



American Journal of Environmental Economics (AJEE)

ISSN: 2833-7905 (ONLINE)

VOLUME 4 ISSUE 1 (2025)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Promoting Community Gardening Among Small-scale Ethnic Minority Producers: A Case of Maryland

Dipendra Gurung^{1*}, Lila B. Karki¹, Prem B. Bhandari¹, Sahil Ojha¹

Article Information

Received: December 14, 2024

Accepted: January 18, 2025

Published: May 07, 2025

Keywords

Adoption, Capacity-Building, Extension Program, Food Security, Knowledge Gain

ABSTRACT

Food insecurity disproportionately affects minority populations, and addressing it has become a daunting challenge amidst a rapidly growing population and changing climate. Community gardening has emerged as an effective tool to combat food insecurity and ensure a sustainable agrifood system. However, the participation of ethnic minority populations in community gardening is low due to several factors, including lack of knowledge, skills, awareness, technical support, and motivation. This study evaluated the impact of an Extension project on the knowledge, skills, perception, and practices of 36 small-scale ethnic minority producers involved in community gardening in Maryland. The results showed improvements in gardening knowledge and skills and increased awareness of the benefits of community gardening. Most participants expressed willingness to continue gardening, participate in community-building activities, and share their knowledge among friends and relatives, indicating an increased awareness of the need to adopt the need for the adoption of sustainable food production strategies. These findings underscore the importance of tailoring extension programs to meet the participant's specific needs, enhance knowledge, and promote the broader adoption of community gardening.

INTRODUCTION

Community gardens are open spaces managed and operated by local community members who cultivate food or flowers for their use or donation (Holland, 2004). Community gardens provide an opportunity for individuals and families living in urban and semi-urban areas with limited access to land to grow their food. Community gardens in the modern United States (U.S.) date back to World War I, when citizens were often required to grow their food. The purpose of a community garden often varies depending on its location and size. For example, in low-income communities, a community garden may serve primarily to improve food security for the residents. Conversely, in higher-income communities, it might be designed specifically as a green space and a place for physical activity. Several studies report the benefits of community gardening, such as – good health, better access to healthy food, and enhanced nutrition (Malberg Dyg *et al.*, 2020; Twiss *et al.*, 2003; Wakefield *et al.*, 2007). Other benefits include increased physical exercise (Armstrong, 2000; Wakefield *et al.*, 2007), sound mental health (Armstrong, 2000), increased social interactions and social capital (Doyle & Krasny, 2003), as well as income generation, employment opportunities (Reuther & Dewar, 2006), and environmental benefits (Okvat & Zautra, 2011).

According to the United Nations Department of Economic and Social Affairs [UN DESA] (2024), the world population is expected to reach 10.3 billion in the mid-2080s. Given the limited resources, there will be significant pressure to feed the growing population (McCarthy *et al.*, 2018). Furthermore, the reduction of arable land around the globe due to rapid urbanization makes the

issue of food security more pressing than ever (Guitart *et al.*, 2012). At the same time, the rapidly changing climate negatively affects agriculture, further worsening food security issues (Mahato, 2014). In 2021, 10.2% (13.5 million) of U.S. households were food insecure and had difficulty providing enough food for all their family members (Coleman-Jensen *et al.*, 2022), meaning that one in every ten Americans did not have enough food at some point during that year.

Of all the populations that lack access to healthy food, poor and racial minorities are most affected. Low-income households spend a significant portion of their income on nutritious food (Golan *et al.*, 2008). Amidst the daunting challenge of food insecurity due to rapid population growth, urbanization, and climate change, it is urgent that we adopt alternative and sustainable strategies to increase food production, such as community or home gardens (Evers & Hodgson, 2011; Gregory *et al.*, 2016). Community gardens provide poor and vulnerable populations access to inexpensive fresh fruits and vegetables (Gottlieb & Fisher, 1996). Lee (2001) mentioned that community gardens allow immigrant populations to grow traditional and ethnic crops, fostering a connection to their homeland. Community gardening provides a place for social gatherings where disadvantaged communities can empower themselves through democratic participation (Armstrong, 2000) and build community capacity by increasing their knowledge and skills (Holland, 2004).

Despite several benefits of community gardening, small-scale ethnic minority producers face many barriers, including lack of knowledge and skills, insufficient financial support, rigid regulations, time constraints,

¹ University of Maryland Eastern Shore, Princess Anne, MD 21853, USA

* Corresponding author's e-mail: dgurung@umes.edu

family obligations, and cultural discrepancies, all of which hinder their participation in community gardening (Karki & Bhandari, 2023; Schrup, 2018). These challenges highlight the need to address these barriers and actively promote the adoption of community gardening among small-scale and minority producers.

Although community gardening has a long history, it is surprising that relatively few studies focus on farmers' experiences, knowledge, skills, and perceptions of community gardening, most studies being based on anecdotal evidence. Marshall (2012) highlighted the importance of identifying farmers' specific needs and evaluating how well they utilize Extension services to ensure that the programs are tailored and delivered effectively, particularly to support minority farmers. However, there is a dearth of research examining the role of institutional and financial support in the adoption of community gardening among small-scale and minority producers in the U.S. Thus, to address these gaps in research, this study examined observations from two community gardens in Baltimore County, and Baltimore City, Maryland, established with the technical and managerial support of the University of Maryland Eastern Shore Extension.

Objectives

The general objective of the study was to engage small-scale ethnic minority producers in community gardening to produce fresh food for their households. The specific objectives of the study were to (i) assess changes in knowledge and skills after project interventions, (ii) evaluate participants' perceptions regarding the benefits of community gardening, and (iii) raise awareness of the importance of community gardening in household food security and greenhouse gas emissions.

LITERATURE REVIEW

Present Trends, Food Security Issues, and Community Gardening

The global population is rising at an alarming rate. The world's population reached 8 billion on November 15, 2022, and is projected to reach 9.7 billion in 2050 and 10.4 billion in 2100 (UN DESA, 2022). Similarly, as the world economy progresses, the world is seeing an unprecedented trend in urbanization. In 2018, 55% (4.2 billion people) of the world's population lived in cities, with North America being the most urbanized region (82.3%) (UN DESA, 2019). Urbanization significantly reduces arable land for agriculture in cities and often accelerates environmental and ecological degradation (Gregory *et al.*, 2016). The food demand has increased with a growing population. A large migration to urban environments from rural areas and a rapid increase in world population has led to growing concerns about food quality, price, and food security. Between 8.9% and 10.5% of the world population—between 702 and 828 million people—faced hunger in 2021, with the highest prevalence in Africa (20.2%), followed by Asia (9.1%)

(FAO, IFAD, UNICEF, WFP & WHO, 2022). The report shows that an estimated 2.3 billion people (29.3% of the world population) were moderately or severely food insecure in 2021. Tilman *et al.* (2011) predicted that global crop production should double by 2050 to meet the increasing food demands and avoid world hunger. However, a significant gap in current crop yield trends makes it challenging to meet this target (Ray *et al.*, 2013). The present agriculture and food market is heavily dominated by conventional or corporate food systems, characterized by highly specialized and standardized commodity-growing practices that prioritize market dominance and profit maximization. These systems have resulted in global food monopolies in seeds, crop commodities, and retail foods while relying heavily on imports and exports, which results in food traveling long distances to reach consumers (Campbell, 2004). The conventional food system addresses short-term hunger relief but is unable to address broader issues such as household income, nutritional quality, and food access (Joseph, 1999). Additionally, the reliance of this system on chemicals has proven to negatively impact the health of farm workers and pose environmental hazards (Greider, 2000). The IPCC 2019 report indicates that up to 37% of greenhouse gas emissions, which contribute to changing climate, originate from total food systems.

These challenges necessitate identifying alternative and sustainable agri-food production systems, such as urban and community gardening. According to Algert *et al.* (2014), gardening is a promising and effective tool to combat the issues of food security and increase access to locally produced nutritious foods. Community and home gardening can help gardeners and local residents meet their daily fresh vegetable and fruit needs, significantly contributing to improved nutrition and health (Malberg Dyg *et al.*, 2020). Urban agriculture can contribute to food security in several ways. At the household level, urban and community gardening can serve as a source of regular income and healthy food, which can maintain stability in food access and affordability, even against seasonality and other temporary shortages (Maxwell, 2002). On a broader level, urban and community gardening can contribute to a significant share of healthy and locally produced foods (especially vegetables and fruits) for the community (Nugent, 2000). Some studies have illustrated the role of the community gardening in food security through donations of surplus produce to people experiencing homelessness, elderly adults, and low-income families (Poulsen *et al.*, 2014; Saldivar-Tanaka & Krasny, 2004). Thus, community gardening can play a substantial role in the food security of households of all income levels by improving access to fresh and nutritious produce (Flanigan & Varma, 2006; McCullum *et al.*, 2005).

Benefits of Community Gardening

Community gardening has several benefits in addition to its role in food security. Inadequate access to nutritious food is often linked to increased risks of heart disease,

diabetes, obesity, and chronic health conditions. However, improved access to fresh and high-quality foods and exercise opportunities through community gardening has been shown to improve individual health (Aubry *et al.*, 2012; Poulsen *et al.*, 2014). Studies have shown that individuals who participated in community gardening consumed more fresh fruits and vegetables than those who did not (Alaimo *et al.*, 2008; Zhang *et al.*, 2021). Promoting community gardening through the Women, Infants, and Children Program has been shown to improve nutrition among participants from low-income urban households, as these gardeners consumed more fresh vegetables (Flanigan & Varma, 2006). Poulsen *et al.* (2014) likewise stated that community gardening contributes to an individual's psychological well-being through the pleasure of sharing food and their increased connections to nature.

Community gardens are found to preserve open green spaces, especially in the urban setting (Drake & Lawson, 2015). Some studies also associate gardens with a climate change mitigation approach, as the gardens remove carbon from the atmosphere (carbon sequestration) and promote locally produced food (Meadows, 2000; Okvat & Zautra, 2011). Locally grown food also minimizes the energy demand and carbon emissions during packaging, refrigeration, and transportation (Okvat & Zautra, 2011). Community gardens also contribute to economic benefits, including income and job opportunities (Okvat & Zautra, 2011). According to a study in San Jose, CA, community gardeners saved \$435 per plot during a season (Algert *et al.*, 2014). Wakefield *et al.* (2007) found that low-income communities involved in community gardening increased their fresh consumption and saved money on groceries. Community gardens also attract a range of economic benefits to the community, including the transformation of vacant lots and improved property values (Guitart *et al.*, 2012; Okvat & Zautra, 2011; Santo *et al.*, 2016).

Other literature also discusses the role of community gardening in building human capital. Community gardens enhance knowledge and skills in gardening as well as facilitate entrepreneurship, especially among youth and individuals belonging to disadvantaged communities (Armstrong, 2000; Blair, 2009). Blair (2009) also expressed that community gardens contribute to community resilience by providing a space for communication, sharing information, and co-learning. Community gardens bring together individuals from different social and cultural backgrounds, nurturing interactions and friendships and offering a broader approach to community involvement and development, social skill development, and hands-on learning (Doyle & Krasny, 2003; McCormack *et al.*, 2010; Saldivar-Tanaka & Krasny, 2004).

Amidst the challenges of land shortage, food insecurity, and degrading environment, community gardening emerges as a viable solution to ensure food security and promote a sustainable environment. By emphasizing local production, it addresses the shortcomings of the mainstream agricultural and food systems, providing

fresh, high-quality foods while mitigating the threats posed to food security and the environment by conventional practices. In summary, community gardens promote the well-being and resilience of individuals, communities, and the environment (Okvat & Zautra, 2011).

Community Gardening, Ethnic Minority Producers, and the Role of Extension

Community gardening offers opportunities for individuals, especially youth and disadvantaged communities, to gain hands-on knowledge and skills in food production, nutrition, environment, and entrepreneurship (Armstrong, 2000; Blair, 2009; Draper & Freedman, 2010; Krasny & Tidball, 2009; Santo *et al.*, 2016). A study of community gardeners from a high-poverty area in Toronto revealed that they increased their fresh vegetable intake while saving money on groceries (Wakefield *et al.*, 2007). These gardeners also reported that they were able to grow ethnic crops that were otherwise expensive or hard to find in stores. Additionally, community gardening promotes empowerment, builds social connections, and enhances the overall well-being of disadvantaged communities by providing access to land and resources (Okvat & Zautra, 2011). However, while urban and community gardening initiatives are associated with food security and justice, they are often dominated by white, well-off, and educated individuals who disproportionately benefit (Okvat & Zautra, 2011).

Several barriers to community gardening for minority and low-income individuals, such as community garden policies related to membership fees, fencing, and the use of digital communication methods, often discourage them from participating (Glover *et al.*, 2005; Meenar & Hoover, 2012). Additionally, people of color, particularly African Americans, demonstrated a lack of interest, accounting for their low participation. This lack of interest among minority communities stems from a lack of gardening knowledge, experience, and awareness of the benefits of community gardening (Haynes-Maslow *et al.*, 2015; Jettner, 2017; Loopstra & Tarasuk, 2013). Moreover, lower-income and ethnic minority gardeners often have less access to support and facilities and lack connections with those in power compared to white and well-educated gardeners (Cohen *et al.*, 2012).

Extension services could create an outreach initiative to bridge these gaps and make a real difference for disadvantaged communities. Marshall (2012) pointed out the necessity of understanding farmers' specific needs and their accessibility to Extension services to tailor support services for low-income and minority producers. A study by Hargrove & Jones (2004) also indicated that extension programs should be personalized and farmer-specific to ensure sustainability. These personalized programs can minimize gaps in knowledge and provide minority producers with easy access to extension services. Marshall (2012) further emphasized the need to regularly evaluate the program results and collect feedback from clientele farmers to further improve Extension services.

MATERIALS AND METHODS

Logical Framework

Figure 1 illustrates the program's logical framework based on the cited literature discussed previously in this paper. The project took the initiative to establish community gardens and provided gardeners with essential inputs for gardening. The program also offered tailored support programs through education, training, workshops, and one-on-one consultation based on the specific needs of the participants.

These interventions aimed to achieve three key learning outcomes: enhanced awareness, increased knowledge, and improved skills and techniques. The gardeners were

expected to apply their improved knowledge and skills in gardening to achieve immediate and long-term outcomes. The expected immediate outcomes included access to fresh and healthy food, improved nutrition, reduction in grocery expenses, and opportunities to sell surplus produce. In the long term, the gardeners were expected to improve their health through the consumption of fresh and healthy food, enhance household food security from increased vegetable production, and increase household income from the sale of surplus produce. Additionally, sustainable gardening practices were expected to bring long-term environmental benefits.

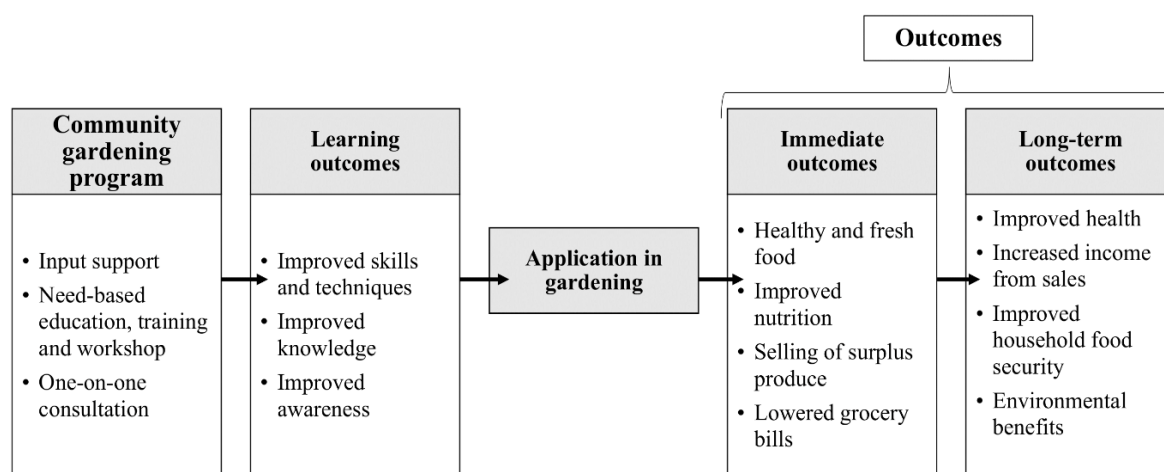


Figure 1: Logical framework of the community gardening program: Adapted from Tembo & Louw (2013)

Implementation

The University of Maryland Eastern Shore Extension, with the financial support of the National Institute of Food and Agriculture (NIFA)/1890 Extension Funding, successfully established two community gardens in Glen Arm and Rosedale, Maryland. The program's primary purpose was to promote community gardening among small-scale and minority producers in Maryland. To achieve this objective and encourage them to start and/or continue gardening, the program provided participants with technical and token material support.

The project initially recruited 20 small-scale ethnic minority producers. With time, through the snowball effect, the number of project participants grew to 36, including producers from Baltimore County and Baltimore City. An initial baseline survey was administered at the beginning of the project to assess participants' needs. Intervention and support activities were subsequently tailored based on the survey findings.

First, the project provided participants with some production inputs to incentivize active participation and address the financial barriers experienced by many participants who could not independently afford resources such as farmyard manure, garden soil, fertilizers, seeds, seedlings, weed-suppressing ground fabrics, and garden tools. Second, through needs-based training, workshops,

mentor/specialist consultation, peer-to-peer interaction, and interactive meetings, the program facilitated capacity-building programs on vegetable production, disease and pest management, compost making, farm production planning and budgeting, risk management, data recording, and produce marketing. Furthermore, the project assisted participants in identifying local vendors, farmers' markets, restaurants, and other potential outlets to explore marketing opportunities to sell surplus produce.

The community gardening program was initiated in February 2023. Two community garden locations were selected based on land availability and proximity to participants. Once the locations and participants were finalized between February and March, a community garden was established in Glen Arm, Baltimore County, and another in Goodnow, Baltimore City, from April 2023 through September 2023. Input support distribution and capacity-building programs were conducted several times between February and September.

Data Collection and Analysis

A semi-structured survey was administered to 36 project participants in September 2023 to assess the outcomes of the project interventions. The survey included the demography of the participating farmers, socio-economic benefits, perceived health benefits, and capacity

improvements as experienced by the participants. The survey was conducted through in-person interviews, phone calls, and focus group discussions. The information produced was triangulated through field visits, phone calls, and group meetings.

Given that the case study was exploratory in nature, the results primarily focused on descriptive statistics. The project's usefulness in fostering capacity building among its participants was measured on a 5-point Likert Scale (extremely useful with a weight of 5 and least useful with a weight of 1), and the mean score was classified following Pimentel (2010). Excel and SPSS were used to analyze the data obtained from the survey.

RESULTS AND DISCUSSIONS

Demographic Characteristics

Among the total respondents who participated in the study ($n = 36$), 52.8% were female. All respondents resided in Baltimore County and Baltimore City and belonged to ethnic minority disadvantaged populations: Bhutanese American (38.9%) and Nepalese American (61.1%).

Knowledge and Skills about Gardening

Out of all survey participants ($n = 36$), 41.7% reported that they did not have knowledge about community gardening prior to joining the project (Figure 2). When asked if their overall knowledge about community gardening and its benefits increased after the project intervention, a large majority (91.7%) of the respondents agreed, with 63.9% in strong agreement and 27.8% agreeing.

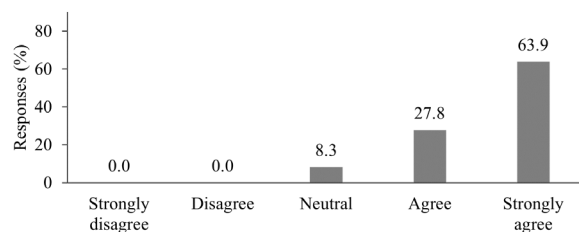


Figure 2: Increase in overall knowledge after participating in the project

Table 1 displays the frequency of the respondents who reported an increase in knowledge and skills in specific areas of community gardening due to participation in the project. The findings indicate that most project participants enhanced their understanding of vegetables and fruit production. Specifically, 100% of the respondents reported an increase in knowledge about different vegetable types, the importance of healthy soil, and water requirements for gardening following their engagement in the project. More than 91% of the respondents realized an increase in knowledge about fertilizer requirements and raised bed gardening techniques. Other areas the respondents reported notable

improvements in their understanding were organic production (88.9%), garden establishment (88.9%), bed preparation (86.1%), seedling production (77.8%), soil health enhancement (75%), and the importance of weeding (75%). Increased knowledge and skills were also reported for growth nutrient application (63.9%), plant disease identification and control (61.1%), insect and pest control (58.3%), application of mulching (58.3%), and marketing of fresh produce (30.6%). These results highlight the project's effectiveness in educating the participants about various gardening practices.

Table 1: Increase in knowledge and skills in various aspects of gardening

Knowledge/Skill	Number of responses	Percent(%)
Different vegetable types	36	100.0
Soil health for healthy production	36	100.0
Fertilizer requirement for plant growth	33	91.7
Watering requirements	36	100.0
Raised bed vegetable gardening	33	91.7
Importance of weeding	27	75.0
Application of mulching	21	58.3
Application of growth nutrients	23	63.9
Garden insect and pest management	21	58.3
Plant disease identification and control	22	61.1
Bed preparation for gardening	31	86.1
Organic production	32	88.9
Enhancing soil health	27	75.0
Establishing a garden	32	88.9
Seedling production	28	77.8
Marketing of fresh produce	11	30.6

Source: Field Survey (2023)

Perceived Benefits of Community Gardening

Respondents were asked about the benefits of community gardening that were realized after engaging in the project and receiving educational and technical assistance from the University of Maryland Eastern Shore Extension. These benefits included the socio-economic, environmental, and health benefits of community gardening. All respondents (100%) agreed that they realized its vital role in producing fresh produce for maintaining good health (Table 2). Equally, respondents realized the benefits of community gardening as a means of engaging in physical activity. Based on their experience in the project, 97.2%

of respondents perceived that community gardening minimizes grocery expenses due to the production of vegetables and fruits. Similarly, 97.2% of respondents agreed that community gardening can contribute to their

household food security. Among the 36 respondents, 61.1% reported that they realized that gardening reduces greenhouse gas emissions by producing food locally, thereby decreasing food miles.

Table 2: Benefits of community gardening

Perceived benefits	Number of responses	Percent(%)
Access to fresh produce for good health	36	100.0
Good means of physical activity	36	100.0
Reduces grocery expenses	35	97.2
Household food security	35	97.2
Reduces greenhouse gas emission	22	61.1

Source: Field Survey (2023)

Program's Usefulness in Fostering Capacity-Building

The mean scores, ranging from 1 (least useful) to 5 (extremely useful), presented in Table 3, determined the project's usefulness in fostering gardeners' capacity building. The responses revealed that the project was very useful in enhancing peer-to-peer networking, reducing the cost of production, and managing locally available resources, such as composting, with the highest mean score for peer-to-peer networking (3.92). The other areas in which the respondents found the project moderately useful were income/production maximization (3.36), farm planning and budgeting (3.14), entrepreneurship development (2.83), record keeping (2.83), and production risk management (2.75).

Table 3: Usefulness of the community gardening program in fostering capacity-building

Indicators	Level of usefulness (%)					Mean score	Description
	Least useful	Slightly useful	Moderately useful	Very Useful	Extremely useful		
Cost reduction	13.9	5.6	13.9	36.1	30.6	3.64	Very useful
Farm planning and budgeting	25.0	8.3	13.9	33.3	19.4	3.14	Moderately useful
Income/Production maximization	13.9	5.6	19.4	52.8	8.3	3.36	Moderately useful
Production risk management	30.6	5.6	27.8	30.6	5.6	2.75	Moderately useful
Entrepreneurship development	25.0	13.9	22.2	30.6	8.3	2.83	Moderately useful
Record keeping	27.8	8.3	25.0	30.6	8.3	2.83	Moderately useful
Resource management	16.7	2.8	16.7	47.2	16.7	3.44	Very useful
Peer-to-peer networking	13.9	2.8	5.6	33.3	44.4	3.92	Very useful

Note: According to Pimentel (2010), *Least useful* (1.00 – 1.79), *Slightly useful* (1.80 – 2.59), *Moderately useful* (2.60 – 3.39), *Very useful* (3.40 – 4.19), *Extremely useful* (4.20 – 5.00)

Source: Field Survey (2023)

Motivation to Continue Community Gardening

A large majority (97.2%) of respondents indicated they were willing to continue gardening and share the acquired knowledge and skills with family, friends, relatives, and neighbors (Table 4). Similarly, realizing the benefits of community gardening, 88.9% of the survey participants reported that they wanted to set up their own kitchen garden at home. To further strengthen their capacity, 77.8% of respondents stated a willingness to participate in future capacity-building activities conducted by the University of Maryland Eastern Shore Extension.

Table 4: Motivation to continue community gardening

Motivation to continue	Number of responses	Percent(%)
Learn more about community gardening	35	97.2
Share knowledge/skills	35	97.2
Establish a kitchen garden at home	32	88.9
Participate in future capacity-building activities	28	77.8

Source: Field Survey (2023)

Discussion

This study assessed various outcomes of promoting community gardening among small-scale ethnic minority producers through the extension approach. A brief discussion is presented below based on the findings.

In the logical framework, we expected that the introduction of community gardening to the participants would result in positive learning outcomes, such as improved awareness, increased knowledge, and enhanced skills. Furthermore, the participants were expected to utilize their newly acquired knowledge and skills to achieve both immediate and long-term benefits from community gardening.

The findings indicated a slightly higher proportion of female participants (52.8%) in the project. Nearly forty-two percent of the participants did not have knowledge of community gardening prior to joining the project, indicating that many were unaware of the functions and benefits of participating in a community gardening program. Following their participation, the majority of participants reported an overall increase in knowledge about community gardening and its benefits, indicating that promotion efforts, supported by technical and material support, can effectively encourage participation and enhance participants' knowledge and understanding of community gardening. The increase in knowledge among participants is consistent with the findings of previous studies (Armstrong, 2000; Blair, 2009; Draper & Freedman, 2010; Krasny & Tidball, 2009; Santo *et al.*, 2016).

The program's hands-on approach proved very effective, as many participants reported enhancement in knowledge, skills, and awareness related to gardening practices. This included increased knowledge about different vegetable types, water, fertilizer, growth nutrient needs, and soil health requirements for a healthy garden. Improvements in skills were reported in specific areas, such as fertilizer and water use, insect/pest and disease management, raised bed preparation, seedling production, and marketing of produce. The increased understanding and improved skills allowed participants to experience firsthand the benefits of community gardening, such as increased consumption of fresh produce leading to good health, improved household food security, reduced grocery expenses, increased physical activity leading to a healthy lifestyle, and a healthier environment due to reduced greenhouse gas emission activities. These benefits of community gardening are also reported in many prior studies (Flanigan & Varma, 2006; Okvat & Zautra, 2011; Poulsen *et al.*, 2014; Wakefield *et al.*, 2007).

The participants' responses highlighted the Extension program's usefulness in contributing to individual capacity-building by fostering peer-to-peer networking, cost minimization, and resource management. However, some areas, including farm planning and budgeting, income maximization, risk management, record keeping, and entrepreneurship development, were deemed only moderately useful. This indicates a need for future

interventions by Extension to focus on these aspects in order to promote participants' capacity building. The primary impact of the program is reflected positively, as most participants expressed a willingness to continue gardening, establish a home garden, participate in capacity-building activities, and share their acquired knowledge and skills with family, friends, relatives, and neighbors.

Overall, the study achieved the desired outcomes in promoting community gardening among small-scale ethnic minority producers. The results demonstrated the potential for the long-term impact of community gardening on increasing household food security.

However, the study has some limitations. First, the sample size was small, and all ethnic participants were of Asian origin, limiting the study's broader generalization. Second, the benefits of community gardening were qualitatively assessed based on self-reporting by the producers, which may introduce bias. Thus, these limitations should be considered in future studies to support and generate more robust and conclusive evidence.

CONCLUSION

The study highlights the perceived benefits of community gardening reported by the participants, including access to fresh food, increased physical activity, reduced grocery expenses, improved household food security, and reduced greenhouse gas emissions. These results demonstrate the benefits community gardening offers to an individual, community, and environment. The findings reveal that extension programs combined with adequate support can promote the adoption of community gardening and enhance knowledge, skills, and overall understanding among small-scale ethnic minority producers. The study also underscores that a tailored extension project can significantly improve the capacity of small-scale ethnic minority producers in community gardening and motivate them to continue gardening and share acquired gardening knowledge and skills. Overall, the study indicates that with broader outreach, the extension's community gardening initiatives can be an effective tool for development at both household and community levels.

REFERENCES

- Alaimo, K., Packnett, E., Miles, R. A., & Kruger, D. J. (2008). Fruit and vegetable intake among urban community gardeners. *Journal of Nutrition Education and Behavior*, 40(2), 94–101. <https://doi.org/10.1016/j.jneb.2006.12.003>
- Algert, S. J., Baameur, A., & Renvall, M. J. (2014). Vegetable output and cost savings of community gardens in San Jose, California. *Journal of the Academy of Nutrition and Dietetics*, 114(7), 1072–1076. <https://doi.org/10.1016/j.jand.2014.02.030>
- Armstrong, D. (2000). A survey of community gardens in upstate New York: Implications for health promotion and community development. *Health and Place*, 6(4), 319–327. <https://doi.org/10.1016/S1353->

- 8292(00)00013-7
- Aubry, C., Ramamonjisoa, J., Dabat, M. H., Rakotoarisoa, J., Rakotondraibe, J., & Rabeharisoa, L. (2012). Urban agriculture and land use in cities: An approach with the multi-functionality and sustainability concepts in the case of Antananarivo (Madagascar). *Land Use Policy*, 29(2), 429–439. <https://doi.org/10.1016/j.landusepol.2011.08.009>
- Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *Journal of Environmental Education*, 40(2), 15–38. <https://doi.org/10.3200/JOEE.40.2.15-38>
- Campbell, M. C. (2004). Building a common table: The role for planning in community food systems. *Journal of Planning Education and Research*, 23(4), 341–355. <https://doi.org/10.1177/0739456X04264916>
- Cohen, N., Chou, J., & Stephenson, R. (2012). *Five Borough Farm: Seeding the future of urban agriculture in New York City*. <https://doi.org/10.13140/RG.2.1.2236.0806>
- Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2022). Household food security in the United States. *Economic Research Report*, 155.
- Doyle, R., & Krasny, M. (2003). Participatory rural appraisal as an approach to environmental education in urban community gardens. *Environmental Education Research*, 9(1), 91–115. <https://doi.org/10.1080/13504620303464>
- Drake, L., & Lawson, L. J. (2015). Results of a US and Canada community garden survey: Shared challenges in garden management amid diverse geographical and organizational contexts. *Agriculture and Human Values*, 32(2), 241–254. <https://doi.org/10.1007/s10460-014-9558-7>
- Draper, C., & Freedman, D. (2010). Review and analysis of the benefits, purposes, and motivations associated with community gardening in the United States. *Journal of Community Practice*, 18(4), 458–492. <https://doi.org/10.1080/10705422.2010.519682>
- Evers, A., & Hodgson, N. L. (2011). Food choices and local food access among Perth's community gardeners. *Local Environment*, 16(6), 585–602. <https://doi.org/10.1080/13549839.2011.575354>
- FAO, IFAD, UNICEF, WFP and WHO. (2022). *The state of food security and nutrition in the world 2022: Repurposing food and agricultural policies to make healthy diets more affordable*. FAO, IFAD, UNICEF, WFP and WHO. <https://doi.org/10.4060/cc0639en>
- Flanigan, S., & Varma, R. (2006). Promoting community gardening to low-income urban participants in the women, infants and children programme (WIC) in New Mexico. *Community, Work and Family*, 9(1), 69–74. <https://doi.org/10.1080/13668800500420806>
- Glover, T. D., Parry, D. C., & Shiness, K. J. (2005). Building relationships, accessing resources: Mobilizing social capital in community garden contexts. *Journal of Leisure Research*, 37(4), 450–474. <https://doi.org/10.1080/00222216.2005.11950062>
- Golan, E. H., Stewart, H., Kuchler, F., & Dong, D. (2008). *Can low-income Americans afford a healthy diet?* Amber Waves: The Economics of Food, Farming, Natural Resources, and Rural America.
- Gottlieb, R., & Fisher, A. (1996). Community food security and environmental justice: Searching for a common discourse. *Agriculture and Human Values*, 13(3), 23–32. <https://doi.org/10.1007/bf01538224>
- Gregory, M. M., Leslie, T. W., & Drinkwater, L. E. (2016). Agroecological and social characteristics of New York City community gardens: contributions to urban food security, ecosystem services, and environmental education. *Urban Ecosystems*, 19(2), 763–794. <https://doi.org/10.1007/s11252-015-0505-1>
- Greider, W. (2000). *The Last Farm Crisis*. *Nation*, 271(16), 11–16.
- Guitart, D., Pickering, C., & Byrne, J. (2012). Past results and future directions in urban community gardens research. *Urban Forestry and Urban Greening*, 11(4), 364–373. <https://doi.org/10.1016/j.ufug.2012.06.007>
- Hargrove, T. M., & Jones, B. L. (2004). A qualitative case study analysis of the small farmers outreach training and technical assistance (2501) program from 1994–2001: Implications for African American Farmers. *Journal of Agricultural Education*, 45(2), 72–82. <https://doi.org/10.5032/jae.2004.02072>
- Haynes-Maslow, L., Auvergne, L., Mark, B., Ammerman, A., & Weiner, B. J. (2015). Low-income individuals' perceptions about fruit and vegetable access programs: A qualitative study. *Journal of Nutrition Education and Behavior*, 47(4), 317–324.e1. <https://doi.org/10.1016/j.jneb.2015.03.005>
- Holland, L. (2004). Diversity and connections in community gardens: A contribution to local sustainability. *Local Environment*, 9(3), 285–305. <https://doi.org/10.1080/1354983042000219388>
- Jettner, J. F. (2017). Community gardens: Exploring race, racial diversity and social capital in urban food deserts. Virginia Commonwealth University. <https://scholarscompass.vcu.edu/etd/4784>
- Joseph, H. (1999). Re-defining community food security. *Community Food Security News*, 3, 12–13.
- Karki, L. B., & Bhandari, P. B. (2023). The significance of urban gardening on the household economy: A case of minority urban gardeners. *Professional Agricultural Workers Journal*, 9(2), 9–25. <https://tuspubs.tuskegee.edu/pawj>
- Krasny, M. E., & Tidball, K. G. (2009). Applying a resilience systems framework to urban environmental education. *Environmental Education Research*, 15(4), 465–482. <https://doi.org/10.1080/13504620903003290>
- Lee, S. H. (2001). *Community gardening benefits as perceived among American-born and immigrant gardeners in San Jose, California* [Unpublished manuscript]. <http://nature.berkeley.edu/classes/es196/projects/2002final/Lee.S.pdf>
- Loopstra, R., & Tarasuk, V. (2013). Perspectives on community gardens, community kitchens and the good food box program in a community-based sample

- of low-income families. *Canadian Journal of Public Health*, 104(1), e55–e59. <https://doi.org/10.1007/bf03405655>
- Mahato, A. (2014). Climate change and its impact on agriculture. *International Journal of Scientific and Research Publications*, 4(4), 1–6.
- Malberg Dyg, P., Christensen, S., & Peterson, C. J. (2020). Community gardens and wellbeing amongst vulnerable populations: A thematic review. *Health Promotion International*, 35(4), 790–803. <https://doi.org/10.1093/heapro/daz067>
- Marshall, R. W. (2012). The impact of the extension service on minority-owned small farm operations. *Journal of Extension*, 50(1), 11. <https://doi.org/10.34068/joe.50.01.11>
- Maxwell, D. (2002). The importance of urban agriculture in food and nutrition. Etc-Ruaf, 5. http://www.ruaf.org/sites/default/files/food_security_nutrition.pdf
- McCarthy, U., Uysal, I., Badia-Melis, R., Mercier, S., O'Donnell, C., & Ktenioudaki, A. (2018). Global food security – Issues, challenges and technological solutions. *Trends in Food Science and Technology*, 77, 11–20. <https://doi.org/10.1016/j.tifs.2018.05.002>
- McCormack, L. A., Laska, M. N., Larson, N. I., & Story, M. (2010). Review of the nutritional implications of farmers' markets and community gardens: A call for evaluation and research efforts. *Journal of the American Dietetic Association*, 110(3), 399–408. <https://doi.org/10.1016/j.jada.2009.11.023>
- McCullum, C., Desjardins, E., Kraak, V. I., Ladipo, P., & Costello, H. (2005). Evidence-based strategies to build community food security. *Journal of the American Dietetic Association*, 105(2), 278–283. <https://doi.org/10.1016/j.jada.2004.12.015>
- Meadows, D. (2000, November 06). *Two brothers talk carbon sequestration*. Grist. <https://grist.org/article/how/>
- Meenar, M., & Hoover, B. (2012). Community Food Security via Urban Agriculture: Understanding People, Place, Economy, and Accessibility from a Food Justice Perspective. *Journal of Agriculture, Food Systems, and Community Development*, 143–160. <https://doi.org/10.5304/jafscd.2012.031.013>
- Nugent, R. (2000). The impact of urban agriculture on the household and local economies. *Growing Cities, Growing Food: Urban Agriculture on the ...*, 67–97. <http://wentfishing.net/farmlit/Theme3.pdf>
- Okvat, H. A., & Zautra, A. J. (2011). Community Gardening: A Parsimonious Path to Individual, Community, and Environmental Resilience. *American Journal of Community Psychology*, 47(3–4), 374–387. <https://doi.org/10.1007/s10464-010-9404-z>
- Pimentel, J. L. (2010). A note on the usage of Likert Scaling for research data analysis. *USM R&D Journal*, 18(2), 109–112.
- Poulsen, M. N., Hulland, K. R. S., Gulas, C. A., Pham, H., Dalglis, S. L., Wilkinson, R. K., & Winch, P. J. (2014). Growing an urban oasis: A qualitative study of the perceived benefits of community gardening in Baltimore, Maryland. *Culture, Agriculture, Food and Environment*, 36(2), 69–82. <https://doi.org/10.1111/cuag.12035>
- Ray, D. K., Mueller, N. D., West, P. C., & Foley, J. A. (2013). Yield Trends Are Insufficient to Double Global Crop Production by 2050. *PLOS ONE*, 8(6), e66428. <https://doi.org/10.1371/journal.pone.0066428>
- Reuther, S., & Dewar, N. (2006). Competition for the use of public open space in low-income urban areas: The economic potential of urban gardening in Khayelitsha, Cape Town. *Development Southern Africa*, 23(1), 97–122. <https://doi.org/10.1080/03768350600556273>
- Saldivar-Tanaka, L., & Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and Human Values*, 21(4), 399–412. <https://doi.org/10.1007/s10460-003-1248-9>
- Santo, R., Palmer, A., & Kim, B. (2016). *Vacant lots to vibrant plots: A review of the benefits and limitations of urban agriculture*. <https://doi.org/10.13140/RG.2.2.25283.91682>
- Schrup, J. (2018). *Barriers to community gardening in Portland, OR*. [University Honors Theses, Portland State University]. <https://doi.org/10.15760/honors.786>
- Tembo, R., & Louw, J. (2013). Conceptualising and implementing two community gardening projects on the Cape Flats, Cape Town. *Development Southern Africa*, 30(2), 224–237. <https://doi.org/10.1080/0376835X.2013.797220>
- Tilman, D., Balzer, C., Hill, J., & Befort, B. L. (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the National Academy of Sciences*, 108(50), 20260–20264.
- Twiss, J., Dickinson, J., Duma, S., Kleinman, T., Paulsen, H., & Rilveria, L. (2003). Community gardens: Lessons learned from California healthy cities and communities. *American Journal of Public Health*, 93(9), 1435–1438. <https://doi.org/10.2105/AJPH.93.9.1435>
- United Nations Department of Economic and Social Affairs. (2024). *World population prospects 2024: Summary of results*. UN DESA/POP/2024/TR/NO. 9. New York: United Nations. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2024/Jul/wpp2024_summary_of_results_final_web.pdf
- United Nations Department of Economic and Social Affairs. (2019). *World urbanization prospects 2018: Highlights*. ST/ESA/SER.A/421. New York: United Nations. <https://doi.org/10.18356/6255ead2-en>
- United Nations Department of Economic and Social Affairs. (2022). *World population prospects 2022: Summary of results*. UN DESA/POP/2022/TR/NO. 3. New York: United Nations. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf

Wakefield, S., Yeudall, F., Taron, C., Reynolds, J., & Skinner, A. (2007). Growing urban health: Community gardening in South-East Toronto. *Health Promotion International*, 22(2), 92–101. <https://doi.org/10.1093/heapro/dam001>

Zhang, X., Zhang, Y., & Zhai, J. (2021). Home garden

with eco-healing functions benefiting mental health and biodiversity during and after the COVID-19 pandemic: A scoping review. *Frontiers in Public Health*, 9, 740187. <https://doi.org/10.3389/fpubh.2021.740187>