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The Role of Women's Community Gardens in The Gambia

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Abstract
Community gardens have increasingly become important livelihood interventions, particularly empowering women and enhancing household resilience in rural West Africa. This study empirically examines the contributions of women's community gardens to household food security, income generation, and women's empowerment in rural Gambian communities. Drawing on-site observations, focus group discussions, key informant interviews, and survey data from 149 garden participants across three rural communities, the study reveals that community gardens substantially enhance economic stability by generating meaningful supplementary income. Participants reported average monthly incomes from garden produce sales, enabling households to cover expenses such as children's education, healthcare, and daily needs, thereby reducing financial vulnerability. Direct consumption of garden produce decreased household food expenditures, improving food security and nutritional diversity. The findings also highlight gardens as social cohesion, community solidarity, and collective action hubs. Women's active involvement in garden governance enhanced their financial autonomy, household decision-making power, and leadership capabilities, in line with broader empowerment objectives. To increase these benefits, the study recommends investments in infrastructure especially irrigation systems, market linkages, secure land tenure, and targeted agricultural training. These findings affirm community gardening's potential as a sustainable model for rural development and women's economic empowerment, offering practical pathways for policymakers and development practitioners in similar contexts.

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I. Introduction

In the agrarian landscape of The Gambia, where subsistence farming forms the bedrock of rural livelihoods, food insecurity presents a persistent challenge. The nations heavy reliance on rain-fed agriculture, coupled with the increasing frequency of climate-related shocks, renders many rural households vulnerable to food shortages and nutritional deficiencies (Hadida et al., 2022). Within this context, women are pivotal to the agricultural sector, yet they face systemic disadvantages. In Sub-Saharan Africa, women constitute a significant portion of the agricultural labour force but often lack equitable access to resources (FAO, 2025). They face significant constraints, including limited access to land, credit, and other productive resources, which curtails their agricultural productivity and perpetuates cycles of poverty (Quisumbing and Pandolfelli, 2010).

In response to these challenges, community gardens have emerged as a promising development intervention. These gardens, often managed collectively by women, offer a space to cultivate a diverse range of nutritious crops, thereby enhancing household food availability and dietary diversity (Hansen et al., 2022). The promotion of these gardens has gained traction among development practitioners and policymakers, who view them as a cost-effective and sustainable means of improving food security and nutrition at the grassroots level. The potential of these gardens to serve as a locus for social and economic empowerment has further amplified their appeal (Ebile, Phelan and Wünsche, 2022).

The supposed benefits of women's community gardens extend beyond food and nutrition. The sale of surplus produce can provide women with an independent source of income, enhancing their economic autonomy and contributing to household livelihood security (Haug et al., 2021). This economic power can, in turn, translate into greater decision-making authority within the household and the community (Quisumbing et al., 2022). The collective nature of these gardens can foster social cohesion and strengthen support networks. Despite the widespread enthusiasm for women's community gardens, there remains a dearth of rigorous, context-specific research to substantiate their acclaimed benefits. Much of the existing evidence is anecdotal or based on small-scale, qualitative studies. While these studies provide valuable insights, they often establish limited causal linkages between participation in community gardens and specific development outcomes, a limitation also noted in reviews of urban agriculture research (Warren, Hawkesworth and Knai, 2015). This knowledge gap hinders the ability of policymakers and development practitioners to design and implement effective, evidence-based interventions.

This study seeks to address this knowledge gap by undertaking a comprehensive and methodologically robust examination of women's community gardens in The Gambia. It will move beyond a singular focus on food security to explore the intricate and interconnected economic and social outcomes of these gardens. By employing a mixed-methods approach, the study will generate both quantitative and qualitative data to assess the role of women's community gardens in transforming the lives of rural women and their communities. The findings of this study will contribute to the broader academic discourse on gender, agriculture, and development.

1.1 Research objectives

The primary objective of this study is to examine the influence of women's participation in community gardening on household food security, income generation, and women's empowerment in rural communities of The Gambia. Specifically, the study aims to:

1. Evaluate the contribution to household food security: Analyze how involvement in community gardens affects household food availability, resilience to food shortages, and dietary diversity. This will involve assessing the range of crops cultivated, self-reported benefits, and income derived from gardening activities.
2. Assess economic impacts on household incomes and livelihood security: Identify and quantify the economic benefits women and their households gain from the sale of garden produce, thereby evaluating the role of community gardening in enhancing overall livelihood security.
3. Investigate social outcomes related to women's empowerment and community cohesion: Examine how participation in community gardens influences women's empowerment, strengthens community bonds, and enhances support networks within participating rural communities.

II. Literature review

The agricultural sector in Sub-Saharan Africa is fundamentally gendered. Women are responsible for a substantial share of agricultural labour, yet they consistently face more severe constraints than men in accessing land, technology, financial services, and markets (FAO, 2025; Quisumbing and Pandolfelli, 2010). This gender gap in resources and opportunities not only undermines women's potential but also imposes significant costs on the broader economy, reducing agricultural productivity and exacerbating food insecurity. Closing this gap by ensuring women have the same access to productive resources as men could increase farm yields by 20–30% (FAO, 2011).

The impacts of climate change are not gender-neutral. In The Gambia, increased variability in rainfall patterns and a higher frequency of extreme weather events disproportionately affect female-headed households and those reliant on rain-fed agriculture (Hadida et al., 2022). Across Africa, women's limited access to resources, information, and decision-making power constrains their capacity to adapt to climate change (Awiti, 2022). Social norms often restrict women's mobility and access to climate information, while their heavy workload, combining agricultural labour with domestic responsibilities, leaves them with less time to implement adaptive strategies.

Empowerment is a multidimensional process involving the expansion of peoples ability to make strategic life choices. A widely used framework for measuring this is the Women's Empowerment in Agriculture Index (WEAI), which assesses empowerment across five domains: (1) decisions about agricultural production; (2) access to and decision-making power over productive resources; (3) control over use of income; (4) leadership in the community; and (5) time allocation (Alkire et al., 2013). Studies show that greater empowerment is associated with improved household food security and dietary quality (Quisumbing and Maluccio, 2003). Empowerment is not simply about individual agency; it is also about challenging and transforming the underlying social and institutional structures that perpetuate gender inequality (Chant, 2008). Recent initiatives such as the project-level WEAI (pro-WEAI) seek to better capture these nuances and measure empowerment more effectively within development projects (Quisumbing et al., 2022).

Community and home gardens are increasingly recognized as important tools for improving nutrition and livelihoods. A systematic review of home gardening in Sub-Saharan Africa found that such initiatives can enhance dietary diversity and provide a source of income, particularly for women (Hansen et al., 2022). These gardens can become spaces for social learning and collective action, strengthening social networks among women (Galhena, Freed and Maredia, 2013). In Cameroon, for instance, home gardens have been shown to play a role in empowering minority women and improving food security (Ebile, Phelan and Wünsche, 2022). The relationship between participation and empowerment is complex. While feminization of agriculture can increase women's decision-making roles, it can also lead to heavier workloads without necessarily improving overall well-being (Haug et al., 2021).

While the literature suggests that community gardens hold significant potential, there is a need for more rigorous, context-specific research, particularly in The Gambia. Many studies on the benefits of gardens suffer from methodological weaknesses that make it difficult to attribute outcomes directly to the intervention (Warren, Hawkesworth and Knai, 2015). Few studies have applied comprehensive frameworks like the WEAI to holistically assess the empowerment impacts of community gardens. This study aims to fill this gap by providing a

methodologically robust analysis of the interconnected food security, economic, and social outcomes of women's community gardens in The Gambia, thereby generating evidence to inform policy and practice.

III.Methodology

This study employed a mixed-methods approach to examine the impact of women's participation in community gardening on household food security, income generation, and women's empowerment in rural communities of The Gambia.

3.1 Study sites

The study was conducted in women's community gardens located in the western part of the Central River Region (CRR) of The Gambia (Figure 1). This region is situated within the Sahelian agroclimatic zone, which is characterized by a tropical savanna climate with a unimodal rainfall pattern. The distinct rainy season, lasting from June to October, is followed by a prolonged dry season from November to May (Sillah, 2014). Annual precipitation is often below 600 mm, creating a short and intensive growing season of approximately 70 days (FAO, 2022). The Gambia's agriculture is overwhelmingly rain-fed, with over 98% of cultivated land dependent on seasonal rainfall, making it highly vulnerable to climatic variability, including erratic rainfall and recurrent droughts (World Bank, 2024).

Agriculture is a cornerstone of the Gambian economy, contributing approximately 20% to the national GDP and employing nearly half of the labor force (World Bank, 2024). However, the sector is dominated by subsistence farming, and food insecurity remains a persistent challenge, particularly in the CRR, which records the highest rates of food insecurity in the country, ranging from 24.1% to 29.8% (FAO, 2022). Women are the backbone of the agricultural labor force, constituting over 70% of agricultural workers and producing about 40% of the total agricultural output (ActionAid, 2011). Despite their significant contributions, female farmers often face systemic barriers, including limited access to land, credit, and productive resources (Badjie, 2018). In this context, community gardens, managed predominantly by women, represent a critical local adaptation strategy to enhance food security, generate income, and foster social empowerment.

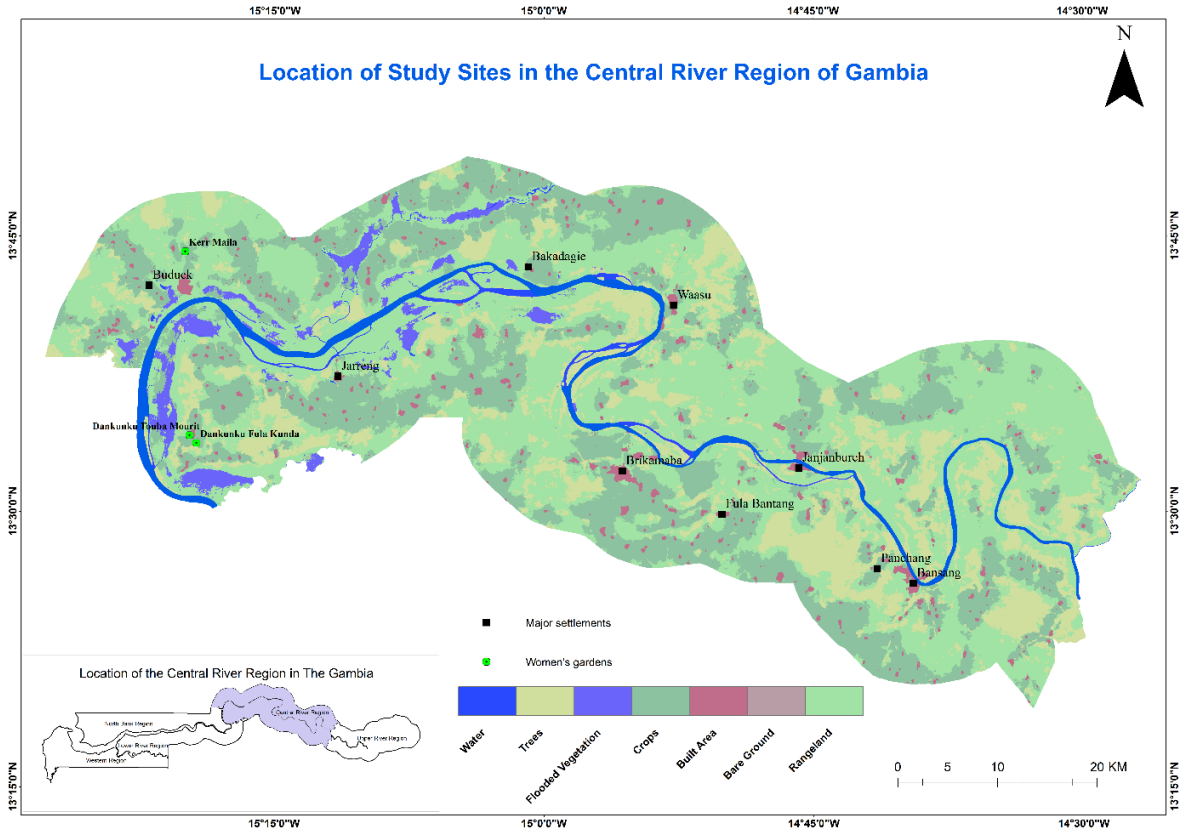

Figure 1. *Location of study sites in the Central River Region (CRR) of The Gambia.*

Touba Mourit	Kerr Maila	Fula Kunda
Center coordinates: 13°34'09"N, 15°19'44"W	Center coordinates: 13°44'10"N, 15°19'59"W	Center coordinates: 13°33'44"N, 15°19'21"W
Area: 2.46 acres	Area: 1 acre	Area: 2.16 acres

Figure 2. *Aerial view of women's garden sites in the three study locations: Touba Mourit, Kerr Maila, and Fula Kunda. Yellow polygons indicate the boundaries of surveyed garden plots. Each site shows the center coordinates and total surveyed area in acres. Source: Google Earth (2024) Dankunku, Fula Kunda, 1:100. Available from: https://earth.google.com/web [8 April 2025].*

3.2 Data collection

A multi-faceted data collection strategy was implemented, incorporating site observations, key informant interviews, focus group discussions, and structured surveys to ensure a robust and holistic dataset.

3.2.1 GEF-6 Project Context and Garden Establishment

The women's community gardens examined in this study were established in response to local community requests within the framework of a Global Environment Facility (GEF-6) funded project titled "Landscape Planning and Restoration to Improve Ecosystem Services, and Livelihoods, Expand and Effectively Manage Protected Areas" (Project ID 9772). Launched in 2020 with a five-year implementation timeline, this project aims to enhance ecosystem services in productive and protected landscapes and waterscapes throughout the Central River Region of The Gambia by improving land use practices and conservation outcomes. The present study was conducted during the third year of project implementation (2023), providing an opportune moment to assess the effectiveness and sustainability of the community-based livelihood interventions established under the project's framework.

The establishment of women's community gardens served as a critical incentive mechanism to encourage and sustain community participation in the project's broader conservation initiatives. While participating communities were offered to brainstorm and arrive at a portfolio of livelihood support activities tailored to their specific needs and preferences, many selected community gardening as their preferred livelihood diversification strategy. To facilitate productive gardening activities, the project provided essential infrastructure including perimeter fencing to protect gardens from livestock damage, a borehole to ensure reliable water access, and water conveyance systems (tanks and distribution networks) to deliver water from the borehole to different sections of each garden.

3.2.2 Site Observations

Field observations were conducted during two critical agricultural periods in 2024: the farm preparation and planting phase (June–July) and the harvest period (October–November). Each of the three garden sites was visited three times during both phases to systematically document key agricultural activities, including land preparation, planting techniques, crop maintenance, irrigation methods, and harvesting practices (Figure 3). These observations provided essential contextual insights into the operational dynamics, organizational structures, and daily routines of the gardens, which subsequently informed the refinement of other data collection instruments.

Figure 3. Activities in two phases of data collection: "a" the farm preparation and planting phase; and "b" the harvesting phase.

3.2.3 Key Informant Interviews

In-depth, semi-structured interviews were conducted with key informants to gain expert and leadership perspectives. Interviewees included the elected head of each garden's

"Garden Committee," which is responsible for managing daily operations, enforcing community-agreed rules, allocating plots, and overseeing financial matters. Additionally, interviews with two influential female community leaders—a women's representative in Kerr Maila and the traditional village head (Alkalo) of Sunthi Jainou—provided broader community-level perspectives on the gardens' role in enhancing food security and promoting women's empowerment.

3.2.4 Focus Group Discussions

A total of six focus group discussions (FGDs) were conducted, with two in each of the three garden communities. Each FGD comprised eight to ten female garden members who were randomly selected to participate. The discussions, facilitated in local languages by trained Gambian enumerators, explored a range of themes, including the organizational structure of the gardens, crop productivity and diversification, perceived community-wide impacts, challenges to long-term sustainability, and the influence of training in sustainable land and water management practices.

3.2.5 Structured Surveys

A structured survey was administered to a total of 149 participants across the three community gardens: Fula Kunda (n=32), Touba Mourit (n=47), and Kerr Maila (n=70). Purposive sampling was employed to include all active female gardeners at the time of the study. The survey instrument, which was developed based on initial site observations and subsequently refined through pre-testing with a small group of non-participant gardeners, was administered digitally using tablets via the EpiCollect v5.1.54 platform to ensure high-quality data capture (Figure 4). The questionnaire collected data on a range of variables, including participant demographics, garden plot characteristics (e.g., size), crop diversity, adoption of sustainable land management (SLM) practices, training history, fertilizer and input utilization, seasonal farming calendars, income generated from the sale of surplus produce, and perceived constraints to gardening activities.

Figure 4. Data was collected by enumerators, using tablets.

3.3 Data analysis

The data were analyzed using both quantitative and qualitative techniques to ensure a comprehensive interpretation of the findings. All quantitative analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 28.0, with a significance level (α) of 0.05 adopted for all statistical tests.

3.3.1 Quantitative Analysis

Pearson's correlation coefficient (r) was employed to measure the strength and direction of the linear relationship between two continuous variables. The coefficient ranges from −1 (a perfect negative linear relationship) to +1 (a perfect positive linear relationship), with 0 indicating no linear association. This analysis was used to assess the relationships between gardeners' monthly income from vegetable sales and variables such as age, plot size, years of gardening experience, and crop diversity. The formula for Pearson's r is:

$$r = \Sigma(x_i - \bar{x})(y_i - \bar{y}) / \sqrt{[\Sigma(x_i - \bar{x})^2 \Sigma(y_i - \bar{y})^2]}$$

where x_i and y_i are the individual paired values of the two variables, and $\bar{x}$ and $\bar{y}$ are their respective sample means (Field, 2018).

Point-biserial correlation (r_pb) was used to assess the association between a continuous variable (monthly income) and a dichotomous variable. This special case of Pearson's r was applied to determine the relationship between monthly income and binary variables such as formal education (yes/no) and receipt of sustainable land management (SLM) training (yes/no). The formula is:

$$r_pb = [(M_1 - M_0) / S_n] \times \sqrt{[(n_1 n_0) / N(N-1)]}$$

where M_1 and M_0 are the mean scores on the continuous variable for the two groups, S_n is the standard deviation of the continuous variable for the entire sample, n_1 and n_0 are the sample sizes for each group, and N is the total sample size ($n_1 + n_0$).

The independent samples t-test was used to compare the mean monthly income between two independent groups based on a dichotomous variable (e.g., SLM training). Welch's t-test was specifically chosen as it does not assume homogeneity of variances, making it more robust. The t-statistic is calculated as:

$$t = (\bar{x}_1 - \bar{x}_2) / \sqrt{[(s_1^2/n_1) + (s_2^2/n_2)]}$$

where $\bar{x}_1$ and $\bar{x}_2$ are the respective group means, s_1^2 and s_2^2 are the group variances, and n_1 and n_2 are the group sample sizes.

3.3.2 Qualitative Analysis

Qualitative data from key informant interviews and focus group discussions were transcribed verbatim and analyzed using thematic analysis, following the iterative six-phase approach outlined by Braun and Clarke (2006). The analysis was facilitated by the use of NVivo (version 12) for data management, coding, and theme development. An inductive, open-coding process was initially employed to systematically identify and label concepts and patterns within the data. These initial codes were then organized into a hierarchical structure of primary nodes (broad themes), secondary nodes (sub-themes), and tertiary nodes (specific aspects), allowing for a granular examination of the dataset. The analysis focused on identifying recurring patterns related to women's empowerment, community cohesion, and livelihood security. To ensure analytical rigor and credibility, the coding framework and emerging themes were independently reviewed by multiple researchers. Any discrepancies in coding or interpretation were resolved through discussion and consensus, thereby strengthening the reliability of the qualitative findings.

IV.Results

The study finds that women's participation in community gardening in rural Gambian communities has led to diverse benefits, including increased household income and improved livelihood security. Key findings highlight the role of community gardens in supplementing income, altering household expenditure patterns, fostering savings, and empowering women through financial independence.

4.1 Key relationships in the survey data

The analysis revealed distinct patterns in the relationships between selected demographic, training, and agricultural factors and income from excess vegetable sales. Age showed no significant correlation with income ($r = 0.15$, $p = 0.12$), indicating that the earning potential from gardening activities is largely independent of the gardener's age. Similarly, receiving sustainable land management (SLM) training demonstrated no meaningful association with gardening income ($r = -0.05$, $p = 0.39$), suggesting either a mismatch between training content and market-oriented skills or external market constraints limiting the efficacy of such training.

Table 1. *The relationship of key variables to yield.*

Title	Hypothesis	Type of correlation used	Result
Age vs. Monthly income from selling excess vegetables	Older women might have more experience or resources, possibly earning more from excess vegetable sales.	Pearsons r	$r = 0.15$, $p = 0.12$ (Not Significant)
Level of education vs. Monthly income from selling excess vegetables	Women with any formal education are hypothesized to earn more from selling excess vegetables than those without formal schooling.	Point-Biserial Correlation / t-test	$r = 0.22$, $p = 0.02$ (Significant)
Received training on SLM vs. Monthly income from selling excess vegetables	Women who have received sustainable land management training might be better at generating income from excess vegetable sales.	Point-Biserial Correlation / t-test	$r = -0.05$, $p = 0.39$ (Not Significant)
Plot size vs. Monthly income from selling excess vegetables	Larger garden plots are expected to produce more yield, thus generating higher income from excess vegetables.	Pearsons r	$r = 0.40$, $p = 0.001$ (Highly Significant)
Years of gardening experience vs. Monthly income from selling excess vegetables	More years of gardening experience could translate into better techniques and higher efficiency, leading to increased income from sales.	Pearsons r	$r = 0.30$, $p = 0.005$ (Moderately Significant)
Crop diversity vs. Monthly income from selling surplus vegetables	Cultivating a greater variety of crops is believed to improve marketability and reduce risk, thus potentially increasing monthly income.	Pearsons r	$r = 0.35$, $p = 0.003$ (Significant)

Several variables exhibited significant positive relationships with income generation. Educational attainment showed a statistically significant positive correlation with income ($r = 0.22$, $p = 0.02$), implying that formal education likely enhances women's capacity to access market information and adopt profitable farming practices. Years of gardening experience also had a meaningful positive relationship with income ($r = 0.30$, $p = 0.005$), reflecting the advantages conferred by accumulated agricultural knowledge and refined management skills. Crop diversity strongly correlated with higher incomes ($r = 0.35$, $p = 0.003$), highlighting the economic benefits derived from risk mitigation and meeting diverse market demands. Most significantly, garden plot size exhibited the strongest correlation with income ($r = 0.40$, $p = 0.001$), underscoring the direct impact of increased productive area on revenue from vegetable sales. These findings collectively emphasize the importance of enhancing education, practical experience, crop diversification, and garden scale as targeted approaches to improving the economic outcomes of women engaged in community gardening in rural Gambia.

4.2 Economic impacts and household financial security

Community gardening in The Gambia is a source of supplementary income for rural households, particularly for women participants. Among the surveyed women, a substantial majority (87.9%) reported generating cash income by selling surplus vegetables not consumed by their households. Although the income from these sales may seem modest, averaging approximately GMD 440 per month with a median of about GMD 375, this revenue stream is significant within the local economic context (Figure 5). Monthly earnings varied widely among respondents, ranging from as low as GMD 50 to as high as GMD 2,000 for the most successful gardeners. This variation reflects differing levels of garden productivity and market access, indicating that while community gardening broadly supports household economies, individual outcomes can differ significantly.

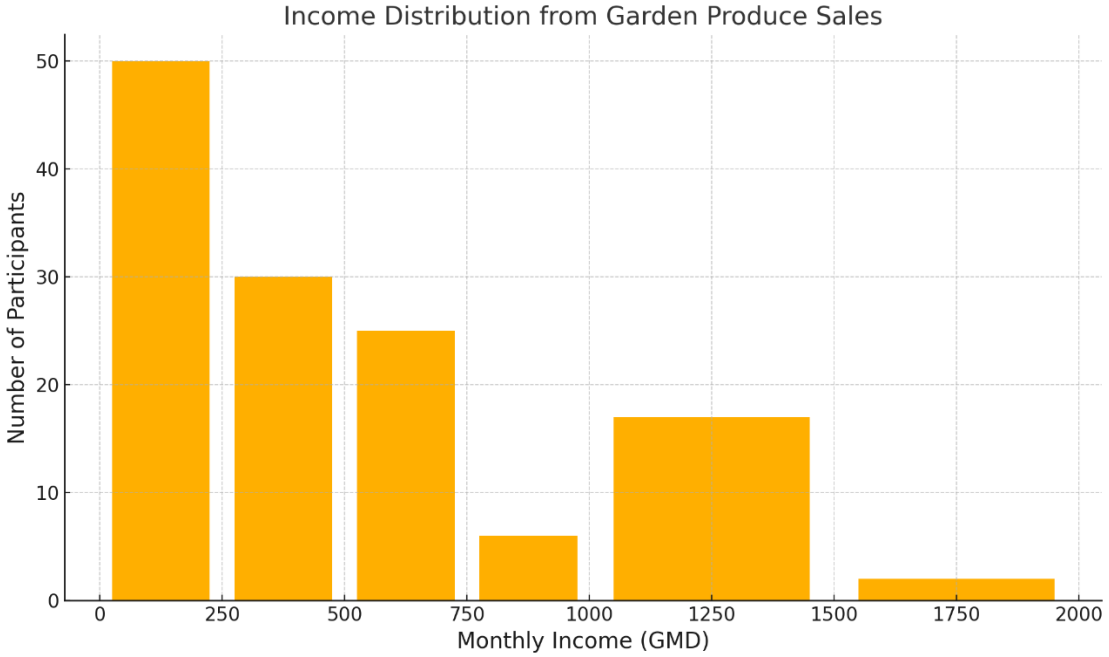

Figure 5. Average monthly income from the sale of garden produce. At the time of data collection, $1 USD = GMD 66.6 Dalasi.

Despite the modest nature of these incomes in absolute terms, they represent a significant financial addition to rural households within the local economic context, helping alleviate financial strains that typically challenge these communities. Income derived from gardening primarily serves household needs, improving the overall financial stability of participating families. Many respondents emphasized the role of gardening in reducing household food expenditures, as a substantial portion of harvested produce directly supplements household consumption. Reducing food purchasing expenses effectively increases disposable household income, freeing resources for other needs. Beyond basic nutritional needs, income from vegetable sales commonly finances children's education, with multiple respondents explicitly noting their ability to pay school fees and purchase necessary educational supplies from gardening revenues. Healthcare expenses and daily household necessities are also frequently covered by gardening income, underscoring its importance in maintaining basic living standards. Several respondents highlighted the newfound ability to set aside savings a previously challenging or impossible financial practice for many. These savings represent an improvement in immediate financial conditions and contribute to longer-term household economic resilience through emergency funds or small-scale investments.

Participants affirmed that community gardens improve their economic well-being and livelihood security. Qualitative understanding gained through interviews revealed a widespread sense of greater financial autonomy among women, described as having their "own money" from vegetable sales, which they manage independently. This economic empowerment has allowed women to contribute substantially to household expenses without relying exclusively on their spouses or other family members. Several women attributed reductions in household financial stress and marital conflicts directly to their ability to manage and allocate their gardening income independently. The consistent availability of diverse garden produce throughout the year was also recognized as important in buffering households against seasonal food shortages and reducing reliance on purchased foods. These factors have contributed to increased economic resilience among participants, reinforcing their confidence in managing unforeseen expenses or potential losses in other agricultural activities.

4.3 Household expenditure patterns and savings

Survey responses illustrate that the income derived from gardening primarily contributes to meeting daily household needs and enhancing financial stability (Figure 6). Nearly all respondents indicated that growing vegetables significantly reduced household food expenditures, as they could directly consume the produce harvested from their gardens. Consequently, gardening effectively decreases cash spending on groceries, enabling households to redirect financial resources toward other pressing needs.

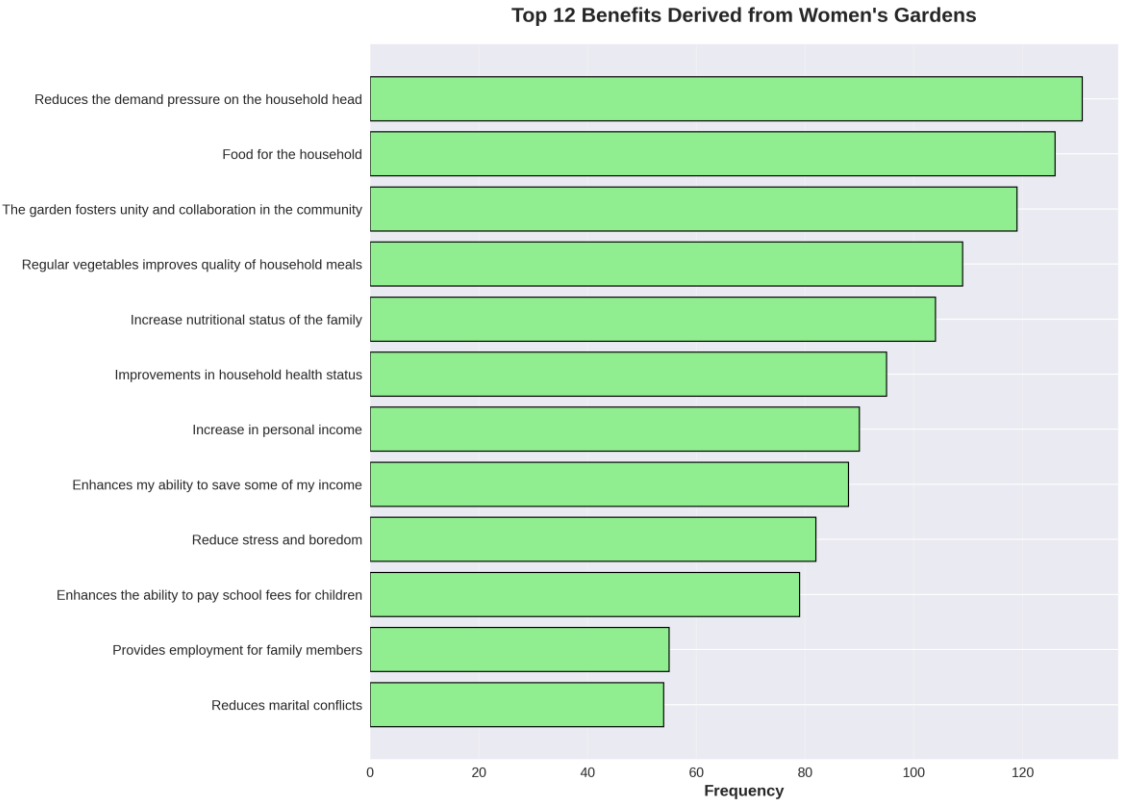

Figure 6. Benefits derived from gardens based on frequency of mentions. Most frequently cited benefits from community garden participation. Reducing household head pressure (131 mentions) ranks highest, followed by household food provision (126 mentions) and community unity fostering (119 mentions). Benefits span economic, social, and nutritional dimensions.

Beyond food, income from garden sales is commonly invested in areas such as education. Over 60% of participants explicitly reported allocating garden earnings to pay for their children's school fees and educational supplies. Approximately 62% noted the ability to save a portion of their gardening income, highlighting a significant shift towards proactive financial planning and increased economic resilience. Several respondents specifically mentioned establishing small savings accounts or joining local savings groups, emphasizing the long-term financial benefits provided by garden-related income. Thus, the community gardens address immediate financial pressures and support broader financial stability and future-oriented economic planning.

4.4 Reported improvements in livelihood security

Participants clearly articulated substantial improvements in their livelihood security, primarily due to their gardening activities. Nearly two-thirds (63%) cited an "increase in personal income" as a significant benefit, underscoring the importance of independent earnings in enhancing their financial autonomy and bargaining power within households. The gardens enabled women to contribute meaningfully to household expenses independently, thus reducing reliance on spouses and alleviating economic pressure on the household head. Approximately 61% of women acknowledged an enhanced ability to save income due to gardening, reflecting improved financial security and resilience. Participants described a strengthened sense of economic stability and confidence in their capacity to manage financial challenges more effectively. Many respondents also associated gardening income with reduced household stress and fewer marital conflicts, as women's ability to independently contribute to household expenditures lowered familial tensions related to financial shortfalls. The gardens were perceived as instrumental in fostering economic independence, improving household financial management, and enhancing women's overall sense of control and security in their livelihoods.

4.5 Relationships between crop diversity, training, and income levels

Quantitative analyses provided insight into the relationships between gardening practices and income levels. A notable positive correlation (Pearson $r \approx 0.35$) is seen between crop diversity the number of crop types cultivated and monthly earnings from vegetable sales. Women who grew a wider variety of vegetables typically reported higher incomes. For example, participants cultivating as many as 10–15 different crop types benefitted from more continuous and staggered harvests, mitigating the risk of potential single-crop failures. This diversification ensured that there was consistently produce available for market sale, thus directly enhancing income stability and profitability.

The analysis investigated the relationship between training in sustainable land management (SLM) training and gardening income. Only a small proportion of respondents (approximately 5%, or eight individuals) reported having received training in SLM practices. Although these trained gardeners reported somewhat higher average monthly earnings (approximately GMD 490) compared to their untrained counterparts (approximately GMD 380), there is no statistically significant correlation between receiving SLM training and income levels ($r = -0.05$, $p = 0.39$). The lack of a statistically significant relationship suggests that SLM training, as currently delivered, may not directly translate into measurable economic benefits within this context. This could reflect limited training uptake, mismatches between training content and market-oriented needs, or external factors constraining the economic value of such training. While agricultural training in principle holds potential, the findings highlight other factors, such as level of education, plot size, years of gardening experience, and crop diversification as a more factors for improving economic outcomes in women's community gardens.

4.5 Challenges faced by women community gardeners

Despite the significant benefits derived from community gardening activities, women gardeners in the Central River Region face considerable operational and structural challenges that constrain their productivity and income generation. The analysis identified ten primary challenges, with lack of storage facilities during peak harvest emerging as the most frequently cited constraint ($n = 130$ respondents). This challenge is particularly acute during the harvest season (October to November), when the concentration of produce exceeds immediate household consumption needs and market absorption capacity. The inability to preserve surplus vegetables through appropriate storage mechanisms results in substantial post-harvest losses, undermining the economic viability of gardening enterprises and reducing the potential for income diversification. Similarly, conflict with domestic animals ($n = 125$ respondents) represents a significant threat to garden productivity, as free-ranging livestock frequently damage crops and consume planted vegetables, necessitating labor-intensive protective measures such as fencing and constant vigilance (Figure 7).

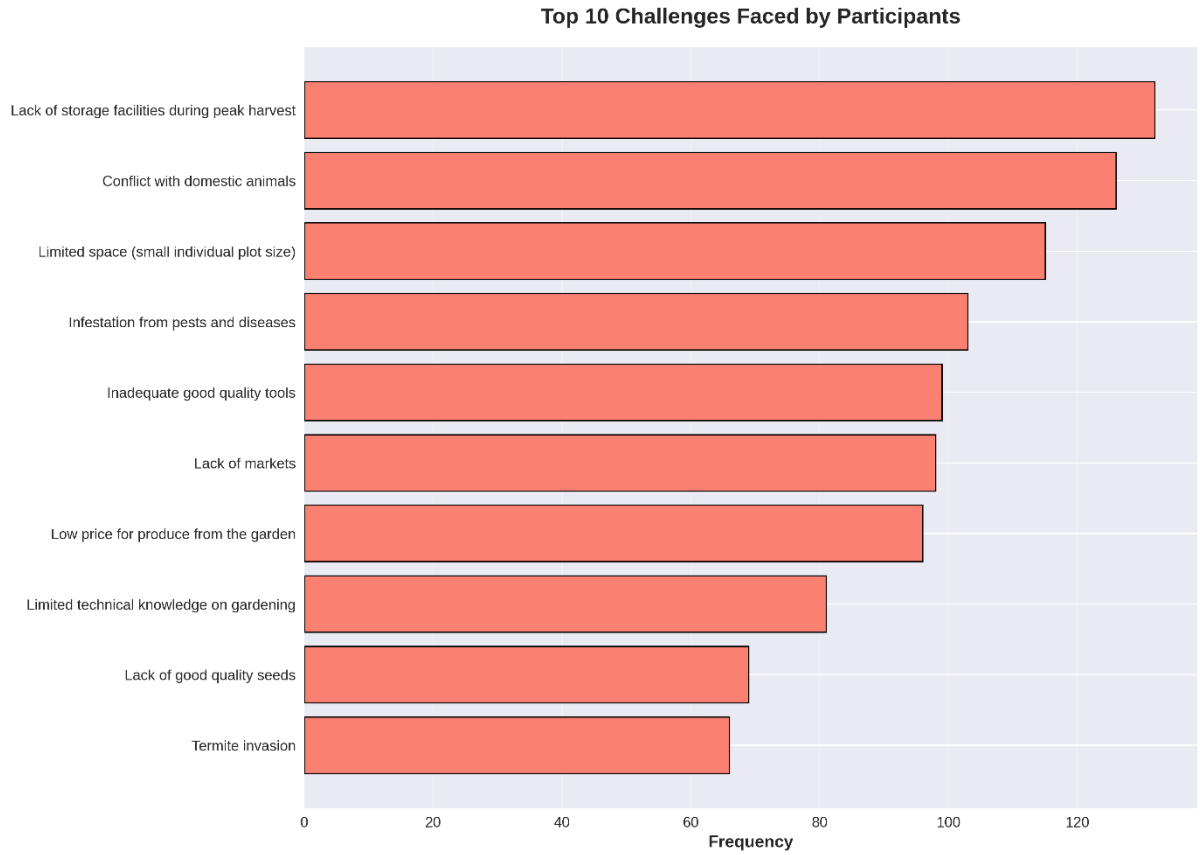

Figure 7. Frequency distribution of the top ten challenges reported by women community gardeners (n = 130) in the Central River Region.

Physical constraints on garden operations further limit the expansion and diversification of production. Limited space, reflected in small individual plot sizes (n = 120 respondents), restricts the variety and quantity of crops that can be cultivated simultaneously, thereby constraining both household dietary diversity and marketable surplus. This spatial limitation is compounded by infestation from pests and diseases (n = 105 respondents), which disproportionately affects the limited growing area available to each gardener. Additionally, inadequate quality tools (n = 100 respondents) and lack of good-quality seeds (n = 65 respondents) impose technical barriers that reduce agricultural efficiency and crop yields. These resource constraints are particularly burdensome for women gardeners who often lack access to credit or capital to invest in improved implements or certified seed varieties.

Market-related and knowledge-based challenges further constrain the economic returns from gardening activities. Low prices for garden produce (n = 95 respondents) and lack of accessible markets (n = 100 respondents) create a challenging commercial environment wherein women struggle to achieve profitable sales despite their labor investments. Limited technical knowledge on gardening practices (n = 85 respondents) and termite invasion (n = 65 respondents) represent additional obstacles that reduce productivity and require specialized interventions.

V.Discussion

The findings of this study provide a nuanced and multi-dimensional perspective on the role of women's community gardens in The Gambia, contributing to the broader discourse on gender, agriculture, and rural development.

5.1 Community gardens as a cornerstone of household food security and dietary diversity

This study's primary finding that participation in community gardens significantly enhances household food security and dietary diversity resonates strongly with a substantial body of literature from across Sub-Saharan Africa and other developing regions. The direct pathway from garden production to household consumption is a well-documented phenomenon (Galhena et al., 2013). The results confirm that these gardens serve as a source of fresh, nutritious produce, particularly during the lean season when market access may be limited and food prices are often volatile (Figure 6). This function is especially vital in the Gambian context, where rain-fed cereal production is highly vulnerable to climate variability and change, a point underscored by recent research

highlighting the precarity of the national food system (Hadida et al., 2022; Ceesay, 2022). By providing a consistent supply of vegetables and other micronutrient-rich foods, the gardens act as a buffer against both seasonal food shortages and the more acute shocks induced by climate change, thereby enhancing household resilience.

The contribution to dietary diversity is a particularly salient outcome. The cultivation of a wide range of vegetables, as observed in this study, directly translates into more varied diets for women and their families. This finding is consistent with studies from Benin, where home gardens were shown to be a significant source of agrobiodiversity (Gbedomon et al., 2017) and where participation in solar-powered market gardens led to measurable improvements in dietary diversity scores (Blakstad et al., 2021). The mechanism is twofold: direct consumption of garden produce diversifies the food basket, and the income generated from sales enables the purchase of other food items, such as proteins and staples, that are not produced in the gardens. This dual benefit underscores the multifaceted role of gardens in improving nutritional outcomes. The link between women's empowerment and improved child nutrition, as documented in studies from other regions (Malapit et al., 2015), suggests that when women have greater control over garden resources, the nutritional benefits for the entire household are likely to be magnified. The income women earn from these gardens is often disproportionately spent on food and healthcare for their children, creating a virtuous cycle of improved well-being.

5.2 Economic impacts: beyond subsistence to livelihood security

While the contribution to subsistence is clear, this study also highlights the significant economic impact of community gardens (see Table 1 and Figure 5), which often transition from a purely subsistence activity to a semi-commercial enterprise that enhances overall livelihood security. This aligns with Ellis's (2000) framework of diversified rural livelihoods, where off-farm and non-farm activities, including horticulture, are essential for reducing vulnerability and building assets. The income generated from the sale of surplus produce, though often modest, provides women with a degree of financial autonomy that is frequently absent in traditional agrarian structures. This independent income stream is not merely supplementary; for many women, it represents their primary source of personal cash, enabling them to cover essential household expenses, pay for school fees, and invest in small-scale entrepreneurial activities.

The economic empowerment derived from garden participation is a recurring theme in the literature. Studies from across Sub-Saharan Africa have shown that when women have control over income, it is more likely to be invested in family welfare (Quisumbing and Pandolfelli, 2010; Annan et al., 2021). Our findings corroborate this, indicating that the income from gardens is a powerful tool for poverty reduction at the household level. The economic benefits are not without their challenges. The transition to commercial production often exposes women to new risks, including price volatility, market competition, and post-harvest losses. As the economic potential of these gardens becomes more apparent, there is a risk of elite capture or men co-opting the most profitable aspects of the value chain, a phenomenon observed in other agricultural sectors (Doss et al., 2018). Therefore, while the economic benefits are substantial, they must be viewed within the broader context of market dynamics and intra-household power relations.

5.3 Social outcomes: empowerment, agency, and community cohesion

Perhaps the most profound and complex impacts of women's community gardens are in the social sphere. This study demonstrates that participation in these collective enterprises is a powerful driver of women's empowerment, fostering a sense of agency, strengthening social networks, and enhancing community cohesion. The concept of empowerment, as articulated by Kabeer (1999), involves a process of change through which individuals who have been denied the ability to make strategic life choices acquire such an ability. The gardens provide a physical and social space where this process can unfold. By working together, managing resources, and making collective decisions, women develop leadership skills, gain confidence, and build a sense of collective efficacy.

This aligns with the multi-dimensional understanding of empowerment captured by the Women's Empowerment in Agriculture Index (WEAI), which includes domains such as production, resources, income, leadership, and time (Alkire et al., 2013). Our qualitative data suggest that garden participation positively influences several of these domains. Women reported having greater input into decisions about agricultural production and increased control over the income generated from their labor. The garden committees and associations provide a platform for women to exercise leadership and participate in community governance. These findings are consistent with research from other parts of Africa that has linked collective action in agriculture to enhanced social capital and empowerment (Haug et al., 2021).

The gardens also serve as a space for building social support networks. The shared labor and collective problem-solving foster a sense of solidarity and mutual trust among participants. These networks provide a safety net in times of crisis, facilitate the exchange of information and resources, and offer a platform for collective action on other community issues. This strengthening of social cohesion is a vital, though often overlooked, benefit of community-based development initiatives. The communal nature of the gardens creates a space where women

can share knowledge, discuss personal and household issues, and organize for collective action, thereby reinforcing the social fabric of the community (Du Toit et al., 2022).

5.4 Challenges, constraints, and the nuances of empowerment

Despite the positive impacts, it is essential to acknowledge the significant challenges and constraints that women face in the context of community gardening (Figure 7). The narrative of empowerment is not linear, and the benefits are often mediated by a complex set of structural and social factors. Access to land remains a primary constraint. While the community gardens provide a degree of access, the land is often allocated by male-dominated village authorities, and women's tenure rights are frequently insecure. This lack of secure tenure can disincentivize long-term investment in soil fertility and infrastructure, a point that has been extensively documented in the literature on women's land rights in Sub-Saharan Africa (Quisumbing and Pandolfelli, 2010; Doss et al., 2018).

Access to water is another challenge, particularly in a country as vulnerable to climate change as The Gambia (Hadida et al., 2022; Sanyang and Saine, 2022). Even though women can access all-season water through project support, the reliance on manual watering is incredibly labor-intensive and limits the scale of production. The burden of water collection often falls disproportionately on women, adding to their already heavy time and labor burdens. This time poverty is a dimension of disempowerment, as it limits women's ability to participate in other income-generating activities, education, or political life (Chant, 2008). While the introduction of solar-powered irrigation systems has shown promise in parts of West Africa (Blakstad et al., 2021), there are potential challenges associated with the maintenance and replacement of parts when these systems begin to fail over time.

While the gardens can be sites which contribute to the economic empowerment of women, they can also reinforce traditional gender roles. The perception of horticulture as a "woman's activity" can lead to a lack of investment from male household members and policymakers. This has been observed by studies in Sierra Leone (Yengoh, Armah and Steen, 2015). The income generated, though valuable, is often seen as secondary to the income from male-dominated cash crops. This underscores the need for interventions that not only support women's productive activities but also challenge the underlying gender norms that constrain their economic and social potential (World Bank, 2012).

5.5 Policy implications and future research

The findings of this study have several important implications for policy and practice. First, there is a need for greater investment in women's community gardens as a key strategy for improving food security, nutrition, and rural livelihoods in The Gambia. This includes providing access to essential inputs such as quality seeds, tools, and, most importantly, water. The promotion of climate-smart agricultural practices, such as drip irrigation and drought-resistant crop varieties, is essential for building the resilience of these gardens to climate change (Segnon et al., 2021).

Second, interventions must go beyond a narrow focus on production and address the structural barriers to women's empowerment. This includes strengthening women's land tenure security, improving their access to financial services and markets, and promoting their participation in decision-making at all levels. The pro-WEAI framework provides a useful tool for designing and evaluating interventions that aim to empower women in agriculture (Seymour et al., 2023).

Third, there is a need for a more integrated approach that links garden activities to broader community development initiatives. This could include linking gardens to school feeding programs, health and nutrition education, and financial literacy training. By situating the gardens within a broader ecosystem of support, their impact on women's empowerment and community well-being can be maximized.

Future research should explore the long-term impacts of garden participation on women's empowerment and household welfare. Longitudinal studies are needed to track changes over time and to better understand the causal pathways between garden participation and various outcomes. There is also a need for more research on the role of men and boys in supporting women's gardening activities and on the potential for gardens to challenge and transform restrictive gender norms. Comparative studies across different agro-ecological zones and cultural contexts within The Gambia would provide valuable insights into the factors that mediate the success of community garden initiatives.

VI.Conclusion

This study examined the role of women's community gardens in enhancing household food security, income generation, and women's empowerment in rural Gambian communities. Community gardening is revealed to be a livelihood strategy, significantly contributing to household economic resilience, nutritional improvement, and strengthened social capital. The empirical evidence presented in this research highlights that community gardens provide meaningful supplementary incomes for participating women, enabling households to manage expenses such as education, healthcare, and daily necessities more effectively. The gardens thus address economic

vulnerabilities inherent in rural agricultural contexts, characterized by reliance on rain-fed farming and susceptibility to climatic and market shocks.

The study's findings demonstrate that even modest income streams from gardening can considerably change the structure of household finances, reducing dependency on male household members and significantly enhancing women's economic autonomy. This economic empowerment improves women's decision-making power within their households and contributes to broader family well-being through increased investment in children's education and improved household nutrition.

The study points to social impacts community gardens foster, specifically highlighting strengthened community cohesion and enhanced social capital. Community gardens are social spaces, facilitating regular, structured interactions among villagers promoting trust, mutual aid, and collective action. This increased social cohesion translates into a practical community safety net, providing enhanced collective resilience against economic or environmental shocks. Inclusive governance structures observed within garden committees empower women and youth by offering leadership opportunities, thereby challenging traditional gender roles and enabling more equitable community participation.

The study also identified factors influencing community gardening initiatives economic and social success. Crop diversification is a strategy to mitigate risks, stabilize income, and enhanced productivity through continuous harvest opportunities. Agricultural training and extension services, although currently underutilized, showed significant potential to enhance gardening outcomes and economic returns. The association between training participation and improved economic outcomes underline the impact targeted capacity-building interventions could achieve.

Based on these findings, the following recommendations are made: (a) Infrastructure development, particularly improved water access through irrigation systems, was identified as relevant for enabling year-round productivity. (b) Enhancing market access through cooperative structures and value-chain integration could stabilize incomes and improve economic returns for women gardeners. (c) Securing land tenure rights would provide investment security, encouraging sustained enhancements to garden infrastructure and agricultural practices. (d) Scaling targeted agricultural training and capacity-building initiatives would substantially empower women gardeners to increase their productivity and profitability.

Future research can build upon this foundation by adopting longitudinal study designs to capture long-term trends and wider socio-economic patterns linked to community gardens. Expanding the scope of research to include larger, more diverse populations across multiple regions could enhance the generalizability and depth of understanding. Investigating comparative contexts within and beyond The Gambia would enrich the understanding of factors influencing gardening success and sustainability.

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