urban Agriculture Models.

Job Training/Community-Based Program Examples:

- **Brooklyn Botanic Garden's GreenBridge** in Brooklyn, NY is a community environmental horticulture program that promotes urban greening through education, conservation, and creative partnerships. Working with block associations, community gardens, and other service groups, GreenBridge is building a vibrant network of people, places, and projects dedicated to making Brooklyn a greener place.

- **Chicago Botanic Garden's Windy City Harvest (WCH)** in Glencoe, IL provides job-skills training to youth from low-income communities, previously incarcerated citizens, community college students, and at-risk youth. Within 13 sites, a staff of close to 40 currently trains and guides about 200 participants per year. Participants have gone on to lead WCH program activities and gained part-time or full-time employment at in Chicago's urban agriculture and local feed sector including at Chicago Botanic Garden.

- **Franklin Park Conservatory** in Columbus, OH works with both Green Corps and Teen Corps programs that focus on developing job skills through urban agriculture. Their Franklin County Green Corps Jobs Program provides horticulture and landscaping training to low-income adults, ages 18–24, interested in obtaining a career in the green, environmental, and agricultural industries. Participants work side-by-side with employees at Franklin Park Conservatory and Botanical Gardens learning skills in horticulture, landscape and garden maintenance, and green practices.

- **Holden Forests & Gardens** in Cleveland, OH operates Green Corps, an initiative that educates and hires teens to work at their urban farm. Green Corps is an urban agricultural work-study program for high school teens. For over 20

years, they have employed more than 1,000 youth at urban farms in the Midtown, Slavic Village, Fairfax, and Buckeye-Woodland communities. In addition, their Vacant to Vibrant Project restores vacant land to productive use, manages stormwater, and works toward environmental justice for urban residents.

- **United States Botanic Garden** in Washington, DC has formed a collaboration with National Center for Appropriate Technology (NCAT) to pilot a veterans urban agriculture training program called Armed to Urban Farm. The program will give veterans an opportunity to see sustainable, profitable small-scale farming enterprises and learn about urban farming as a viable career, by combining classroom sessions with farm tours and hands-on activities. Participants will learn about business planning, budgeting, recordkeeping, marketing, urban soils, land access, vegetable production, and more. The program is available to military veterans and active duty soldiers who are interested in starting an urban farm or who are beginning urban farmers (with less than 10 years of experience). Training programs will be in multiple locations around the country.

On-Site Educational Program Examples:

- **Huntington Botanical Garden** in San Marino, CA started The Huntington Ranch Project in 2008, an urban agricultural garden project that explores and interprets optimal approaches to gardening in their regional ecosystem and climate – the semi-arid landscapes of Southern California. Part classroom and part research lab, the mission of the Ranch is to connect people to food and teach them to grow produce in a sustainable way that conserves water. The garden demonstrates how to grow a variety of fruit trees and other edibles for Southern California residents to replicate at home or in community gardens.

- **Queens Botanical Garden Farm & Compost Site** in Flushing, NY arose from the New York City Compost Project (NYCCP), a project of the city's Department of Sanitation that has partnered with botanic gardens throughout the city for over 20 years to compost organic food waste. The Farm & Compost Site showcases how to make and use compost to create healthy soil for many living creatures. With their compost bin display, one-acre farm, and pollinator habitat, they demonstrate how New Yorkers can divert organic waste and improve urban soils. Vegetables grown on the Farm are shared with interns and volunteers, and donated to emergency food relief programs. Crops grown on the Farm include a variety of heirloom tomatoes, beans, turnips, kales, lettuces, peppers, and radishes.

- **The U.S. National Arboretum's Washington Youth Garden** in Washington, DC uses the garden as a tool to enrich science learning, inspire environmental stewardship, and cultivate healthy food choices in youth and families. This is a program of the Friends of the National Arboretum with support from the U.S. National Arboretum, and primarily serves underserved, low-income schools and families northeast of the Capitol.

Knowledge Gaps at Public Gardens:

Even with such a diversity of urban agriculture programs, if public gardens are to successfully support future food education in urban areas, they will need more strategic partnerships with agricultural research-based institutions (such as land-grant universities), urban farm associations/networks, local food policy councils, non-profits, federal agencies, and community-based organizations. Knowledge gaps in food-related programming at public gardens in or near urban areas were identified in literature review and previous studies, such as *An Evaluation of Food Systems Education and Interpretation in U.S. Public Gardens* (Kinley, 2017) and *Food-Related Programming in Public Gardens* (Benveniste, 2016)**.** Key challenges include increased cross-departmental collaboration, stronger evaluation and measurement of educational programming impacts, and improved data tracking method. The following were identified as major challenges to successful food-related programming at public gardens in urban areas:

Food-related Programs and Education Challenges:

- Educational programs appear to be missing hands-on learning opportunities. To date, few public gardens have more than one acre of outdoor agriculture production areas (American Public Gardens Association, 2018), This can make it difficult to connect educational displays, exhibits, and classroom learning to experiential learning. In addition, some gardens' outdoor agriculture production areas are off-site, which makes it difficult to connect with other garden programming and garden visitors.

- The most common food-related activities offered by gardens include garden displays, classes, and lectures. Nearly half of gardens host food-related exhibits and culinary programs with few gardens engaging in food crop seed bank collections, training programs, or agricultural research (Benveniste, 2016). Without proper training on growing food, people in food insecure urban areas may not benefit significantly from displays, lectures, and culinary programs. Food-related classes, in particular, are often designed to attract new audiences rather than as a tool for teaching people about food systems. Individual class content is influenced by instructors who are often identified from program managers' personal networks, and who may not incorporate current agricultural science or proven industry knowledge. Moreover, classes are sometimes fee-based and thus exclude individuals that cannot afford them.

Policy-related Education Challenges:

- Survey results identified food-related research, food policies, zoning regulations, and specific production-related activities as underrepresented topics in food systems education at public gardens (addressed by less than 20% of survey respondents; Kinley, 2017). In fact, food policy was largely

ignored as an aspect of food systems programming with less than 8% of public gardens including that as an aspect of their educational program (Benveniste, 2016). This is significant to note for urban public gardens, as an understanding of municipal policies governing food and agriculture is key to replicating relevant practices without breaking the law or unknowingly doing environmental harm. Most public gardens reported struggling with the red tape and bureaucracy that surround food policies in their area, such as zoning laws and safety regulations.

- Organizations that claim to be addressing food insecurity may not be aware of its root causes or understand the barriers to improving health in underserved communities. (Kinley, 2017).

Mission Alignment, Networking, and Funding Challenges:

- Public gardens encounter difficulties reaching new audiences, as most of their marketing is directed toward membership. While each garden reported a number of unique obstacles, marketing and communications of food-related programming frequently came up as challenges for gardens traditionally known for ornamental horticulture.

- Food-related programming often lacks alignment with a garden's mission and/or other initiatives, making it difficult to justify continued funding. In particular, small gardens in a lower revenue bracket have less financial capacity and resources to invest in agricultural production areas or outreach programs in urban areas.

- Forty percent of public gardens report that limited human and financial resources are the main factors for them not having developed food-related programs (Benveniste, 2016). Because many existing urban agriculture programs focus on outreach to low-income or underserved communities, almost all funding must come from non-program-fee sources, such as sponsors, grants, or the garden itself. Barriers to food systems education included lack of expertise, limited human resources, and the perception that certain food topics were not mission-relevant. Some programs have been able to form external partnerships to fill expertise gaps, but other programs are still struggling to make these connections. Networking with regional farming associations and urban farmers is a challenge for many public gardens.

Results

Prior research included *Food-related Programming in Public Gardens* (Benveniste, 2016), which surveyed programs on how to grow and prepare fresh fruits and vegetables, interventions designed to increase access to healthy foods, and job skills training. Most gardens interviewed noted that their food garden displays and programs

were comfortable and familiar points of entry for less traditional garden visitors, and that offsite programs afford important community connections. Many off-site activities lead to or involve collaborations with other organizations. Many gardens observed that their food education and outreach programs positively impact participants' quality of life. However, the anecdotal nature of these observations makes them difficult to quantify and track over time. As such, they pose an inherent evaluation challenge in measuring programmatic impact. Half of the gardens interviewed (52) have offsite operation facilities and/or programs that integrate food and agriculture activities with community gardening and revitalization, children's education, youth leadership, job skills training, or social entrepreneurship.

From this initial research of urban agriculture programs nationwide, 27 survey and interview responses were gleaned. Ten filled out the survey, and five participated in a more in-depth interview (City of Cleveland Department of Economic Development, Green Veterans, Growing Home, NYC Parks GreenThumb, and Urban Agriculture Department of University of Maryland Extension). Five for-profit organizations were contacted with only one agreeing to an interview request (Agritecture). Survey responses and interview notes were combined for a more comprehensive data set. Survey respondents that selected "Other" and wrote in a response were then added in as a separate category (i.e., Immigrants, Figure 1 below). Five of these programs were 15-years old or older (Added-Value Farms, GreenThumb, Growing Families, Growing Home, Homeless Garden Project, NYC Parks). Five of the 50 organizations surveyed were urban university extension services. All responded via survey or interview and were extremely helpful in providing regional and state trends.

The survey and interview process demonstrated that low-income families and individuals (18) were the most common target audience (Figure 1) with urban agriculture job training (19), agriculture business or entrepreneurship education (15), and nutrition education (12) being the most common program components included (Figure 2).

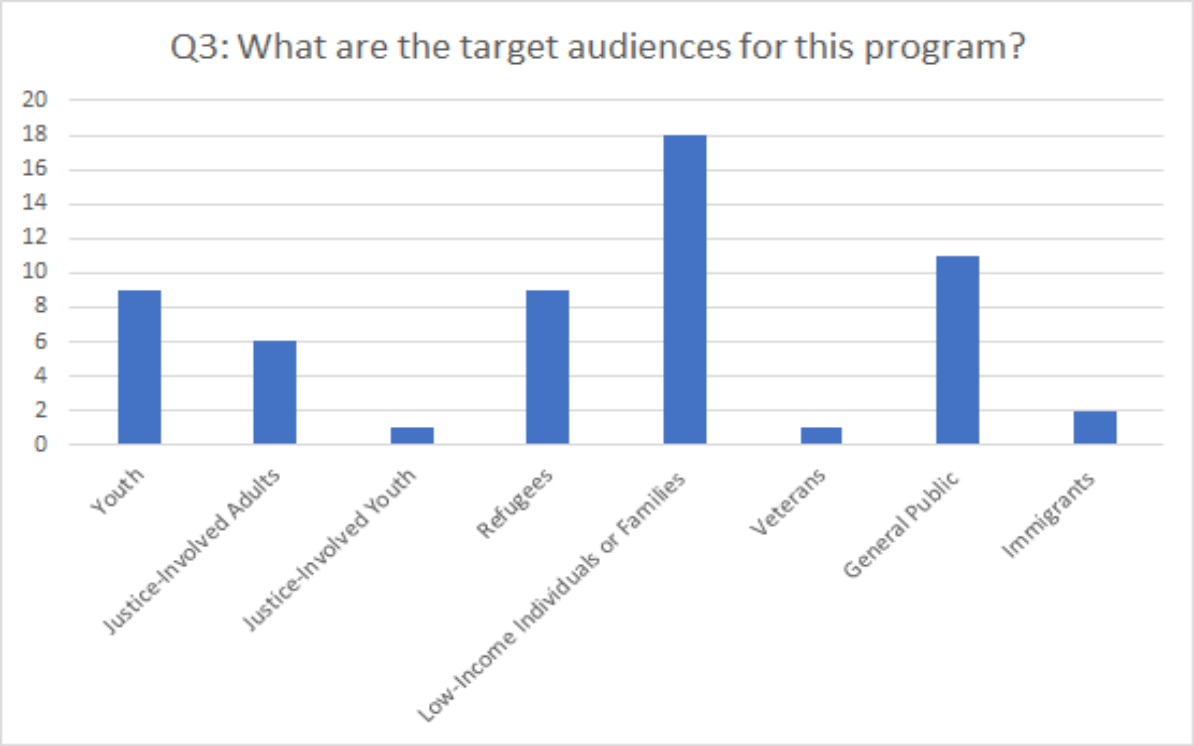

Figure 1. Responses to question three of survey/interviews regarding most popular target audiences for urban agriculture programming.

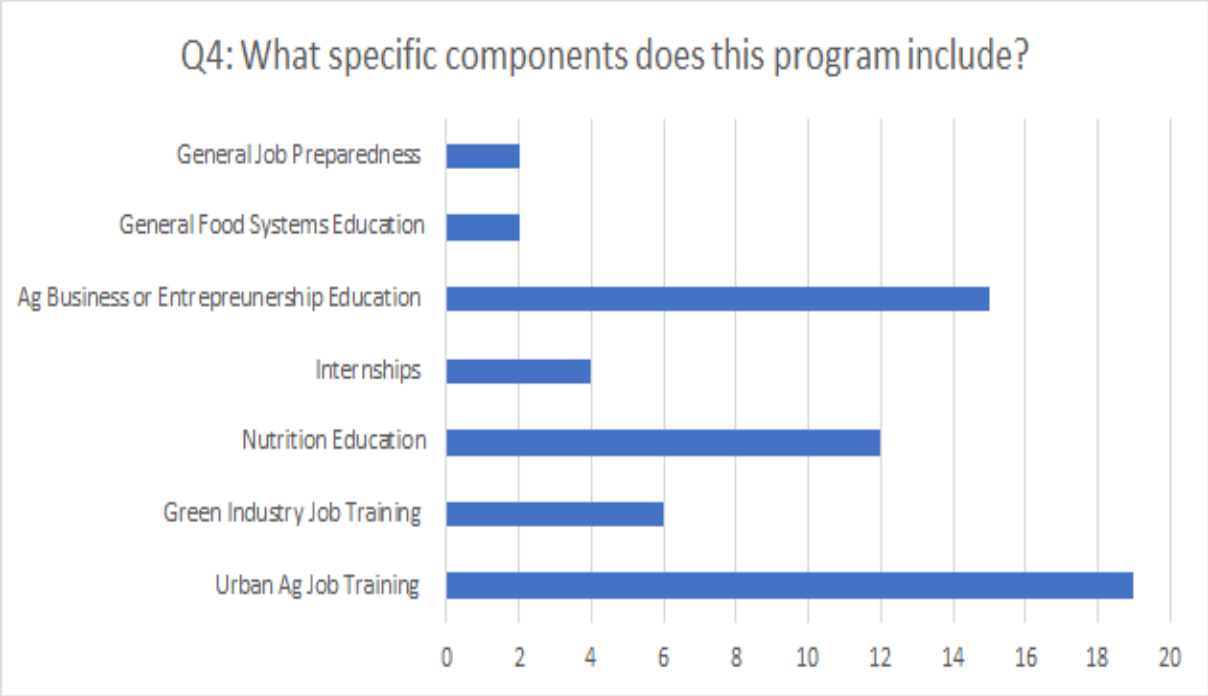

Figure 2. Reponses to question four of the survey/interview regarding specific components of their urban agricultural programming.

Despite many survey respondents and interviewees mentioning a focus on nutrition education and the desire to serve underserved communities in food desert areas, few collected data on health outcomes or consumption patterns of their produce (Figure 3). Many survey respondents and interviewees (16) indicated that their programs are only collecting data using the metrics (number of participants, length of participation, yearly food production, cost-benefit analysis of tools and outreach activities) required by USDA or other granting bodies, the leading primary source of funding (grant funding is distinguished in survey and interviews from other government funding; Figure 4). Furthermore, many of these programs responded that they work closely with local government departments and align their data collection with existing city initiatives directed toward economic revitalization and sustainability.

Of the 27 organizations contacted, the most common partnerships for urban agriculture programs were with parks and recreation departments, and universities. For example, the John Hopkins Center for a Livable Future farm is based in a 1,200-square foot hoop-house on the grounds of the Cylburn Arboretum, where space has been provided by the Baltimore City Department of Recreation and Parks. Few programs contacted have revenue streams associated with program services (5) and/or urban agricultural production-related sales (5). This is notable as it shows the difficult nature in creating a self-sustaining economic model that could be replicated on a national scale.

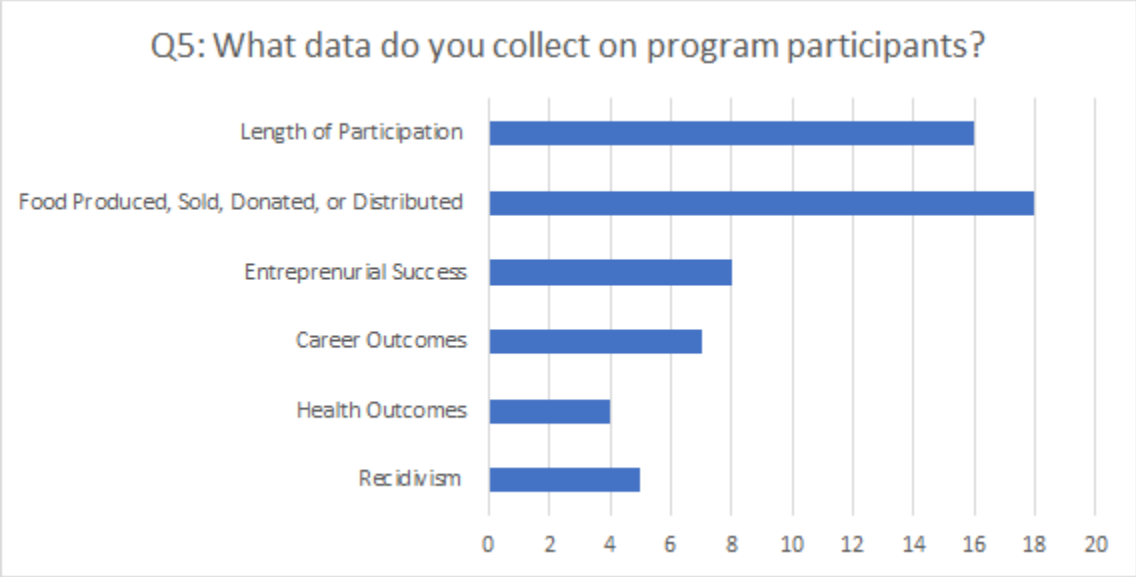

Figure 3. Reponses to question five of survey/interview regarding collected data on urban agriculture program participants.

As Figure 3 shows above, an overwhelming majority of data are collected on length of participation and food produced, sold, donated, or distributed. Several survey respondents and interviewees also collect data on the number of community gardens served or established, participants that went on to write an urban farm business plan, and individuals/families served (data not shown). The lack of data collected on nutrition outcomes, career outcomes, and entrepreneurial success may be the result of grant-driven data collection.

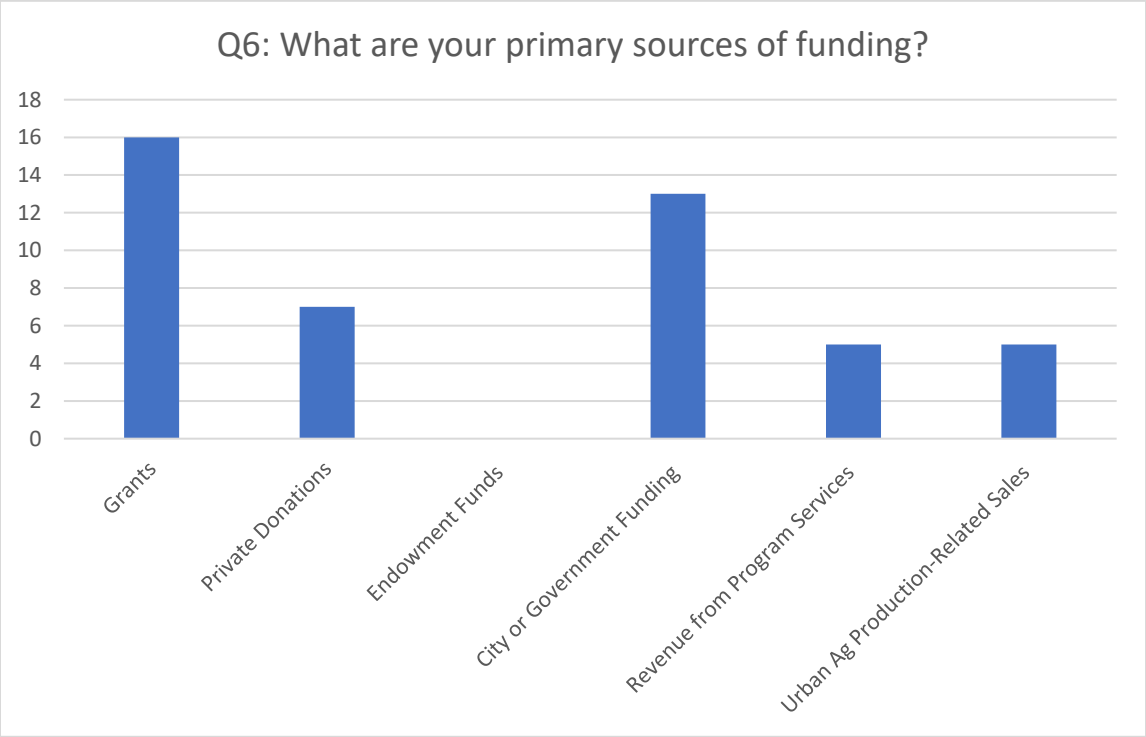

Figure 4. Reponses to question six of survey/interview regarding funding sources for urban agriculture programs.

Source of funding is an important factor in maintaining a long-term urban agriculture program. As Figure 4 shows, many programs rely exclusively on grant funding and therefore have specified metrics to track as part of USDA and other grant reporting requirements. They do not go beyond these evaluative metrics due to staff size, lack of funding, and the cyclical nature of grant awards. Moreover, many urban farmers report they are ill-equipped to sustain success due to the realities of the real estate market in their city, which may explain the lack of data and reporting on entrepreneurial success. This data gap may also be the result of an inability to maintain contact with program participants as low-income individuals or families may not have consistent communication access. More success has been realized with community center approaches and alumni programming that continue to engage “graduates” in-person (see Selected Urban Agricultural Models section for examples). Results suggest it could be several years, if at all, before an urban farm, whether small or large, reaches financial stability without additional philanthropic support and assistance.

Based on interview responses, recruitment methods varied depending on program partnerships and application requirements and processes. Urban agriculture programs tend to partner with organizations in the food industry that are looking for specific job skills or certifications; urban food hubs and networks; or job placement organizations that aid justice-involved youth and adults, low-income individuals or families, or those with mental and physical health issues (rehabilitation clinics, law offices, social services, correction services, health and wellness centers). All are valuable resources that

interviewees relied on to provide exposure and help with recruitment efforts. Growing Home, for example, works with Cabrini Green Legal Aid and has developed stringent selection criteria, only accepting participants with serious criminal records. They recruit by hosting events only in Chicago's underserved areas and require those interested to continue to show up at hosted events before selecting them. Growing Home, as well as CAUSES, DUG, and Urban Tricycle, also utilize their graduates as recruiters and success stories. Graduates come back and speak as alumni at formal and informal events to share how they benefitted from the program.

A key component of many urban agricultural education programs is connecting participants with agricultural experts and providing on-site mentorship and training. Research/Interviews revealed that many programs have staff agricultural experts who provide training and support for critical farming skills such as season extension, organic pest control, food safety, building pollinator habitats, and tool care. Farm School NYC, for example, offers a two-year certificate program in urban agriculture with courses taught by experts in the field. A wide range of topics from social justice issues, to urban planting techniques, to grassroots community organizing are covered. As a result of receiving technical training from agricultural experts, there are some examples of participants earning a special license or certification that is recognized by government agencies and specific food industries, enhancing the chances of securing a job. For example, San Antonio Food Bank's Texas Second Chance Program trains justice-involved adults for their material handling equipment license with the end goal of providing jobs in the food industry. Tricycle's Urban Agriculture Fellowship Program allows participants to earn their certificate in urban agriculture, recognized by the USDA-Natural Resources Conservation Service (NRCS).

Discussion

Survey results indicate that urban agriculture programs across the country do not have unifying goals, but instead individually target a diversity of audiences and outcomes. Some aim to grow food at community gardens, providing food directly to those working in the garden or donating food to a local food bank. Several work to increase financial and technical assistance to existing urban farmers, and others provide educational and technical assistance to those interested in learning to farm as well as selling produce at a reduced price in low-income neighborhoods (farmer's markets, CSAs). Because of zoning, city ordinances, and food policies, many programs focus on constructing/maintaining raised soil beds and hoop-houses to develop infrastructure on a small-scale community level where large tracts of land are not needed. Some programs are primarily focused on teaching transferable job skills that are relevant to jobs beyond urban agriculture or the food industry. In these cases, urban agriculture is used more as a springboard for those with barriers to employment and housing, supplying them with the support network needed to reintegrate themselves into a community and to make a living wage.

The challenges with maintaining these programs are limited year-round staffing and lack of funding, which impact the organization's ability to collect meaningful data and evaluate impacts. Similar findings were found in *Food-Related Programming at Public*

Gardens (Benveniste, 2016), which cited the expense and amount of time needed to track and evaluate program outcomes as a challenge. Perhaps serving as a future model to track nutrition outcomes, several urban agriculture programs, including Denver Urban Gardens (DUG) and Tricycle Urban Agriculture, have partnerships with a hospital or affiliated healthcare provider/foundation and will be evaluating nutrition outcomes.

The multi-faceted nature of urban farming goals often leads to the targeting of several audiences. The following are some examples that illustrate the varying nature and focus of different urban farms and urban agriculture programs:

- **Green City Growers Cooperatives (Cleveland, OH)** has a three-acre hydroponic greenhouse, grows greens and herbs, and provides living wage jobs for low-income residents in the surrounding area. They teach horticultural skills but also build a positive work culture, teach conflict resolution, and strengthen communication skills. This initiative was created as a strategy to make Cleveland a more cohesive community by creating shared economic opportunity and prosperity.

- **Hilltop Urban Farm (Pittsburgh, PA**) will have a three-acre CSA farm, three-acre farmer incubation program, one-acre youth farm, a farmer's market building, a 5,000-square foot event barn, a public community garden area, and an education center. This will officially be open to the public in 2020.

- **Rid-All Green Partnership (Cleveland, OH)** has a five-month training program that includes learning on-site and practicing hands-on skills needed to profitably farm in the city. The program offers a seminar series on topics including greenhouses, training gardens, aquaponics systems, large-scale vermicompost and composting, anaerobic digestion, and food distribution. Their Victory Garden Initiative is a six-week training program for veterans who, once they complete the training, can apply to be placed at the Victory Garden Demonstration Site to earn an income managing their own farming project.

- **The Bay Area Farmer Training Program (Oakland, CA)** supports immigrant, refugee, formerly incarcerated, and under-resourced beginning farmers by offering a strong hands-on educational component. The program offers learning opportunities with experienced farmers through site visits and guest lectures. This program also offers new farmers the opportunity to learn agro-ecological farming and business management. Diverse topics include aquaponics, nursery production, sustainable livestock care, business planning, marketing, product distribution, and access to land and capital.

- **Urban Agriculture Department of University of Maryland Extension (Baltimore, MD)** helps Baltimoreans repurpose vacant city-owned lots by promoting home gardening, teaching proper gardening techniques, and training master gardeners. Its partnership with the Parks & People Foundation supports community greening projects in Baltimore and provides educational workshops,

technical support, garden tool banks, and other resources for Baltimoreans interested in urban gardening. In its first year, the program met informally with 22 urban farms, served 85 individuals with 200 hours of technical assistance, launched a monthly e-newsletter with 187 subscribers at a 39% open rate, and leveraged existing UMD Extension programs and stakeholder groups to offer trainings tailored to their urban farmers' goals.

Success for urban agriculture is not necessarily defined by financial stability. A number of other objectives are also being met. Urban agriculture can be a conduit for synchronizing municipal, non-profit, and even for-profit entities toward collective community planning and targeted positive impacts. Policy plays a large role in urban agriculture projects through land access, leasing agreements, ordinances relating to city held property, and water access (including purchasing). This factor deeply influences the face of urban agriculture programs throughout the country, where real estate markets vary widely.

There are excellent examples of workforce development programs using urban agriculture as an integrated hands-on component. These range from high-touch therapeutic environments to much more loosely structured open-access training opportunities. There are some promising results coming from programs assisting people who have moderate to extreme barriers to work. However, few of these programs are able to place graduates in urban agriculture businesses.

Lacking proof of profitability for urban agriculture businesses, making decisions regarding urban agriculture program structures is complex and requires several considerations. There are very few programs that offer viable (profitable) entrepreneurship models for people wishing to start small scale urban agriculture enterprises. That said, there may be other social, supplemental income, and nutrition benefits to some populations, such as refugees and recent immigrants or those with extremely limited means.

In terms of using technology for start-up businesses (such as hydroponics, vertical farming, aeroponics, etc.), it is important to note that very steep initial investment is needed and high-end markets nearby may be required for profitable operation. An example is indoor operations solely focused on microgreens for epicurean restaurants and markets. Capital costs for such infrastructure are $25-$30 per square foot for a greenhouse and $150-$200 per square foot for a 4-level vertical farm with LED lighting (Agritecture, n.d.). Many of these businesses have launched in the last three years and almost none have exceeded the return on investment. While these businesses have led to some urban job opportunities and there may be transferable skills gained from such ventures, heavy startup costs make these challenging models for social enterprise. Many of these projects supplement operational income by producing and holding events.

Economic sustainability in the case of the more typical non-profit urban agriculture models (those with clearly stated goals for social, job training, or nutrition outcomes) is worth considering further. Very successful models seem to include community initiatives

(a citizen-voiced and citizen-driven need being fulfilled) and a consistent form of financial support. There are a few examples of output (e.g., product sales) being significant enough to meaningfully supplement program operations. These are worth considering more closely as a potential model for success (See, for example, RecoveryPark Farms in the Selected Urban Agricultural Models section).

Another successful pathway for non-profit urban agriculture models is to partner with universities, city departments, public gardens, hospitals, foundations, and other institutions in order to have greater potential impact on revitalizing communities and food insecurity, along with strengthening the capacity to develop rigorous, long-term data and evaluation metrics on nutrition outcomes.

Universities are devoted to research and education. A university-affiliated urban farm may already have existing infrastructure to use for urban agriculture training purposes, urban agriculture technology to evaluate for project use, and expertise to engage both students and community members on local food issues. Universities are also less reliant on recruiting and maintaining interest, as students can train, learn, and engage community members for up to four years.

Some non-profit organizations vet businesses and form mutually beneficial partnerships to supply them with future employees trained in relevant skills. Urban farms have brokered partnerships with distributors to obtain a guaranteed sales agreement to supply businesses like restaurants and corner stores in food deserts (e.g., RecoveryPark Farms). Although there were no such examples observed herein, an urban farm alliance comprised of graduates of these urban agricultural education programs is another partnership model that could yield powerful results. Because of the limited real-estate in urban centers and the preponderance of small scale urban farming, farm alliances coming together to supply larger businesses and institutions (hospitals, school districts, etc.) and have a unified voice on food policies and zoning regulations might hold greater community influence.

There is much anecdotal evidence that nutrition outcomes are a benefit of many urban agriculture programs, but due to many factors such as grant cycles and limited resources, evaluation data is extremely limited. It is promising, however, that in many cities the number of urban plots being used to grow food plants and estimates of food production are being tracked (NYC Parks GreenThumb, Truly Living Well, etc.). That information overlaid with food accessibility data in those areas of embedded poverty implies that the food produced is being consumed locally by those without previous access. It should be noted that not just for high-tech agriculture, but for all urban agriculture in general, there is little quantitative evidence directly indicating impact on nutrient deficiency correction in urban areas.

Challenges to Urban Agriculture:

- Initial financial support is a barrier to success for many urban agriculture models, especially when they are farming at a small scale and competing against larger

commercial distributors. Many of these projects supplement income through agritourism or by hosting events. Truly Living Well, Muir Ranch, and Agrictecture are examples of for-profit and non-profit urban agriculture organizations that heavily rely on agritourism to supplement their income for operations and infrastructure.

- Many of these programs have only existed for a few years and their ability to cultivate a profitable business model is unproven given the lack of evidence that they have the infrastructure and resources to sustain production and partnership commitments. A guaranteed supply-chain sales agreement and distribution partner that can help promote the program and distribute produce to restaurants and other local businesses is very difficult to establish. Green Veterans-Urban Farming Program, for example, has been unsuccessful in finding a partner to distribute their urban farm produce.

- Urban agriculture programs can range from an eight-week training program with six-months to a year of follow-up assistance and agricultural business advice like Nuestras Raices (Holyoke, MA), to a two-year program like HomeGrown at Phipps Conservatory and Botanical Gardens (Pittsburgh, PA). Shorter training programs with less of a follow-up/post-training advisory component tend to lead to an unsustainable urban agriculture business.

- Favorable city ordinances and zoning policies are vital to successful urban agriculture. The City of Atlanta has an ordinance that allows people to grow and sell food to whomever they want. Programs that teach participants how to build raised soil beds and hoop-houses and get involved in CSA and farmer's markets will be more successful under these circumstances. Alternatively, NYC Parks GreenThumb must abide by the current laws in New York City, which state they can sell only if proceeds go directly back into production (no profit allowed). Programs like HomeGrown Minneapolis work with city officials to establish building codes and permits that allow for year-round greenhouses and hoop-houses.

- A few studies correlate urban farms and community gardens to increasing home values and household income. The presence of gardens in many urban areas can raise property values as much as 9.4% within five years of establishment (Golden, 2013). However, these gardens and farms can attract younger, more affluent populations which can often lead to gentrification, culturally changing neighborhoods and alienating long-time residents.

- A lack of community and stakeholder consultation/input prior to building a farm or community garden was a common issue interviewees cited in establishing an urban agricultural education program.

- Organizations often have insufficient staff and, in some cases, could not afford year-round staff.

Potential in Urban Agriculture:

- Many urban agriculture programs provide training in 'soft' job skills that are transferable to jobs in other industries. Out of the 27 survey and interview responses received from non-profits and for-profits, 56% focus their programs on agriculture entrepreneurship education and 70% on urban agriculture job training. A review of the literature also revealed that farmer's markets and CSAs can successfully incubate new businesses and provide a competitive and alternative option to equivalent amounts of organic and conventional produce at retail grocery stores (Golden, 2013; Santo et al., 2016). The low-risk and flexible nature of farmer's markets allows many participants to refine their operations and develop a devoted customer base. Several small farms or food processers in urban settings produce value-added products to sell. Urban farm projects can serve as catalysts for entrepreneurial projects that benefit residents and gardeners.

- Sixty-seven percent of non-profit and for-profit organizations that responded as part of this study have urban agriculture programs that track information on food that is produced at community gardens and donated to charitable causes. Interviews, survey responses, and the literature review revealed that many community garden programs grow beyond personal consumption and share excess fruits and vegetables with other community members and local food banks. Urban agriculture projects evaluated by the Community Food Security Coalition produced 18.7 million pounds of food with over 726,000 pounds donated for community consumption (Golden, 2013).

- Substantial research indicates that urban agriculture saves participants money on their food expenditures. Interviewees for this study expressed that community gardeners who participated in their training programs frequently discussed the cost savings of growing food. Since most gardeners have to pay little or nothing for membership and many programs provide tools, land, and utilities, the average cost of community gardens was $25 per plot, giving participants a high return on investment (Golden, 2013; Santo et al., 2016).

- Urban agriculture activities and programs often lead to the development of healthy corner stores in underserved areas. Food access concerns across the nation have led to the creation of the Healthy Corner Store Network, which "supports efforts to increase the availability and sales of healthy, affordable foods through small-scale stores in underserved communities." In St. Louis, the Healthy Corner Store Project is a partnership between the City of St. Louis, University of Missouri Extension, and the St. Louis Development Corporation. Corner stores agree to regularly stock a number of healthy foods and beverages, accept Supplemental Nutrition Assistance Program (SNAP) benefits, and use

promotional displays for healthy foods. A similar program in Louisville, Kentucky is called the Healthy in a Hurry Corner Stores Program.

- Urban agriculture may save municipal agencies money by transforming vacant lots and commercial building roofs into urban agriculture sites. For example, in San Francisco, the Department of Public Works saved an estimated $4,100 a year per site by preventing vandalism and dumping and reducing labor-intensive upkeep (Golden, 2013). Any further site improvements to prevent stormwater runoff/conserve water would also be both economically and environmentally beneficial.

- Urban landscapes and green spaces such as community gardens can add, depending on the region of the country, anywhere from 6 to 11% to the perceived base value of a home (Behe et al., 2005). Gardens located in close proximity (within 1000 ft.) to community gardens saw a positive initial and stable increase after their establishment (Voicu & Been, 2008). An investment in a green space can be recovered and increase both the actual and perceived value of a property.

- There is tremendous social value from urban agriculture, including providing a medium for learning experiences and educational programs specific to youth development opportunities. Many of the case studies featured in our literature review describe projects that include youth leadership opportunities and youth/at-risk youth apprenticeship programs. In fact, 37% of urban agriculture programs at non-profits that responded to the study target youth/at-risk youth.

- Urban agriculture is an avenue for rehabilitation and reintegration for justice-involved adults. Many urban agriculture programs target those with serious barriers to employment due to prior convictions. Urban agriculture training becomes a vehicle for them to earn a living wage and contribute to their communities, whether in urban agriculture or another industry. Interview and survey responses show that 22% of urban agriculture programming focused on justice-involved adults.

- Urban agriculture can promote cultural integration. Several urban farm and community garden projects work with immigrants and refugees to cultivate food unique to their culture and heritage. Since many immigrants have substantial experience in agriculture, these programs allow them to use their existing skill sets to grow and sell produce and provide food access to their families and communities. Urban agriculture gives immigrants and refugees an opportunity to share their cultural varieties of vegetables and fruits with neighborhood markets. This not only helps them network with other immigrants and refugees but also creates opportunities to share their knowledge and culture with non-immigrant or non-refugee residents. Based on interviews and survey responses, immigrants and refugees were involved in at least 41% of urban agriculture programming. This number is likely higher given the high volume of literature and programs researched that mentioned this as one of their audiences.

- There is some evidence that urban agriculture programs increase fruit and vegetable consumption. Research shows that people who participate or have family members that participate in community gardens “were 3.5 times more likely to consume fruits and vegetables than people without a gardening household member.” Youth involved in community garden programs discussed eating more fruits and vegetables and less junk food as a result of their participation (Golden, 2013).

- Some reports suggest that urban agriculture is more effective as a strategy for increasing food and health literacy than it is for impacting food production. Several community and urban farm programs included nutrition information that discusses healthy food choices at the request of communities. These programs, as well as CSAs and farmer’s markets, can raise nutrition awareness and increase healthy cooking and eating practices. “Greenness” (park access, street trees, green cover, etc.) has been tied to lower rates of obesity in rural and urban environments (Michimi & Wimberly, 2012). Due to the lack of access to nature and green spaces in many densely populated urban areas, community gardens are places for residents to recreate and engage in physical activity for sustained amounts of time, which has been found to prevent stress, depression, and improve overall well-being (Golden, 2013; Santo et al., 2016).

Selected Successful Urban Agriculture Models:

The following are a selection of urban agriculture programs at public gardens and non-profit organizations that have demonstrated success in urban agriculture programming whether through data tracking/evaluation methods, food production, sustained partnerships, and/or plans to scale up their program in the future:

Bartram’s Garden (Philadelphia, PA):

Sankofa Community Farm at Bartram’s Garden is in a Southwest Philadelphia neighborhood and has an African focus and renewed resources and partnerships to sustain youth development, community health, and food sovereignty. The farm has increased access to fresh fruits and vegetables within the community for both older African American families and new West African immigrants who are making Southwest Philadelphia their home. The four-acre farm is maintained by roughly 20 paid local high school interns. It produces and distributes over 15,000 pounds of food each year, works with more than 50 local families in a community garden, manages weekly neighborhood farm-stands and grocery partnerships to sell its produce affordably and locally, and distributes over 80,000 vegetable transplants to over 130 Philadelphia farms and gardens through the Pennsylvania’s Horticultural Society’s (PHS) City Harvest Program.

College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES) of the University of the District of Columbia (UDC) (Washington, DC):

CAUSES has set out to build a model that is universally applicable – focusing on growing cities with high real estate costs. Their model tries to create power in the marketplace through the production of value-added products while working with small urban farm producers. CAUSES has a business incubator structure with associated training programs in food production, urban agriculture job training, green industry job training, nutrition education, and agriculture business/entrepreneurship. Their training also has a strong focus on water conservation through installing rain gardens and teaching basic water management concepts. Participants have the opportunity to earn national green infrastructure certification from DC Water at the completion of their training.

Both students and community members can participate in their programming. CAUSES works closely with extension educators to remain relevant and accurate and to recruit participants. Prospective entrepreneurs can use an online application process to apply for the use of facilities. A review panel interviews applicants to select the most promising entrepreneurs. Since new business start-ups only have to incur operating expenses, their financial viability and future expansion efforts have great potential. By investing in urban food hubs, UDC expects to improve the success rate of the urban businesses it incubates.

Local entrepreneurs receive training and technical support to implement their business plans. These can range from health-focused businesses that maximize nutrient yield and offer health assessment and nutrition counseling, growing microgreens and herbs for high-end restaurants, producing ethnic crop for local niche restaurants and grocery stores, green roofs that serve as food production and event space, and growing native plant seedlings for urban parks and rain gardens. CAUSES also conducts research to trial produce varieties for indoor environments focusing on crops for ethnic restaurants. They host a variety of community workshops on gardening and have a neighborhood steering committee at each site. Most importantly, they work with employment agencies and DC Water, for job placement and networking.

CAUSES tracks data on SNAP education programs and their ability to increase consumption of fruits and vegetables for children. They are active in tracking nutrition outcomes because full-time physicians are part of their programs. When participants graduate, CAUSES follows up with them for six months and again at the one-year mark to evaluate fresh vegetable and fruit consumption patterns. While they have plans to do more comprehensive data and evaluation collection, they currently track participant numbers and green infrastructure certifications awarded.

Chicago Botanic Garden (Glencoe, IL):

- **Windy City Harvest (WCH)** grows more than 100,000 pounds of produce a year and provides job-skills training to low-income citizens. The initiative currently trains about 200 participants per year – a mix of community college students, at-

risk youth, and (in separated programs) previously incarcerated citizens (non-violent, non-domestic abuse, and nonsexual criminal offenders). This program has evolved over the years and now employs full-time social workers and a staff of close to 40 devoted to ensuring its success and expansion. Many of the program participants have gone on to lead program activities and gained part-time or full-time employment at Chicago Botanic Garden. The program operates at 13 sites in the Chicago area.

- **VeggieRx** is an expansion of WCH in partnership with Lawndale Christian Health Center. The expansion includes the addition of a new urban farm with a year-round facility. The new farm doubles WCH's training capacity and increases production. The roughly 30,000 square foot facility houses a 50,000-gallon aquaponic system, a greenhouse, a cold storage area, a healthy corner store, and a commercial kitchen (for making value-added products and hosting cooking classes). The health center owns the facility and WCH is the tenant. Rent is paid in the form of produce for the health center's VeggieRx program, in which health care providers "prescribe" boxes of produce for people with chronic health conditions. VeggieRX is funded through USDA's Food Insecurity Nutrition Inventive (FINI) Grant Program. Lawndale Christian Health Center uses an electronic patient scheduling platform to help schedule and remind patients to participate. The program has comprehensive data on boxes distributed (733 in 2016-2017) and to which demographics. In 2016-2017, 80% of participants reported eating more than half their Veggie Rx box weekly.

Denver Botanic Gardens (Denver, CO):

Denver Botanic Gardens Chatfield Farms is a 700-acre native plant refuge and working farm located along the banks of Deer Creek in southern Jefferson County. It has its own Community Supported Agriculture (CSA) program, Chatfield Farms CSA. Chatfield Farms CSA was created as part of a grant offered by Kaiser Permanente, a health care provider, to bring more local, nutritious foods to Denver. Denver Botanic Gardens is committed to increasing access to fresh, healthy food through a number of community-based projects.

Chatfield Farms CSA launched in 2010, and was the first offered by a large botanic garden. The CSA provides 270 subscriber families with fresh, local produce for 23 weeks out of the year. Several tons of surplus vegetables have also been donated since the CSA's inception. This CSA is also the growing site for the Denver Human Services (DHS) and City of Denver farm stands and the site of the Chatfield Farms Veterans Farm Program. More than 150 neighborhood gardeners grow produce for their families and community members. Additional produce is donated to food banks and other distribution programs every year. Moreover, Denver Botanic Gardens Education Department visits schools across Colorado with the Cultivation Cruiser, a classroom on wheels. The Grow Local Colorado program helps design vegetable community gardens across the Denver metro area. On-site programs use Chatfield Farms as a living classroom for kids, families, and veterans to learn farming skills.

Denver Botanic Gardens works with DHS, the City of Denver, and Union Station Farmer's Market to provide farm stands at several weekly locations with fresh vegetables, local fruits, and other farm-fresh products for sale to Denver residents June through October.

Desert Botanical Garden (Phoenix, AZ):

Desert Botanical Garden's new incubator farm in South Phoenix is called Spaces of Opportunity. It hires aspiring farmers and pays them a living wage for their work as they develop skills to eventually start their own farms. The farm's mission is to enable all South Phoenix families to have affordable access to healthy food. The farm is engineering a comprehensive, neighborhood-level food system where gardeners, farmers, and farm workers are celebrated as artisans. It is a 10-acre incubator farm with family gardens and an onsite farmer's market.

The farm provides a quarter-acre to one acre plots of land with a preference to farmers with limited resources who are part of the South Phoenix community. In addition, their Harvest/Nuestra Cosecha Farmers Market and community supported agriculture (CSA) subscription is a cooperative agreement between farmers who grow without chemicals, market their produce primarily in South Phoenix, and work together with mentor farmers. For $5 a month, community members can rent a plot to plant, grow, and harvest produce for their own use or to share it with others. Regular events are also held at the community garden to celebrate food, diverse culture, and community.

This incubator farm came to fruition through strategic partnerships with the Roosevelt School District No.66, TigerMountain Foundation, The Orchard Community Leaning Center, and Unlimited Potential. It is supported by foundations, health insurance providers, and government agencies such as Blue Cross Blue Shield of Arizona, ArtPlace America, Cigna, Newman's Own Foundation, National Endowment for the Arts: Our Town, USDA Local Food Promotion Program, Vitalyst Health Foundation, and Sprouts Healthy Communities Foundation.

Dreaming Out Loud-AyaUplift Program (Washington, DC):

Dreaming Out Loud helps open opportunities by growing jobs, supporting community economic development, and building human capacity through training. It addresses educational needs (over 50,000 D.C. residents do not have a high school diploma) and employment concerns (D.C. youth unemployment rates are twice the national average, and the current African-American unemployment rate is above 12%; Simons, 2018).

AyaUplift is a six-month intensive skills training and personal development program for D.C. residents with low income who live in public housing and/or receive public assistance. The program uses Dreaming Out Loud's Food Distribution Program, the Organic Garden at Blind Whino in Southwest, and the Farm at Kelly Miller as training

sites that introduce program participants to a healthy food culture while also giving them transferable employment skills and fair wages. The program runs for 26-weeks and has four components: Garden Training, Food Distribution Training, Food Systems & Community Engagement Training, and Personal Leadership Development.

Beautiful RVA/Lewis Ginter Botanical Garden (Richmond, VA):

Lewis Ginter Botanical Garden is serving as a “backbone” institution in a shared leadership model called Beautiful RVA that desires to make a sustainable collective impact in the Richmond region. Beautiful RVA is an experiment in community building, communication, and collaboration across often insular and isolated public and private entities. It is an effort to increase local capacity to accomplish urban greening projects that are often beyond the reach and resources of local government.

The initiative directly supports the Garden’s 2016 strategic goal to “strengthen and enhance the Garden’s community engagement through leadership, partnerships, projects, communication, and events.” The current 300+ person roster of Beautiful RVA represents an affinity group of over 60 agencies and organizations including City of Richmond administrators and elected representatives, heads of prominent community environmental organizations, cultural and tourism representatives, university professionals, urban planners and economic development specialists, as well as grassroots neighborhood and civic associations.

Beautiful RVA’s Ginter Urban Gardeners Program not only teaches citizens how to garden, but also how to lead large-scale projects and coordinate volunteers. More importantly, the training serves as personal development for citizens to learn how to work with the community, not for it. Trainees envision projects and learn how to develop and maintain them. Graduates of Ginter Urban Gardeners training have the opportunity to submit proposals to have Beautiful RVA fund urban greening and beautification projects in their communities. The Community Greening Toolkit and the Ginter Urban Gardeners training program are two Beautiful RVA projects funded by The Community Foundation. To help build an “enabling environment” for community-directed urban greening projects, the Community Greening Toolkit is an online repository of resources that citizens can use to help design, budget and plan beautification projects throughout the city.

Minnesota Landscape Arboretum (Chaska, MN):

As part of the University of Minnesota, a land-grant university, the Minnesota Landscape Arboretum (MLA) Urban Garden Program has grown from neighborhood garden sites for children to now include an experience-based garden curriculum aligned to Minnesota's science education standards with a focus on science and nutrition delivered to 200 children annually. The program includes a garden-based youth

employment program which focuses on developing entrepreneurial and leadership skills for 50 youth each summer.

The Arboretum also provides opportunities for youth to pursue and learn more about post-secondary education. The goal of the Growing to College project is to build on the success of the Arboretum's Urban Garden Program by developing and offering activities to participants that may increase the probability they will pursue higher education. As part of this initiative, children and youth that are graduates of their Urban Garden Program are offered a series of age-appropriate visits to the University of Minnesota campus. As part of these experiences, youth are exposed to the University Community, facilities, and campus life.

New York Botanical Garden (NYBG) (Bronx, NY):

The New York Botanical Garden Edible Academy, with the Ruth Rea Howell Vegetable Garden as its centerpiece, provides education, hands-on activities, and programs that helps children, families, teachers, and the public learn about growing and preparing vegetables, fruits, and herbs while encouraging a lifelong interest in gardening and healthy living. The expanded three-acre campus features a classroom building with a green roof, demonstration kitchen, and technology lab; a teaching greenhouse; a solar pavilion; and a terraced amphitheater, as well as new display gardens that accommodate a broader range of programs and people served each year.

NYBG also has a community gardening outreach program, Bronx Green-Up. This program provides horticulture education, training, and technical assistance to Bronx residents, community gardeners, urban farmers, local schools, and community organizations. The program is the visible presence of the garden beyond the garden’s gates, inspiring New York City residents to get involved in improving their communities through greening projects.

The Bronx Green-Up program also has a series of edible gardening courses designed to equip community gardeners, teachers, and city residents with the best organic techniques for growing vegetables safely and effectively, particularly in an urban setting. The program combines instruction in the classroom with hands-on gardening instruction in the field. Consisting of six classes, each student has the opportunity to design his or her own urban vegetable gardening project as a final component of the course. The projects are open-ended with two main goals: to grow more food and to pass on what you have learned to an identified group in your community.

Ohio City Farm and the Refugee Empowerment Agricultural Program (REAP), **(Cleveland, Ohio):**

Ohio City Farm and REAP is an urban farm that many cities in Ohio look to replicate and was recommended by both Kevin Scholtzer from Cleveland’s Department of Economic Development Gardening for Greenbacks Program and by Ohio State Extension Urban Agriculture Educators. At Cleveland’s Ohio City Farm, refugees are

learning how to grow food in the city and are also introducing nutritious, sometimes unfamiliar, fruits and vegetables to the tables of their community. The Ohio City Farm (one of the largest contiguous urban farms in the United States at nearly six acres) exists to provide fresh, local, and healthy food to Cleveland's underserved residents, boost the local food economy, and educate the community about the importance of a complete food system. Ohio City Farm is jointly managed by Ohio City Incorporated, the Cuyahoga Metropolitan Housing Authority, and the tenants who work the land. Providing the needed resources, land, and support to sustain successful ventures for urban farmers, the partnership further positions Ohio City Farm as a key component in Cleveland's regional food system.

Built upon a vacant lot across from the Cleveland Metropolitan Housing Authority's Riverview Towers, Ohio City Farm provides low-cost land, shared facilities, and technical assistance to support new agricultural entrepreneurs. To support refugees, Ohio City Farm partnered with Refugee Response and created REAP, which employs refugee trainees and teaches them employable skill sets. Refugees learn food science, horticulture, business, and agriculture. They sell directly to restaurants and have their own market stand. Biweekly workshops focus on agricultural education including soils, harvesting, pest control, winter growing, cover cropping, and irrigation. Many refugees have gone on to careers in kitchens, grocery stores, and farming.

Phipps Conservatory and Botanical Gardens (Pittsburgh, PA):

Phipps Conservatory and Botanical Garden's Homegrown program is dedicated to increasing community access to fresh produce, promoting better food choices, and improving the overall health of families and children. Since its inception in 2013, Homegrown has installed over 210 raised-bed vegetable gardens at households in underserved neighborhoods and provided mentorship and resources to hundreds of community members. The program supports participants over two years, equipping them with the resources they need to become self-sufficient gardeners. Each family receives help with installation, plus free materials.

After five years of operating the Homegrown edible garden outreach program, Phipps expanded its outreach to the Larimer neighborhood in 2018. As part of the initiative's mission to increase access to healthy foods in underserved communities, Homegrown helps families keep their gardens growing by building and honing participants' gardening skills and knowledge. Topics range from weed and pest management to healthy cooking skills to other monthly classes that allow new gardeners to realize the full potential of their raised beds, while offering opportunities for neighbors to connect.

Pennsylvania Horticultural Society's (PHS) City Harvest (Philadelphia, PA):

PHS City Harvest began in 2010 and is powered by partnerships. With training from PHS staff, inmates of the Philadelphia Prison System grow seedlings at a prison greenhouse, and thousands more seedlings are started at neighborhood-based

greenhouses run by non-profit partners. Inmates receive training in gardening and basic landscaping, along with valuable life-skills lessons. Each year, 250,000 seedlings are transplanted and grown in urban farms and gardens throughout the city, as well as in the prison's onsite garden. Participating growers distribute the fresh produce in their communities through food cupboard donations and at farmer's markets.

In 2015, PHS City Harvest program introduced 10 new sites, expanding a network that now includes a total of 140 urban gardens and farms. New and seasoned growers attend training sessions hosted by PHS, which are led by agricultural experts who focus on topics such as season extension, organic pest control, food safety, building pollinator habitats, and tool care. The program tracks food produced and sold, length of participation, and seedlings distributed.

PHS City Harvest not only works closely with Bartram's Garden in targeting underserved areas and demographics in Southwest Philadelphia, but also serve on the Food Policy Advisory Council. Through work with the Philadelphia Parks and Recreation Department, they influence policies that may affect the aims of their program. Furthermore, they consult with neighborhood and community leaders they seek to help, working closely with the East Park Revitalization Alliance (EPRA), a community-based non-profit with neighborhood residents at the helm. Cultivating these relationships with a variety of partners is the main reason PHS City Harvest has been able to expand their network of urban gardens and farms with community support.

RecoveryPark Farms (RPF) (Detroit, MI):

RecoveryPark Farms (RPF) is an urban agriculture enterprise providing fresh, local specialty produce to top quality restaurants using novel lighting technology to support sustainable year-round growing. RPF has been running for 1.5 years. Starting with high tunnels and progressing to hydroponic greenhouses using natural standards, they grow chef-requested specialty produce which reaches their restaurants within 24-48 hours in a 300-mile radius. They specifically work with individuals that have highly significant barriers to employment (non-literate, formerly incarcerated). RPF works directly with the Department of Corrections and the State of Michigan Rehabilitation Services to obtain clients. Their mantra is to train, retain, and follow.

RPF's business model relies on a single distributor (Del Bene Produce) to purchase everything grown and act as the direct supply stream from farm to restaurant. They (RPF) get credited at restaurants and have an exclusive sales agreement with Del Bene Produce. RPF also employs a full-time hydroponic specialist to provide technical assistance and help educate their employees. While they are currently operating at a small scale, RPF is a rare example of an urban farm that has been able to translate training into hiring 13 full-time, year-round employees. This is no small feat given they are relatively new, the seasonality of their industry, the typical economic scale of urban agriculture, and the necessary capital to grow and acquire more land. In three years, RPF believes it will be fully independent economically with no additional philanthropy needed.

RPF is a business-focused enterprise with a mission to create jobs and help people earn a living wage. They are investing in individuals who are unemployed to help their business grow. Their intention is to add more full-time employees and acquire more land for production as their team and profits increase. In addition to urban agriculture skills, employees develop ‘soft skills’ on how to work as team and lead tasks and projects. RPF stands out as an organization that invests time and money into proper training and in being thorough about evaluating their training processes. A significant investment (approximately $15,000) is made in individual participant development and support, and 11 areas of personal and professional growth and incidence of recidivism are all tracked.

Southside Community Land Trust (SCLT) (Providence, RI):

Southside Community Land Trust (SCLT) serves people in economically challenged urban neighborhoods where fresh produce is scarce and who, as a result, are at risk for life-threatening, diet-related, chronic diseases. In existence for 20 years on state land, in 2010 they started subleasing to urban farmers. SCLT owns or directly manages 21 community gardens in Providence, Pawtucket, and Central Falls. It partners with schools, housing, and community organizations to manage them. SCLT also owns or manages land used by 25 farmers to supply fresh fruits and vegetables to farmer’s markets, food businesses, restaurants, and CSAs. In addition to running a number of programs for schoolchildren and other youth, SCLT operates the Urban Edge Farm, a 50-acre business incubator farm for new farmers.

SCLT has urban agriculture business-related workshops and has established a land access working group. They work as a Land Trust with a number of different properties. In Providence, they have a food processing center and distribution chain along with large market plots on their 21 community gardens. They provide services to micro-businesses such as seeds and tools. They work closely with the University of Rhode Island for educational components and to recruit and target refugees, low-income individuals or families, and southeast Asian immigrants.

SLCT has a business model that is innovative in terms of looking at land use succession planning and appealing to the diverse community members of Providence. The workshops they currently offer are for multilingual speakers, providing for different cultures and ethnicities who may not speak English. Of greater significance is that they are achieving land security and tenure for community members by having pieces of land that they can lease to farmers for a prolonged period of time. Urban Edge Farm is currently subleasing pieces of land to 9 farmers. Each farmer can lease up to 5 acres, and they are hoping to produce value-added products to sell at city markets.

SLCT recognized that urban farmers in Rhode Island were being priced out of land and that land access was going to be a barrier to successful urban agriculture. Providing that land through the different sites they manage and the variety of support services they offer including training that integrates other cultures are their best achievements to

date. They exemplify an urban farm that recognizes diversity and inclusion as a key component to success.

Tricycle Urban Agriculture (Richmond, VA):

Tricycle Urban Agriculture is a leading urban agriculture non-profit organization that is about two-years old. Through their Urban Agriculture Fellowship Program, participants earn their certificate in urban agriculture, recognized by the USDA-Natural Resources Conservation Service (NRCS). The 11-month, part-time program combines classroom training with hands-on experience on urban agriculture sites that enables a graduate to go on to start their own urban farm or other small business in the field of urban agriculture or or to support the work of creating healthier food systems in the local community.

Tricycle's Urban Agriculture Fellowship and Certificate program is the first program of its kind designed in partnership with the USDA-NRCS. Its Urban Agriculture Fellows work with Tricycle staff, learn from experts from the USDA, Virginia Tech, the Rodale Institute, Roots of Success, the Small Business Administration, and others for an 11-month term that provides formal instruction and hands-on experiences grounded in the business of sustainable urban agriculture.

All of Tricycle's programs are community driven, meaning they sought input from community members before implementation. They focus on job development for low-income individuals or families and justice-involved adults in order to make a living growing commercially viable products such as ginger, turmeric, mushrooms, and other value-added products. Their training focuses on business planning, such as in how to get a loan for small scale farming to be commercially successful. Tricycle does great work sharing program information with other non-profits in the city like CARITAS, an organization that helps the most vulnerable neighborhoods break the cycles of homelessness and addiction. They have also started tracking the farm bill and encouraging participants to advocate for urban agriculture policy issues.

The Urban Agriculture Fellowship program includes several components: urban agriculture job training, green industry job training, nutrition education, internships, and agricultural business/entrepreneurship education. Tricycle has considered scaling up their model by having successful graduates come back and train new recruits from Richmond and in other cities. Their intended impact is to develop a trained workforce in Richmond and other cities in urban farming, with the goal of providing a long-term support system for success. Tricycle plans to track graduate groups as long as they will stay in touch through their alumni network – which has a Facebook and email groups, quarterly potlucks on the farm, and other events. They plan to start tracking poundage of production, the number of trained certified growers making an impact on urban food production, and job outcomes, all based on their established alumni network.

Tricycle partners include a non-profit Catholic hospital, USDA, the University of Virginia (UVA), and the Allegheny Mountain Institute's health system—Augusta Health. These

partners provide an example of an organization that is actively pursuing the connection between food production and nutrition outcomes. The food grown on-site helps supply the hospital and wellness center of their partners. Additionally, UVA has committed to increase local food sourcing through Tricycle food production. The greatest accomplishments of Tricycle have been their partnership with NRCS in order to get a wealth of knowledge and provide certification from experts. Through this and the above partnerships they've created an extensive network. Their healthy corner store program is limited in tracking purchases, but they work with a cancer center and have begun collecting information on patients eating habits and ways to improve nutrition education and help those with specific dietary needs.

Key Elements of Successful Urban Agriculture Collaborations:

Strategic and Diverse Partnerships:

Diverse and strategic partnerships with both public and private entities appear to be crucial to sustain urban agriculture programming success and continued viability. Cultivating mutually beneficial relationships with a variety of partners enables these programs to expand their offerings to different demographics and underserved communities. Because urban agriculture programs can have multiple goals that are all of social, economic, and environmental importance – it allows for the establishment of diverse partners. Many public gardens and non-profit organizations that have notable urban agriculture programming are successful because they work with healthcare providers, social workers, urban farm alliances, local food policy councils, municipal agencies, school districts, universities, city administrators and elected representatives, urban planners and economic development specialists, government agencies, and grassroots neighborhood and civic associations, to name a few.

These partnerships can provide expertise, financial support, educational certifications, participant job placement, food distribution, infrastructure and supplies, recruitment from specific demographics where barriers to employment and physical and mental health issues are common (rehabilitation clinics, correction services, health and wellness centers, etc.), and nutritional education. Partnerships can also help these programs by providing staff to run training programs, work part-time, or establish data collection/evaluation processes for research and strategic purposes.

Examples: 1) **Desert Botanic Gardens** incubator farm came to fruition through strategic partnerships with the Roosevelt School District No.66, TigerMountain Foundation, The Orchard Community Leaning Center, and Unlimited Potential, 2) **CAUSES** teaches basic water management components by offering national green infrastructure certification through their partnership with DC Water for job placement and networking, 3) **Bartram's Garden** formed grocery store partnerships to sell its produce affordably and locally, and distributes over 80,000 vegetable transplants to over 130 farms and gardens around Philadelphia through the **PHS City Harvest Program**, 4)

Lewis Ginter Botanic Gardens Urban Gardeners Program is part of Beautiful RVA , which is an affinity group of over 60 agencies and organizations, 5) **Tricycle's Urban Agriculture Fellowship Program** is designed in partnership with the USDA-NRCS, which supplies them with outside expertise, 6) **Chicago Botanic Gardens** has hired 2 full-time social workers for their Windy City Harvest program.

Re-Engaging with Program Participants/Graduates:

Another key component to a successful urban agriculture program is long-term engagement of participants after "graduation." Having graduates return to speak at formal and informal events to provide evidence for how they benefitted from the program is an important way to recruit and sustain interest. In turn, post-training financial assistance, follow up advice, and mentorship is more likely to lead to a job outcome at the organization itself or elsewhere. This also helps generate a better understanding of whether or not the program is succeeding in its goals. For example, whether the knowledge gained from the training program is leading to positive production and nutrition outcomes at a community garden.

Examples: 1) Part of **MLA's Urban Garden Program** is their Growing to College project, which offers previous children and youth programs participants opportunities (when they are older) to visit the University of Minnesota and participate in activities to inspire them to pursue higher education, 2) Graduates of the **Lewis Ginter Urban Gardeners** program have the opportunity to submit proposals to have Beautiful RVA fund their urban greening and beautification projects in their communities, 3) **Phipps Conservatory and Botanical Gardens Homegrown program** continues to engage participants for 2 years, providing technical assistance along with additional materials and tools, 4) **CAUSES** follows up with participants after they graduate at six months, and then again at the one-year mark for a questionnaire on consumption patterns of fresh vegetables and fruits, 5) **Tricycle Urban Agriculture** has an established alumni network and plans to use it to start tracking poundage of production, number of trained certified growers making an impact on urban food production, and job outcomes.

Long-term Data Tracking:

Many of these models track data such as participants' job outcomes, food produced, food donated, certifications awarded, and CSA subscribers, to name a few measures. Long-term data can inform which elements of programming have the most impact socially, environmentally, or economically. The more rigorous urban agriculture programs track urban farm production, nutrition outcomes/consumption patterns, job outcomes (part-time, full-time, industry), etc. to gain a "triple bottom line" estimate of programmatic success.

Examples: 1) **CAUSES** tracks data on SNAP education programs and their ability to increase consumption of fruits and vegetables for children and green infrastructure certifications awarded, 2) **RPF** tracks 11 areas of personal and professional growth as well as the percentage of recidivism, 3) **Denver Botanic Garden's Chatfield Farms** tracks the number of CSA subscribers and food donated to local food banks, 4) **PHS**

City Harvest tracks food produced and sold, length of participation, and seedlings distributed.

Multi-faceted Educational Training and Support Services:

Successful models of urban agriculture programs provide a variety of learning and training opportunities for participants. This includes workshops, demonstrations from agricultural experts, training on entrepreneurship and developing a business plan, connecting participants to urban farmers for mentorship, and providing tools coupled with hands-on training. Some ensure programs have support services for multilingual speakers, especially those that recruit immigrants and refugees in underserved areas. Educational training that combines classroom and hands-on components tends to be most successful.

Examples: 1) **SCLT** established a land access working group and works closely with the University of Rhode Island for educational components to recruit refugees, low-income individuals or families, and southeast Asian immigrants. The workshops that they offer are for multilingual speakers so they provide for different cultures and ethnicities who may not speak English. 2) **CAUSES** offers a variety of community workshops on gardening and has a neighborhood steering committee at each site to provide feedback. 3) **Ohio City Farm and REAP** have biweekly workshops that focus on agricultural education including soils, harvesting, pest control, winter growing, cover cropping, and irrigation. 4) **Tricycle Urban Agriculture** combines classroom training with hands-on experience on urban agriculture sites. 5) **New York Botanic Gardens Bronx Green Up** program combines instruction in the classroom with hands-on gardening instruction in the field. 6) **Phipps Conservatory and Botanical Gardens** covers topics from weed and pest management to healthy cooking skills and offers monthly classes that allow new gardeners to realize the full potential of their raised beds while offering opportunities for neighbors to connect. 7) New and seasoned growers attend training sessions hosted by **PHS City Harvest,** which are led by agricultural experts who focus on topics such as season extension, organic pest control, food safety, building pollinator habitats, and tool care.

Avenues to Financial Stability:

A few best practices exist that contribute to financial stability in urban agriculture programming. 1) Development of sales agreements with distributors to purchase product and get it from farm to restaurants, grocery stores, and retail stores. 2) Partnerships with colleges/universities, land trusts, or other entities that have previously acquired large tracks of land, and can devote it to agriculture production. For example, college and university gardens possessed more land devoted to outdoor agricultural production than their non-university affiliated counterparts (American Public Gardens Association, 2018). By partnering with these organizations and institutions, new urban agriculture businesses may only have to incur operating expenses, thus increasing their financial viability and helping to offset expensive start-up costs associated with

obtaining and developing new infrastructure and facilities. 3) Joining urban farm alliances and networks to influence local food policies that are advantageous to competition with larger commercial enterprises. 4) Production of value-added products to sell at city markets along with fresh produce.

Examples: 1) **CAUSES** invests in Urban Food Hubs and expects to improve the success rate of the urban businesses it incubates. 2) **RPF** business model is exclusive to a single distributor, Del Bene Produce, that purchases everything grown and acts as a direct supply stream from farm to restaurant, while still crediting RPF as its origin. 3) **SLCT** achieves land security and tenure for community members by having pieces of land that they can lease to farmers for a prolonged period of time.

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The Association would like to thank all of the organizations that generously volunteered their time to fill out a survey and/or agreed to an interview. A list of those organizations can be found in the Appendix below.

Appendix

List of organizations contacted for this study:

Organization/Affiliation & Program	Location	Survey	Interview
Added Value Farms/Red Hook Community Farm-Youth Empowerment Program	Brooklyn, NY	✓	
AeroFarms	Newark, NJ		
AgLanta-Grows-A-Lot Program	Atlanta, GA		
Agritecture	Brooklyn, NY		✓
Boston Natural Areas Network - The Trustees of Reservations	Boston, MA		
City of Cleveland, Dept. of Economic Development-Gardening for Greenbacks Program	Cleveland, OH	✓	✓
Colorado Building Farmers (Colorado State University Extension)	Fort Collins, CO		✓
Crossroads Community Food Network - Microenterprise Training Program	Takoma Park, MD		✓
Denver Urban Gardens (DUG)	Denver, CO		✓
Detroit Dirt and The Detroit Dirt Foundation	Detroit, MI		
Dreaming Out Loud AyaUplift Program	Washington, DC		
Earthworks Urban Farm	Detroit, MI		
Farm School NYC	New York, NY		
Food on the Move	Providence, RI		
FRESHFARM	Washington, DC		
Green City Growers	Cleveland, OH		
Green Veterans-Urban Farming Program	Milwaukee, WI	✓	✓
Greener Partners	Philadelphia, PA		
NYC Parks GreenThumb	New York, NY	✓	✓
Growing Home	Chicago, IL	✓	✓
Hantz Woodlands	Detroit, MI		
Hilltop Urban Farm	Pittsburgh, PA		✓
Homegrown Minneapolis	Minneapolis, MN		✓
HOSCO	St. Louis, MO		
Just Food NYC	New York, NY		
Lots of Hope	Providence, RI		
Muir Ranch	Pasadena, CA		✓
NeighborSpace	Chicago, IL		

Nuestras Raíces-Beginning Farmers Training Program	Holyoke, MA		✓
Ohio City Farm and REAP	Cleveland, OH		
Ohio State University-The Kinsman Farm	Cleveland, OH		
Ohio State Extension-Cuyahoga County	Columbus, OH		✓
Oko Farms	Brooklyn, NY	✓	
Penn State Extension	Pittsburgh, PA		✓
Pennsylvania Horticultural Society (PHS)-City Harvest	Philadelphia, PA	✓	
Planting Justice-Bay Area Farmer Training Program	Oakland, CA		
P-Patch	Seattle, WA		
RecoveryPark Farms	Detroit, MI		✓
San Antonio Food Bank-Texas Second Chance Program	San Antonio, TX		✓
Southside Community Land Trust-Urban Edge Incubator Farm	Providence, RI		✓
Sweet Water Foundation-Apprenticeship and Outreach Program	Chicago, IL		
The Food Project	Boston, MA		
The Food System Lab at Cylburn Arboretum-John Hopkins Center for a Livable Future	Baltimore, MD	✓	
The Food Trust	Philadelphia, PA		
The Homeless Garden Project-Job Training Program	Santa Cruz, CA	✓	
The Youth Farm	Brooklyn, NY		
Tricycle Urban Agriculture-Urban Agriculture Fellowship Program	Richmond, VA		✓
Truly Living Well-Growing Families Program	Atlanta, Georgia		✓
University of Maryland Baltimore City Extension-Entrepreneurial Urban Agriculture Education Program	Baltimore, MD	✓	✓
University of the District of Columbia CAUSES	Washington, DC		✓

*Hilltop Urban Farm will officially open in 2020.

List of Public Gardens Surveyed and Analyzed for Food-Related Programming in Public Gardens (2016)

ABQ BioPark Botanic Garden	Albuquerque, NM
Airlie Gardens	Wilmington, NC
Allegheny Arboretum at IUP	Indiana, PA
Allen Centennial Garden	Madison, WI
Ambler Arboretum of Temple University	Ambler, PA
Applewood	Flint, MI
Atlanta Botanical Garden	Atlanta, GA
Baker Arboretum	Bowling Green, KY
Bartram's Garden	Philadelphia, PA
Better Homes and Gardens Test Garden	Des Moines, IA
Boerner Botanical Gardens	Hales Corners, WI
Bok Tower Gardens	Lake Wales, FL
Boone County Arboretum	Union, KY
Callaway Gardens	Pine Mountain, GA
Cheyenne Botanic Gardens	Cheyenne, WY
Chicago Botanic Garden	Glencoe, IL
Clark Gardens Botanical Park	Mineral Wells, TX
College of the Atlantic	Mount Desert Island, ME
Como Park Zoo and Conservatory	St. Paul, MN
Connecticut College Arboretum	New London, CT
Cornell Plantations	Ithaca, NY
Colorado State University Extension	Junesburg, CO
Dallas Arboretum	Dallas, TX
Delaware Botanic Gardens at Pepper Creek	Bethany Beach, DE
Denver Botanic Gardens	Denver, CO
Desert Botanical Garden	Phoenix, AZ
Fellows Riverside Gardens	Youngstown, OH
Filoli	Woodside, CA
Fort Worth Botanic Garden	Fort Worth, TX
Franklin Park Conservatory and Botanical Gardens	Columbus, OH
Frederik Meijer Gardens & Sculpture Park	Grand Rapids, MI
Fullerton Arboretum	Fullerton, CA
Goizueta Gardens at the Atlanta History Center	Atlanta, GA
Greater Des Moines Botanical Garden	Des Moines, IA
Green Bay Botanical Garden	Green Bay, WI
Green Spring Gardens	Alexandria, VA
Greenwood Gardens	Short Hills, NJ
Haagen-Dazs Honey Bee Haven	Davis, CA

Harold L. Lyon Arboretum	Honolulu, HI
Henry Schmieder Arboretum	Doylestown, PA
Hidden Lake Gardens	Tipton, MI
High Glen Gardens	Frederick, MD
Hildene, The Lincoln Family Home	Manchester, VT
Houston Botanic Garden	Houston, TX
Humboldt Botanical Garden	Humboldt, CA
Huntington Museum of Art	Huntington, CA
Illinois Central College Horticulture Land Lab	East Peoria, IL
Indianapolis Museum of Art Tanner Orchard	Indianapolis, IN
Iowa Arboretum	Madrid, IA
Jacksonville Arboretum and Gardens	Jacksonville, FL
Jardin Botanico Francisco Javier Clavijero del INECOL	Veracruz, Mexico
Jardin Botanico Regional de Cadereyta	Queretaro, Mexico
Jensen-Olson Arboretum	Juneau, AK
Lady Bird Johnson Wildflower Center	Austin, TX
Land & Garden Preserve and Greenrock	Northeast Harbor, ME
Leach Botanical Garden	Portland, OR
Lincoln Park Zoo	Chicago, IL
Linden Botanic Garden	Rockville, MD
Longwood Gardens	Kennett Square, PA
Los Angeles Arboretum & Botanic Garden	Los Angeles, CA
Lurie Garden	Chicago, IL
Maymont Foundation	Richmond, VA
Memorial University of Newfoundland Botanical Garden	St. John's, Newfoundland and Labrador, Canada
Minnesota Landscape Arboretum	Chaska, MN
Missouri Botanical Garden	St. Louis, MO
Moore Farms Botanical Garden	Greenville, SC
Mountain Top Arboretum	Tannersville, NY
Naples Botanical Garden	Naples, FL
North Carolina Botanical Garden	Chapel Hill, NC
Powell Gardens	Kingsville, MO
Queens Botanical Garden	Queens, NY
Reynolda Gardens of Wake Forest University	Winston-Salem, NC
Rogerson Clematis Garden	West Linn, OR
Roosevelt Vanderbilt National Historic Site	Hyde Park, NY
Sarah P. Duke Gardens	Raleigh, NC
Smithsonian Gardens	Washington, DC

Southern Highlands Reserve	Toxaway, NC
Spring Grove Cemetery and Arboretum	Cincinnati, OH
Springs Preserve	Las Vegas, NV
The Botanic Garden at Historic Barns Park	Traverse City, MI
The Botanical Garden at Sanibel Moorings	Sanibel, FL
The Christopher Farm & Gardens	Sheboygan, WI
The Elizabeth F. Gamble Garden	Palo Alto, CA
The Frelinghuysen Arboretum	Morristown, NJ
The Garden of Eatin' at The Gardens on Spring Creek	Fort Collins, CO
The Gardens of Matter Park	Marion, IN
The Kampong, part of NTBG	Miami, FL
The New York Botanical Garden	Bronx, NY
The Scott Arboretum of Swarthmore College	Swarthmore, PA
Toledo Botanical Garden	Toledo, OH
Toronto Botanical Garden	Toronto, Ontario
Tower Hill Botanic Garden	Boylston, MA
Tyler Arboretum	Media, PA
United States Botanic Garden	Washington, DC
UBC Botanical Garden	Vancouver, BC
UCF Arboretum	Orlando, FL
United States National Arboretum	Washington, DC
University of California Botanical Garden at Berkeley	Berkeley, CA
University of Illinois Arboretum	Urbana, IL
University of Maryland Arboretum and Botanical Garden	College Park, MD
University of Washington Botanic Gardens	Seattle, WA
Vizcaya Museum and Gardens	Miami, FL
Western Colorado Botanical Gardens	Grand Junction, CO
Windmill Island Gardens	Holland, MI

Urban Agriculture Survey 2018 (distributed via Qualtrics):
Q1 Organization and Program Name:
Q2 When did this urban agriculture program start?
Q3 Who are the target audiences for this program?

- ▢ Youth (1)
- ▢ Justice-involved youth (2)
- ▢ Justice-involved adults (3)
- ▢ At-risk youth (4)
- ▢ Refugees (5)
- ▢ Low-income individuals or families (7)
- ▢ Veterans (8)
- ▢ General Public (9)
- ▢ Other (please describe): (10)

Q4 What specific components does this program include?

- ▢ Urban agriculture job training (1)
- ▢ Green industry job training (2)
- ▢ Nutrition education (3)
- ▢ Internships (4)
- ▢ Ag business or entrepreneurship education (5)
- ▢ Other (please describe): (6)

_____

Q5 What data do you collect on program participants?

- ▢ Recidivism (1)
- ▢ Health outcomes (2)
- ▢ Career outcomes (3)
- ▢ Entrepreneurial success (4)
- ▢ Food produced, sold, donated, or distributed (5)
- ▢ Length of participation (6)
- ▢ Other (please describe): (7)

_____

Q6 What are the primary sources of funding for your program?

- ☐ Grants (1)
- ☐ Private donations (2)
- ☐ City or government funding (3)
- ☐ Endowment funds (4)
- ☐ Revenue from program services (i.e. class fees, tuition, etc.) (5)
- ☐ Urban agriculture production-related sales (i.e. produce sold at markets, stores, restaurants, etc.) (6)

Q7 What partnerships are associated with your urban agriculture program?

Q8 If chosen for the next phase of this study, would you be willing to participate in a short but ***more in depth*** conversation with one of our project leaders? If so, please enter your name and contact information below:

_____

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