Professional Agricultural Workers Journal

Volume 9
Number 2 *Professional Agricultural Workers Journal (PAWJ)*

Article 3

9-25-2023

The Significance of Urban Gardening on the Household Economy: A Case of Minority Urban Gardeners

Lila B. Karki
University of Maryland Eastern Shore, Princess Anne, Maryland, lkarki@umes.edu

Prem B. Bhandari
University of Maryland Eastern Shore, Princess Anne, Maryland

THE SIGNIFICANCE OF URBAN GARDENING ON THE HOUSEHOLD ECONOMY: A CASE OF MINORITY URBAN GARDENERS

***Lila Karki[1] and Prem B. Bhandari[1]**
[1]University of Maryland Eastern Shore, Princess Anne, Maryland
***Email of lead author: lkarki@umes.edu**

Abstract

Urban gardening (UG) is an emerging approach to increase the consumption of fresh produce in the homestead. The objective of this exploratory case study was to enhance the technical and economic efficiency of small, socially disadvantaged, and minority (SSDM) urban gardeners in Maryland. Twenty-two SSDM producers engaged in UG participated in the study. The findings showed that farmers were operating rationally, and cultivating diversified specialty, medicinal, and ethnic crops, with an average of twenty specialty/ethnic crops on 1.2 acres. The farmers reported six primary reasons for sustaining urban gardening: family consumption (79%), outdoor and physical activity (79%), supplemental household income (57%), leisure (50%), experiential learning for family members (14%), and tax benefits (7%). Findings revealed that 96% of the farmers strengthened knowledge in reducing production costs, increasing farm income (86%), enhancing entrepreneurial skills (82%), improving farm management practices (73%), mitigating risk (59%), and changing UG behaviors and actions (100%).

Keywords: Extension Education, Minority Producers, Risk Diversification, Self-Employment, Technology Adoption

Introduction

Small, socially disadvantaged, and minority (SSDM) farmers have been facing ever-increasing challenges while striving to obtain their living from the farm, specifically as urban gardeners. Urban gardening (UG) increases access to healthy, affordable, fresh produce and provides families with opportunities to learn about nutrition and growing food. Most importantly, UG gives children an opportunity to know where food comes from and how it is grown. Urban and peri-urban inhabitants are becoming more concerned about the health benefits of eating greens in every meal. Other benefits of UG include improving food habits, increasing household income, and reducing greenhouse gas emissions.

UG embodies a broad social, economic, and environmental scope of expansion across the community. Various forms of UG exist such as a backyard, side yard, rooftop, kitchen, community space, or any other space where growers can easily produce some fruits or vegetables. Evidence shows a need for a larger, more intensive intervention to promote UG, one reason being the ever-increasing migration to urban areas. The concept of UG is increasingly being adopted by small, urban, and semi-urban, historically underserved, limited resource, and minority farmers who have culturally based traditions and strong ethnic food habits. Such cultural practices encourage them to continue UG, which underpins the sustainability of small farms. Furthermore, urban gardeners must be innovative and efficient to achieve high production and productivity from the limited space available in urban and suburban areas. Some production technologies to make the best use of limited space include tower or vertical gardening, container rooftop gardening, community gardening, square foot gardening, tree guilds, growing dual-purpose plants, dense planting, and companion planting.

Published by Tuskegee Scholarly Publications, 2023

According to King (2020), the history of urban gardening dates back to the 1970s, when UG became part of the social justice movement that encouraged sustainability. By the 1990s, UG became essential for providing fresh produce in inner cities. As cities grew, many green spaces for growing food were replaced by high-rise buildings. This loss of green space encouraged indoor farming or gardening. Indoor-grown produce has become a staple for most urban communities. UG not only provides access to fresh produce, but it also minimizes the use of harmful pesticides.

Literature on small farms in the U.S. is limited, even though they are the most numerous farm type, account for over 20% of agricultural production, and are more likely to be operated by historically underserved (i.e., beginning, minority, veteran, women, young) farmers than operators of large-scale farms. Few studies explicitly address the challenges of small producers, but researchers have addressed the challenges of producers in general and for specific groups, such as women farmers (Keller 2014) and underserved sustainable producers. Based on the reasons and perspectives mentioned above, this paper examines the impact of interventions on participant farmers' household economy. The purpose of the study was to examine the scope and opportunities for sustainable UG by revitalizing the target clientele in Maryland. The specific objectives of the study were to (1) strengthen the technical and economic efficiency of small, socially disadvantaged, and minority (SSDM) farmers and (2) study the scope and market potentials of specialty and ethnic vegetables to increase the household income of the participant farmers.

Literature Review

Challenges to Urban Gardening

Smallholder farmers, such as urban gardeners, are increasingly facing both natural and anthropogenic challenges, that affect their capacity to increase production and move towards profitable farming practices (Fan and Rue, 2020). However, relatively few studies focus on the challenges of small and minority farmers (Keller, 2014; Tritsch et al., 2022). These challenges include a lack of access to appropriate production technologies, need-based educational opportunities, lack of knowledge and skills about emerging climate-smart urban gardening practices, high transaction costs associated with community markets, and ever-expensive production inputs. Other pressing challenges are limited space, too many rules and regulations, and possibly a lack of enough sunlight to grow crops adequately.

According to Karki and Escobar (2022), one of the significant problems SSDM farmers face is a lack of knowledge and skills sustaining urban gardening. Dill et al. (2012), Karki and Escobar (2022), and Karki, and Bhandari (2022) reported that financial support is a critical need for most of these farmers. Historically underserved farmers are less aware of the economically efficient and environmentally sound production knowledge and skills along the food value chain. According to Dill et al. (2012), beginning farmers identified the need for knowledge of crop production methods, laws, and regulations related to agricultural operations, and financial management as the highest priority. Governor's Intergovernmental Commission for Agriculture [GICA] (2011) reported that there were not enough outreach and educational events to encourage and support small-scale agriculture, including access to markets, economic isolation, unstable prices of products, and lack of on-farm processing benefits. Daniels (2019) also indicated that the overall number of farms was 3% lower in 2017 than in 2012, and local farm employment has been gradually declining.

Such challenges are believed to lead these farmers to undertake lower-risk and lower-yielding agricultural practices providing small-scale farmers with little or no profit and perpetuating a cycle of poverty. Moreover, many urban and semi-urban residents, including the socially disadvantaged, small-scale, and minority farmers are compelled to rely heavily on imported produce (such as vegetables, fruits, and other farm products) that often travel long distances, spending several days in transit. Because imported produce is gradually becoming unaffordable due to continually rising prices and declining household incomes, urban, and peri-urban residents are often forced to adopt unhealthy food habits. These problems have multi-faceted impacts, influencing their health and social well-being.

The problem of marketing surplus produce also discourages small farmers, including urban and semi-urban farmers. Marketing and financing were among the highly ranked issues reported by beginning farmers in Maryland (Dill et al. 2012). Despite growth in the number of farmer markets statewide, many communities still faced significant barriers to accessing fresh and nutritious food (Misiaszek et al., 2018). Myers (2021)) also highlighted the need for marketing and support activities that enhance on-farm profitability, which requires providing business development assistance, supporting the expansion of marketing opportunities, and increasing skills and training for farmers and agricultural entrepreneurs in product development and market assessment. Similarly, Karki and Escobar (2022) reported that farmers prioritized the marketing of agricultural products (branding, packaging, and labeling), and certification of good agricultural practices (low-volume, high-value crops) to increase their capacity to sustain small-scale farming. Meemken and Bellemare (2019) suggest that contract farming, a pre-harvest agreement between farmers and buyers, can facilitate smallholder market participation, improve household welfare, and promote rural development as it stimulates employment.

UG increases household income by increasing production, employing family members, and reducing household costs by providing fresh and healthy produce on a regular basis. Apart from providing fresh and healthy food, previous research shows that community gardening programs (and other forms of urban gardening) provide employment, education, and entrepreneurship opportunities for a wide range of people, including students, recent immigrants, and people experiencing homelessness (Community Food Security Coalition [CFSC], 2003). Moreover, gardeners save significant amounts of money on produce. Similar findings were reported by Hlubik et al. (1994, p. 2), indicating that "community gardeners saved between $75 and $380 in food costs every season." Correspondingly, community gardens have been shown to increase property values in the immediate vicinity where they are located. In Milwaukee, properties within 250 feet of gardens experienced an increase of $24.77 per square foot, and on average, a garden was estimated to add approximately $9,000 per year to the city's tax revenue (Bremer et al., 2003; Chicago Botanical Gardens and the City of Chicago, 2003; Sherer, 2006).

In addition to the socio-economic and civic benefits of urban and community gardening, an environmental impact is reported by Bremer et al. (2003, p.50, 56; Sherer, 2006). Community gardening helped reduce soil erosion and runoff, which lessens flooding and saves cities money. Likewise, Chicago (2003, p.14; Sherer, 2006) reported that community gardening also helps restore oxygen to the air and helps reduce air pollution through the gas exchange systems of leaves and soils. Similarly, Schmelzkopf (1995) mentioned that while vacant lots can be magnets for litter

Published by Tuskegee Scholarly Publications, 2023

and criminal activity, community gardens are monitored and managed by the gardeners, resulting in a cleaner space and a more active local community. All this often comes at little or no cost to the city. CFSC (2003) revealed that developing and maintaining garden space is less expensive than parkland areas, in part because gardens require little land, and 80% of their cost is in labor.

King (2020) stated that UG is a significant source of healthy food that is affordable and accessible to those who need it and minimizes the carbon footprint of mass-produced produce. He also indicated that the future of urban farming will utilize agricultural technology to improve the automation of indoor UG, saving valuable resources, improving sustainability, and addressing growing issues of urban food insecurity.

Plumer (2016) recalled that millions of Americans planted "victory gardens" in their backyards during World War II, effectively supplying a hungry nation with 40% of its homegrown fruits and vegetables. He explained that after the war, those urban farms withered away, replaced by increasingly efficient large-scale rural agriculture. In recent years, UG has made a curious comeback, encouraging people to grow crops in vacant lots or on rooftops. It is sometimes considered a solution to food deserts in poor neighborhoods. On a similar note, Hyden-Smith (2009) mentioned that up to 44% of the nation's vegetables were grown in Victory Gardens during World War II.

A significant portion of small-scale producers have been abandoning farms they inherited and owned. According to GICA (2011), the trend of abandonment of inherited and owned farms has been increasing in the past 40 years. The reason is these farms are owned and managed by elderly farmers who want to give up or have given up farming. In addition, GICA (2011) stated that due to brokers' influence, high transaction costs, and a lack of direct access to market outlets, farmers' share of the retail food dollar has been steadily decreasing, with farmers receiving only about $0.20 out of every food dollar spent by consumers, which was $0.41 in 1950, and $0.31 in 1980. The readiness of the SSDM farmers to contend in agriculture is greatly challenged by a lack of demand-driven knowledge and skills and a lack of access to hands-on and experiential learning opportunities, market information (e.g., product pricing, commodity supply, and demand), market access, continuous outreach, and need-based hands-on education.

The need to promote UG is also reflected by Houngbo (2020, p. 2), who explained that "small-scale farms grow 50% of our food calories on 30% of the agricultural land. When access to inputs and conditions are equal, smaller farms tend to be more productive per hectare than most larger farms." However, urban farmers face significant knowledge gaps and institutional barriers (Pearson, Pearson, & Pearson, 2010).

Urban Gardening from an Extension Perspective

Although most state land-grant universities and their Extension programs have initiated allocating resources for urban agriculture (Reynolds, 2011; Surls et al., 2014), there is a dearth of research and literature regarding urban agriculture. This shortage is exacerbated by the fact that most Extension agents, educators, and specialists are trained to support rural farming and are often located physically distant from urban centers (Pearson et al., 2010). Time restrictions and funding for technical assistance staff are also challenges (Surls et al., 2014) to grow urban gardening at an accelerated pace. Consequently, potential, beginning, and existing urban farmers and gardeners do

not receive adequate support to sustain urban agriculture. On a similar note, Brown & Carter (2003) suggested that Cooperative Extension has often overlooked the scope of urban food production and should expand extension services related to urban agriculture/gardening and integrate urban food-system topics within research and extension programs.

Methodology

Conceptual Framework

Production Function Approach

The study applied a production function approach to assessing the impact of UG on the household economy. The assumption was made that positive changes would occur in desired indicators through a set of interventions. Moreover, the study employed a before-after analysis approach to assess the plausible impacts of interventions in UG on the household economy, in general, through changes in the farmers' knowledge, skills, and behavior or actions. The theoretical expectation is that these changes in knowledge and skills, and behavior or action would bring about positive changes in production and consumption, resulting in increased income or welfare of the household economy.

Theoretically, as shown in Figure 1, the level of output was only 0a quantity with f_0 inputs before the activities were implemented. After the intervention, the production curve shifted from bi (before the intervention) to ai (after the intervention) with a rise in output from 0a to 0b. The authors believe that this change was realized primarily due to the interventions (such as changes in knowledge and skills, behavior or action, technology, and farming practices) and the net of other factors, including time. This implies that farmers could achieve the 0a output with a reduced level of input usage (f_1) or higher output 0b with the same level of inputs, with all inputs other than interventions held constant.

Mathematically,

$Y_{(t)} = 0b\,(ai) - 0a\,(bi)$ ……. (i)

Where: $Y_{(t)}$ = Impact/outcome in a given time (t); 0b = Change in quantity/quality due to intervention; 0a = Baseline information/status quo; f_0 & f_1 = Production inputs

Approach

A case study approach was used in this study. The University of Maryland Eastern Shore (UMES) Extension with financial support from the Northeast Sustainable Agriculture Research and Education (SARE) carried out an exploratory case study to investigate the situation, scope of, and opportunity for UG. Initially, the research team recruited 11 farmers. Over time, through a snowball effect, the number of farmers expanded to 14, 16, and finally, to 22 in five counties of Maryland, namely, Anne Arundel, Baltimore City, Baltimore, Somerset, and Wicomico. The participating farmers were identified as urban and semi-urban gardeners who primarily produced

Published by Tuskegee Scholarly Publications, 2023

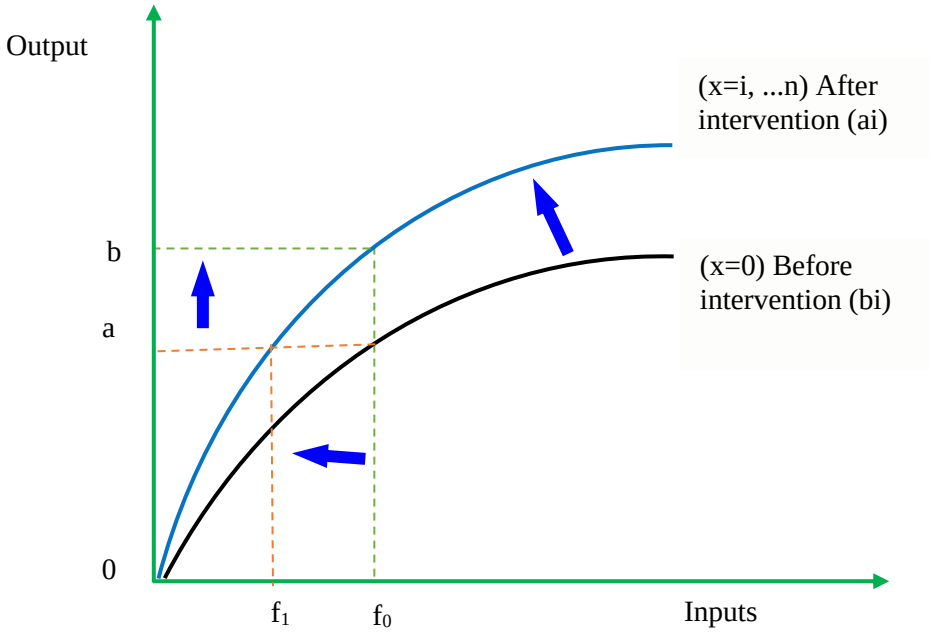

Figure 1. An illustration of the before vs after assessment approach

for the purpose of home consumption. As indicated earlier, this study utilized the before-after approach to assess the plausible impacts of interventions on the household economy in general. An evidence-based approach was implemented to determine the necessary interventions and to measure the outcomes. For this purpose, the study collected farmers' reporting of the needs at the baseline and designed intervention strategies by providing production inputs and capacity-building training to change farmers' knowledge and skills, behavior, or actions. At the end of the study, the impacts of the interventions were assessed.

Data Collection

Baseline Survey

A semi-structured needs assessment survey was administered to the participating farmers at the study's initiation meeting. The survey broadly collected information on farm size, farming experiences, the scale of farming, reasons for farming, major problems, preferred training, educational materials, and demographic information. In addition, an in-person interactive workshop as well as email, telephone communications, and farm-field visits were organized to triangulate the information collected. Interventions were carried out based on the findings of the needs assessment survey. First, production inputs, such as manure and fertilizers, seeds and seedlings, garden soil, farm tools and equipment (hand tillers, hoe, rakes, shovels, hedge cutters, wheelbarrow, weed cutter, rainwater harvesting tanks, plant feed, insecticide, pesticide, and herbicides), were provided to farmers as token support. Second, these activities were followed by capacity-building training programs, on-farm management practices, data recording, compost making, peer-to-peer and peer-to-specialist interactions, farm visits, one-on-one and one-to-many counseling and consultations, and marketing initiatives. The study initiated its first activity of conducting a baseline survey of the participant farmers using a semi-structured survey.

Successive interventions were made based on the baseline survey results during the study period

that ended after nearly 18 months.

End Survey

The researchers conducted an end survey of the 22 participating farmers to evaluate the impact of the interventions on several outcome measures, including household income. The survey primarily aimed at assessing farmers' reporting of the impact on socio-economic and human capital variables. First, the survey included whether the participating farmers received any production input(s) from the project. Second, the participating farmers' opinions were sought to understand the usefulness of the educational activities (trainings, meetings, in-person discussions, counseling, consultations, farm visits, and peer-to-peer interactions) in enhancing their knowledge and skills for promoting specialty and ethnic crops. Third, their responses sought the usefulness of the activities in reducing the cost of production; increasing farm revenue; mitigating production, marketing, and financial risks; developing entrepreneurial capability; facilitating farm planning, budgeting, and managing and allocating limited production farm resources efficiently. Fourth, they were asked whether their participation in the study was useful in bringing about positive changes in various farming-related aspects. Finally, they were asked whether their participation was useful in increasing production, positive changes in food intake habits, and in increasing supplemental household income.

Data Collection and Analysis

The above two surveys were administered to the participating farmers at the beginning and end of the study through self-administered surveys. The researchers also collected data through market surveys of specialty, ethnic and medicinal crops, and crop biodiversity surveys. In addition, data were gathered at the farm gate, during training events, support services, monitoring and farm visits, group meetings, and telephone and email communications. Because the study was exploratory in nature, the focus was primarily on descriptive results. The data were analyzed using Excel and SPSS software.

Results and Discussion

Farmers' Demographic Characteristics

At the beginning of the study, 14 farmers participated. A majority were from Baltimore City and Baltimore County (43%), followed by Somerset County (36%), Anne Arundel County (14%), and Wicomico County (7%). These farmers belonged to a diverse group of ethnic minorities that comprised Hispanic/Latino (7%), White/Caucasian (7%), Non-Hispanic/Latino (7%), African American (14%), and Asian (64%). Of the participants, 36% were female and 64% were male. The ages of the participants ranged from 26 to over 60 years. Categorically, 50% were below 44 years of age, followed by 43% below 60 years of age and 7% above 60 years of age. The average farm size was only 1.20 acres (with a median size of 0.38 acres), ranging from 0.06 acres to a high of 11 acres.

Farmer Type and Farming Experience

Nearly 86% of the farmers reported that they were seasonal farmers, and only 14% reported they were part-time farmers. Most of them operated backyard kitchen gardens (86%), and the remaining 14% were involved and volunteered in community gardens (Table 1). Fifty percent had <10 years and 50% had >10 years of farming experience. Just over 71% of the farmers reported that they did not keep any farm records, implying that they did not practice systematic and data-based farm

Published by Tuskegee Scholarly Publications, 2023

planning and budgeting.

Table 1. Types of farmers and their farming experiences (n=14)

Characteristics	Percent
Involvement type	
Part-time	14.3
Seasonal	85.7
Farming experience	
1-5 years	35.7
6-10 years	14.3
More than 10 years	50.0
Scale/type of farming	
Backyard kitchen garden	85.7
Community garden	14.3
Keeps farm record	
Yes	28.6
No	71.4

Farm Commodities

Most (93%) of the participating farmers reported that they cultivated vegetables (Table 2). Many of them grew multiple commodities. Nearly 36% of them reported growing fruits, followed by medicinal herbs (29%), flowers (14%), poultry (14%), and 7% each reported having peacocks, ducks, oysters, and mussels.

Table 2. Commodities grown in the farm (n=14)

Farm commodity	Percent
Vegetables	92.9
Fruits	35.7
Medicinal herbs	28.6
Poultry	14.3
Flowers	14.3
Peacock	7.1
Ducks	7.1
Oysters and mussels	7.1

Reasons for Urban Gardening

Nearly 79% of the participants indicated that the primary reasons for farming were for family consumption and the health benefits of working in the garden. They reported that working with plants gave them pleasure and the enjoyment of being outdoors and engaging in physical activity. Likewise, 57% reported that farming supplemented household income by providing fresh vegetables to the kitchen during the study period, saving a significant amount on grocery bills.

Fifty percent of the participant farmers described gardening as an excellent way for retired family members to pass the time. Sharing educational experiences throughout the year, especially with

children at the dining table, was reported by 14% of them. Farmers indicated that they

communicate with family members the knowledge of growing produce. They also discussed how

Table 3. Primary reasons for farming (n=14)

Primary Reasons	Percent
1. Outdoor and physical activity	78.6
2. Produce for family consumption	78.6
3. Supplemental income	57.1
4. Time pass	50.0
5. Educational purpose	14.3
6. Tax benefits	7.1

to protect plants from insects and diseases, how to properly care for them with water, and the necessary manure and fertilizer to help them grow and provide fresh food at each meal. Seven percent also shared that gardening allows them to receive tax benefits. The findings are consistent with Caspersen et al. (1991) that participants spent relatively more time gardening (225 minutes/week) than doing other leading forms of exercise, such as walking (160 minutes/week) and cycling (170 minutes/week).

Impact of Urban Gardening on the Household Economy

The results revealed that urban gardening enhanced the household economy of participating farmers by increasing production, reducing production costs, and increasing the consumption of fresh and healthy produce. The findings further confirmed that participating farmers benefited socio-economically and technically through various marketing initiatives. Farmers were assisted with trying potential market outlets in the community and developing practices for marketing their fresh produce, such as inviting consumers to the garden for U-Pick and taking produce to different markets in the community (farmer's market, street festivals, selling at the community meeting locations/venues, etc.). Following these marketing avenues, twelve farmers participating in the study collectively reported $1,976 in sales, primarily through direct marketing during the summer and fall of 2022. Moreover, 20 farmers reported an increase in fresh vegetable consumption; fifteen participating farmers estimated a 25% increase (equivalent to $10,500 (on average $117/month)), and five farmers estimated a 15% increase (equal to $2,000) (on average nearly $67/month)) in consumption of fresh produce at home during the study period (summer and fall of 2022). Thus, the direct and indirect economic benefits from vegetable sales due to the intervention were $14,476, which the participating farmers never achieved before the study. Various mechanisms that may have contributed to the increase in household incomes of participating farmers through UG, as reported by the farmers, are discussed below.

Change in Knowledge and Skills

All of the project's participating farmers (100%) reported that they gained knowledge and skills in exploring marketing opportunities, reduced production costs, and increased networking with peers and professionals at the service-providing institutions (96% each). Similarly, the other areas in which they gained knowledge and skills were farm revenue maximization, entrepreneurial skills, farm management practices, developing a data-driven farm plan, the need for data recording, management of limited and scarce resources, and production risk mitigation.

Published by Tuskegee Scholarly Publications, 2023

Table 4. Knowledge and skills gained by the participant farmers (n=22)

Assessment Indicators	Percent
▪ Exploring marketing opportunity	100.0
▪ Reducing cost of production	95.5
▪ Peer-to-peer networking	95.5
▪ Networking with professionals	95.5
▪ Farm revenue maximization	86.4
▪ Entrepreneurship development	81.8
▪ Improved farm management practices	72.7
▪ Data-based farm planning	68.2
▪ Importance of data recording	63.6
▪ Resource management	63.6
▪ Production risk mitigation	59.1

Changes in Behavior and Action

All 22 participating farmers described their participation in the study as very useful in bringing about positive changes in behavior or action pertinent to sustaining urban gardening (Figure 2). Harvesting rainwater, making compost from kitchen waste, plant by-products, chopped grasses, and marketing farm produce were some examples.

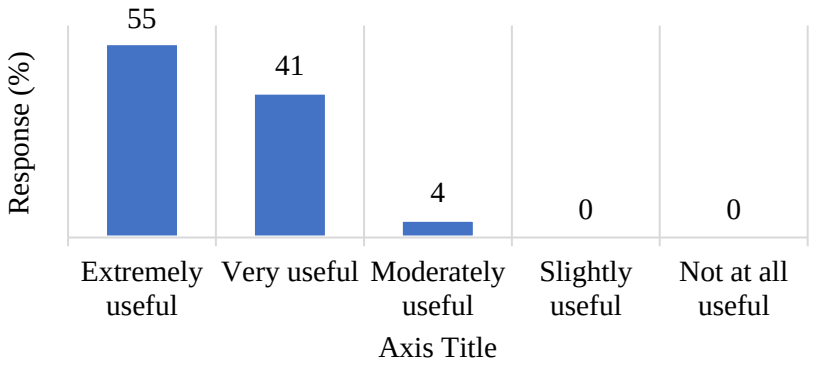

Figure 2. Changing behavior or action after participating in the study

Production and Productivity

Twenty-one of the 22 farmers participated in the post-evaluation survey; 55% reported that their involvement in the study was extremely useful, followed by 41% very useful, and 4% moderately useful in increasing farm production and productivity of the selected specialty and ethnic vegetables.

Consumption of Fresh Vegetables

Farmers reported that their involvement in the study was extremely useful (50%), followed by very useful (41%) and moderately useful (9%) in increasing consumption of fresh garden-produced vegetables at each meal. The increase in fresh intake was due to the increased production of fresh produce in the gardens (Figure 3).

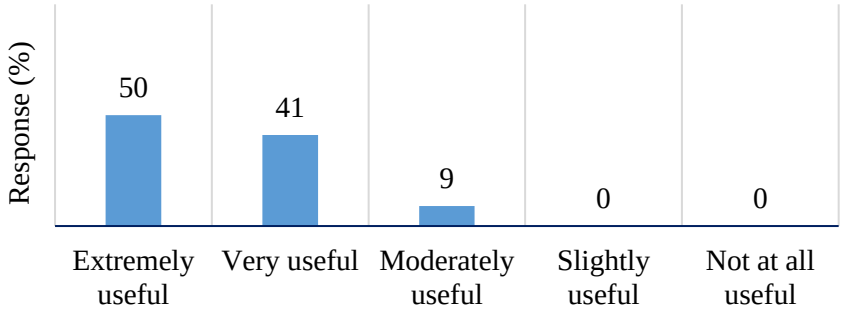

Figure 3. Increased consumption of fresh produce due to project intervention

Niche Marketing of Ethnic Vegetables

The project helped participating farmers market the surplus specialty and ethnic vegetables at the local street festival, which was eye-opening to hundreds of minority families (in particular, Asian, African, and Latino) in the community and the street festival onlookers. The street festival stall served as a perfect extension model, informing buyers and potential customers about the sources of fresh produce in the community, types of available seasonal specialty and ethnic vegetables, and possible ways of buying them.

Considering the volume of sales recorded at the street festival, the market demand for such vegetables seemed huge. For the first time, these sellers saw an opportunity to generate self-employment in the homestead and contribute to reducing carbon emissions associated with transporting food. According to Kloppenburg et al. (1996) and Pollan (2008), food in the United States travels an average of 1300 miles from farm to fork, changes hands half a dozen times, and consumes 10 calories of fossil fuel energy to produce a single calorie of modern supermarket food. The authors also reported that fruits and vegetables sold in supermarkets spend as many as 7 to 14 days in transit. During this time, almost 50% of the transported food is lost due to spoilage. Moreover, locally grown products will help reduce or eliminate the transit time, thus significantly reducing the waste of fresh fruits and vegetables. Also, gardening will encourage exercise and motivate people to stay active longer than other activities. Besides selling at the street festivals, project farmers were able to sell their produce at the farm gate, farm to the family kitchen, farm to local groups, farm to organizational contacts, pick your own vegetables, and farm to contact consumers.

Lowering the Cost of Production

In total, 96% of the participating farmers mentioned that their participation in the study helped them to reduce the cost of production of garden produce. Seventy-three percent said that their participation in the project was extremely useful, followed by very useful (23%) in lowering the cost of production.

Published by Tuskegee Scholarly Publications, 2023

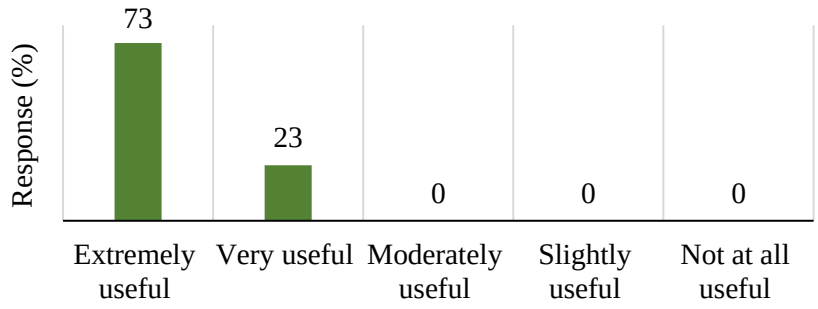

Figure 4. Impact on reducing cost of production

Data-Driven Farm Planning, and Budgeting

Participating farmers stated that the support they received from the study to acquaint them with the farm planning and budgeting process and methodology was extremely useful (36%), followed by very useful (59%) and moderately useful (5%). The participants outlined their production and marketing plan based on generated data about the production, consumption, marketing, and available farm resources.

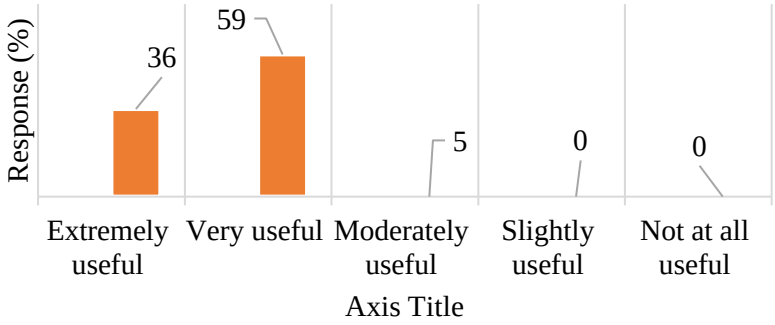

Figure 5. The impact of the study on preparing data-based garden planning

Sustainable use of Limited and Scarce Resources

Ninety-six percent of the farmers confirmed that the support was extremely useful (36%), very useful (55%), and moderately useful (5%) for managing scarce and limited farm resources, such as making compost, rainwater harvesting, making use of fencing for trellising, and producing

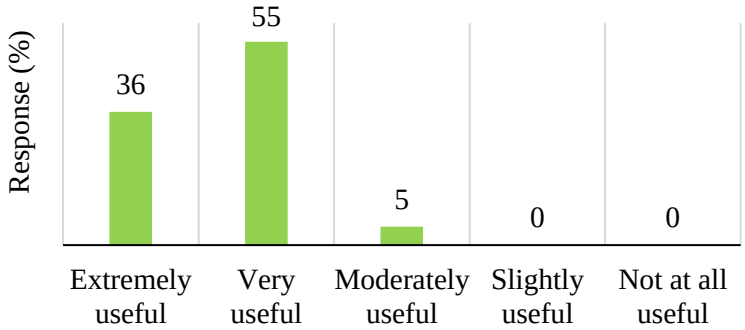

Figure 6. The impact of the study on making sustainable use of resources

vegetables in a two-tier system by optimizing their limited space and using locally available resources while practicing mixed farming intensively.

Conclusion

The study's findings revealed that the participating urban gardeners were willing to apply practices to increase production and lower production costs to increase their supplemental household income and consumption of fresh and healthy produce. Consequently, they integrated specialty and ethnic vegetables, fruits, and medicinal herbs on an average of 1.2 acres. They practiced intensive mixed cropping, rainwater harvesting, compost making, water-conserving, one-to-one, and one-to-many marketing methods that helped increase their household income.

From a research standpoint, the study aimed to enhance the technical and economic efficiency of socially disadvantaged, small, and minority farmers by strengthening their knowledge and skills to make informed decisions, develop evidence-based farm plans, and adopt economically sustainable practices to optimize farm income. Accordingly, the study strengthened farmers' technical and economic efficiency and, ultimately the household income through urban gardening by (i) enhancing their capacity to allocate limited resources efficiently and make informed decisions, (ii) strengthening their knowledge and skills to record farm data and monitor farm performance such as production, consumption, and marketing, (iii) strengthening their capacity to prepare a data-driven farm business plan, (iv) increasing cropping intensity and crop biodiversity, (v) encouraging them to install rainwater harvesting technology, (vi) training them to expand compost making, and (vii) linking them to market outlets to sell their marketable surplus.

From an extension perspective, the post-evaluation findings confirmed that their participation in the study was useful in (i) building and enhancing entrepreneurial skills; (ii) developing data-driven planning; (iii) managing limited resources efficiently; (iv) reducing the cost of production; (v) mitigating production, marketing, and financial risks; (vi) improving farm production and increasing consumption of fresh products; (vii) maximizing farm revenue; (viii) increasing household income; (ix) securing socio-economic and technical benefits; and (x) changing behaviors, actions, attitudes, and enthusiasm for selling produce in the market. Overall, the farmers benefited from the enhanced knowledge and skills and acquired experiences by increasing supplemental income in the household. This will strongly motivate the farmers to continue UG in the future and for their sustenance.

Acknowledgment

The study was funded by the Northeast Sustainable Agriculture Research and Education (SARE) Program-competitive partnership grant in 2021.

References

Brown, K., and Carter, A. (2003). Urban agriculture and community food security in the United States: Farming from the city center to the urban fringe. http://www.foodsecurity.org/PrimerCFSCUAC.pdf. In Reynolds, K. (2011). Expanding technical assistance for urban agriculture: Best practices for extension services in California and beyond. *Journal of Agriculture, Food Systems, and Community Development*, *1*(3): 197-216. doi:10.5304/jafscd.2011.013.013

Bremer, A., K. Jenkins, and D. Kanter. (2003). "*Community Gardens in Milwaukee: Procedures for their Long-Term Stability and their Import to the City of Milwaukee*." In Gardening

Matters: Multiple Benefits of Community Gardening. https://www.lamar.edu/sustainability/_files/documents/Multiple%20Benefits_2012.pdf [Retrieved May 22, 2023].

Caspersen, C. J., B. P. Bloemberg, W. H. Saris, R. K. Merritt, and D. Kromhout (1991). "The Prevalence of Selected Physical Activities and Their Relation with Coronary Heart Disease Risk Factors in Elderly Men: The Zutphen Study." (1985). *American Journal of Epidemiology*, 133:1078-1092.

Chicago Botanic Garden and the City of Chicago. (2003). *Green Connections: A Research Assessment of Community Gardening in Chicago*. The City of Chicago, Illinois. In Gardening Matters: Multiple Benefits of Community Gardening. https://www.lamar.edu/sustainability/_files/documents/Multiple%20Benefits_2012.pdf [Retrieved May 22, 2023].

CFSC [Community Food Security Coalition], (2003). "Urban Agriculture and Community Food Security in the United States: Farming from the City Center to the Urban Fringe." http://www.foodsecurity.org [Retrieved July 12, 2021].

Daniels, J. (2019). "Census of Agriculture Shows Continued Decline in Number of US Farms." https://www.cnbc.com/2019/04/11/census-of-agriculture-shows-continued-decline-in-number-of-us-farms.html [Retrieved September 17, 2022].

Dill, S., S. Hannah, B. Benjamin, and J. Hanson. (2012). "Maryland Beginning Farmer Needs Assessment. Beginning Farmer Success." University of Maryland Extension, College Park, Maryland. https://extension.umd.edu/resource/beginning-farmer-guidebook [Retrieved October 23, 2023].

Fan, S., and C. Rue. (2020). "The Role of Smallholder Farms in a Changing World." In Gomez, Y., S. Paloma, L. Riesgo, and K. Louhichi (eds.), *The Role of Smallholder Farms in Food and Nutrition Security*. https://doi.org/10.1007/978-3-030-42148-9_2 [Retrieved February 21, 2022].

GICA [Governor's Intergovernmental Commission for Agriculture] (2011)). "Understanding and Responding to the Changing Needs of Maryland Agriculture: A Toolkit for Local Communities." www.mda.state.md.us/boards_comms/gica.php [Retrieved March 30, 2021].

Hlubik, W. T., M. W. Hamm, M. A. Winokur, and M. V. Baron. (1994). "Incorporating Research with Community Gardens: The New Brunswick Community Gardening and Nutrition Program." *Health & Place* 6(2000):319-327.

Houngbo, G. F. (2020). "Why Small Farms are Key to the Future of Food and How We Can Support Them." https://www.ifad.org/en/web/latest/-/blog/why-small-farms-are-key-to-the-future-of-food-and-how-we-can-support-them [Retrieved February 15, 2023].

Hyden-Smith, R. (2009). Victory Grower website. In Reynolds, K. (2011). Expanding technical assistance for urban agriculture: Best practices for extension services in California and beyond. *Journal of Agriculture, Food Systems, and Community Development*, *1*(3):197-216. doi:10.5304/jafscd.2011.013.013

Karki, L. B., and P. Bhandari. (2022). *Needs Assessment of Small, Socially Disadvantaged, and Minority Farmers*. *Study Report*. Increasing Efficiency and Decision-Making Capability of Small, Socially Disadvantaged and Minority Farmers. University of Maryland Eastern Shore, Princess Anne, Maryland.

Karki, L. B., and E. N. Escobar. (2022). *Farmer's Needs Assessment in Agriculture. A Case of Maryland Study Report*. University of Maryland Eastern Shore, Princess Anne, Maryland. September 2022.

Keller, J. C. (2014). "I Wanna Have My Own Damn Dairy Farm!' Women Farmers, Legibility, and Femininities in Rural Wisconsin, U.S." *Journal of Rural Social Sciences* 29(1):4.

King, J. (2020). "The Importance of Urban Farming." https://blog.growlink.com/the-importance-of-urban-farming [Retrieved February 21, 2023].

Kloppenburg, J., J. Hendrickson, and G. W. Stevenson. (1996). "Coming in to the Foodshed." *Agriculture and Human Values* 13(3):33-42.

Meemken, E., and M. F. Bellemare. (2019). "Smallholder Farmers and Contract Farming in Developing Countries." *Proceedings of the National Academy of Sciences* (*PNAS)*.117(1): 259-264.

Misiaszek, C., S. Buzogany, and H. Freishtat. (2018). "Johns Hopkins Center for a Livable Future. Baltimore City's Food Environment, Report." https://clf.jhsph.edu/sites/default/files/2019-01/baltimore-city-food-environment2018-report.pdf [Retrieved April 02, 2021]. [Retrieved April 17, 2021].

Pearson, L. J, Pearson, L., and Pearson, C. J. (2010). "Sustainable urban agriculture: Stocktake and opportunities." *International Journal of Agricultural Sustainability*, *8*(1-2):1-19.

Plumer, B. (2016). "The Real Value of Urban Farming. Hint: It is not Always the Food." https://www.vox.com/2016/5/15/11660304/urban-farming-benefits [Retrieved Feb.21, 2023].

Pollan, M. (2008). "Farmer in Chief." *New York Times Magazine*. http://www.nytimes.com/2008/10/12/magazine/12policy-t.html [Retrieved Dec. 14, 2022].

Reynolds, K. (2011). "Expanding technical assistance for urban agriculture: Best practices for extension services in California and beyond." *Journal of Agriculture, Food Systems, and Community Development*, *1*(3):197-216. doi:10.5304/jafscd.2011.013.013

Schmelzkopf, K. (1995). "Urban Community Gardens as Contested Space." *Geographical Review* 85(3):364-381.

Sherer, P. M. (2006). "The Benefits of Parks: Why America Needs More City Parks and Open Space?" http://www.tpl.org [Retrieved October 31, 2022].

Surls, R., Feenstra, G., Golden, S., Galt, R., Hardesty, S., Napawan, C., and Wilen, C. (2014). "Gearing up to support urban farming in California: Preliminary results of a needs assessment." *Renewable Agriculture and Food Systems*. Retrieved from: http://dx.doi.org/10.1017/S1742170514000052

Tritsch, K, K. Mix, M. Edwards, and M. Piña. (2022). Evaluating Success Factors and Challenges Among Small-Scale Agricultural Producers: A Texas Case Study. *Journal of Rural Social Sciences* 37(3): Article 3.

Myers, G. S (2021). *Niche Marketing - Outside of the Box, but in the Black.* University of Maryland Extension. Fact Sheet, FS-846. https://extension.umd.edu/sites/extension.umd.edu/files/publications/FS_846NicheMarketing.pdf [Retrieved April 01, 2021].