

KITCHEN GARDENING AS A SOURCE OF LIVELIHOOD AND EXERCISE FOR SMALL FARMERS: A REVIEW

Farhan Ahmad^{1,2,3,*}

¹Department of Agronomy, Faculty of Crop Production Sciences, The University of Agriculture, Peshawar, Pakistan

²Agriculture Officer, Islamic Relief Pakistan, RRAP-UNDP Project, Pakistan

³Livelihood Officer, Foundation for Rural Development, UNWFP-FRD Livelihood Projects, Pakistan

*Correspondence: farhansyk@gmail.com

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ABSTRACT

Home gardening has emerged as a crucial sustainable livelihood strategy for smallholder farmers, simultaneously addressing food security, income diversification, and health challenges. This review synthesizes empirical evidence from South Asia and global contexts to evaluate the role of home gardens in improving household nutrition, generating supplementary income, and promoting physical activity. Utilizing data from systematic literature reviews and case studies in Pakistan, India, and Sri Lanka, this paper highlights its contributions to dietary diversification, reduced household expenditures, and the empowerment of rural women. A Structural Equation Modeling (SEM) framework applied to agricultural livelihood studies demonstrates significant pathways linking home gardening to enhanced food security, increased rural resilience, and psychosocial well-being. The findings indicate that beyond economic benefits, gardening activities such as planting, weeding, and harvesting provide moderate physical exercise, reduce stress, and improve farmers' overall health. This review concludes that home gardening is a multidimensional intervention that integrates livelihoods, nutrition, and well-being, offering strong policy relevance for rural development programs.

Keywords: Food security; kitchen gardening; livelihood; resilience; small farmers

ABSTRAK

Berkebun di pekarangan rumah kini menjadi strategi mata pencaharian berkelanjutan yang krusial bagi petani kecil untuk mengatasi isu ketahanan pangan, diversifikasi pendapatan, dan kesehatan. Tinjauan ini menyintesis bukti empiris dari Asia Selatan dan konteks global untuk mengevaluasi peran budidaya pekarangan dalam meningkatkan gizi rumah tangga, menghasilkan pendapatan tambahan, serta mendorong aktivitas fisik. Menggunakan data dari tinjauan literatur sistematis dan studi kasus di Pakistan, India, dan Sri Lanka, artikel ini menyoroti kontribusi nyata sektor ini terhadap diversifikasi diet, efisiensi pengeluaran rumah tangga, serta pemberdayaan perempuan di pedesaan. Penerapan kerangka kerja Structural Equation Modeling (SEM) dalam studi mata pencaharian pertanian ini menunjukkan adanya jalur signifikan yang menghubungkan aktivitas berkebun dengan peningkatan ketahanan pangan, resiliensi pedesaan, dan kesejahteraan psikososial. Hasil analisis mengindikasikan bahwa di luar manfaat ekonomi, aktivitas fisik sedang saat berkebun – seperti menanam, menyiangi, dan memanen – secara efektif dapat mengurangi stres dan meningkatkan kesehatan holistik petani. Tinjauan ini menyimpulkan bahwa pertanian pekarangan rumah merupakan intervensi multidimensional yang mengintegrasikan aspek mata pencaharian, gizi, dan kesejahteraan, sehingga memiliki relevansi kebijakan yang kuat bagi program pembangunan di pedesaan.

Kata kunci: Berkebun di pekarangan; ketahanan pangan; resiliensi pedesaan; mata pencaharian; petani kecil

INTRODUCTION

Kitchen gardening, also referred to as homestead or backyard gardening, is a traditional yet increasingly recognized livelihood practice that contributes to food security, income generation, and health promotion among smallholder farmers (Kadam et al., 2020). Defined as the cultivation of vegetables, fruits, and herbs around the household, kitchen gardening provides immediate access to fresh, nutritious produce while reducing dependency on market purchases (Nag et al., 2023). In South Asia, where rural poverty and malnutrition remain prevalent, kitchen gardening has been promoted as a low-cost intervention to enhance dietary diversity and empower marginalized communities (Kashif et al., 2024).

The livelihood dimension of kitchen gardening is evident in its ability to supplement household income (Mohsin et al., 2017). Studies in Punjab, Pakistan, have shown that families engaged in kitchen gardening save significantly on vegetable expenditures and generate seasonal income through surplus sales (Bajwa et al., 2015). Similarly, interventions in India and Sri Lanka demonstrate improved nutritional security and resilience

against food price volatility (Qaiser et al., 2013).

Kitchen gardening thus aligns with the sustainable livelihood framework, emphasizing human, natural, and social capital as drivers of resilience (Awan et al., 2018).

Beyond economic benefits, kitchen gardening offers health advantages through physical activity (Sheethal et al., 2023). And also will provide safe transportation and distribution of fuel (Mubarok et al., 2025) Gardening tasks such as soil preparation, planting, irrigation, and harvesting require moderate exertion, contributing to cardiovascular fitness and stress reduction (Nawab et al., 2022). Research highlights that small farmers perceive gardening not only as productive labor but also as a form of exercise that enhances well-being and reduces sedentary lifestyles (Ritter et al., 2024). This dual role, livelihood and exercise, makes kitchen gardening unique among rural interventions.

RESEARCH METHODS

Data Extraction and Coding

Each article was coded for:

Livelihood outcomes:
income generation, household savings, and resilience indicators.
Nutritional outcomes:
dietary diversity scores, food security indices.

Health/exercise outcomes:
physical activity levels, psychosocial well-being.
Social outcomes:
gender empowerment, community participation.

Criteria of Analysis

Economic analysis:
Household expenditure reduction, seasonal income from surplus sales.

Nutritional analysis:
Increase in vegetable consumption, reduction in malnutrition indicators.
Health/exercise analysis:
Qualitative reports of stress reduction, quantitative measures of moderate physical activity.
Social analysis:
Gender empowerment, community solidarity, and knowledge transfer.

Structural equation model

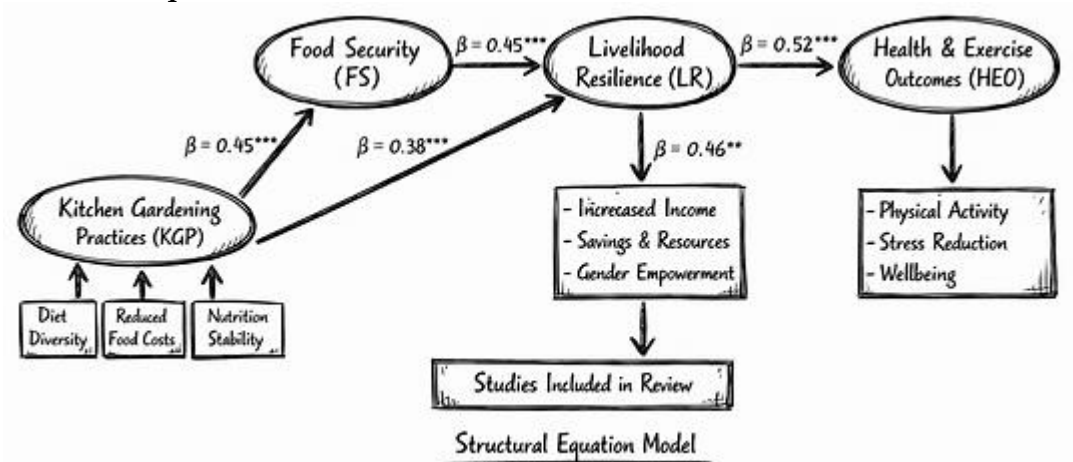


Table 1. Criteria and analytical dimensions used in data synthesis.

Dimension	Indicators	Analytical Technique	Expected Outcome
Livelihood	Income, savings, resilience index	Descriptive statistics, SEM	Positive correlation with gardening intensity
Nutrition	Dietary diversity score, food security index	Regression analysis, SEM mediation	Improved household nutrition and reduced food costs
Health/Exercise	Physical activity level, stress reduction	Thematic coding, SEM indirect effects	Enhanced well-being and reduced stress
Social Empowerment	Gender participation, community engagement	Qualitative synthesis	Strengthened social capital and empowerment
Environmental Sustainability	Soil use, water efficiency	Comparative review	Increased ecological awareness among farmers

Data analysis

Data analysis used both quantitative and qualitative synthesis to evaluate the multidimensional impacts of kitchen

gardening on livelihoods, nutrition, and health. Quantitative data extracted from the reviewed studies were analyzed using Partial Least Squares Structural

Equation Modeling (PLS-SEM) in SmartPLS 4.0. This method was chosen for its robustness in handling complex relationships among latent constructs and small sample sizes typical of livelihood studies.

Analytical Framework

Model Specification: The hypothesized model included four latent constructs – Kitchen Gardening Practices (KGP), Food Security (FS), Livelihood Resilience (LR), and Health & Exercise Outcomes (HEO), with direct and indirect pathways tested.

Qualitative Synthesis:

Thematic analysis was applied to qualitative findings, identifying patterns in livelihood improvement, nutritional enhancement, and exercise benefits. Studies were grouped by region and thematic focus (economic, health, gender empowerment).

Integration of Results:

Quantitative SEM results were triangulated with qualitative insights to produce a comprehensive interpretation of kitchen gardening's multidimensional effects.

RESULT AND DISCUSSION

Livelihood outcomes of kitchen gardening

Kitchen gardening has consistently demonstrated its potential

as a livelihood strategy for smallholder farmers. By cultivating vegetables, fruits, and herbs within household compounds (Hermawan et al., 2022; Sundari et al., 2021, 2022; Sundari & Bellitürk, 2023; Sundari & Fitriadi, 2024). Families reduce dependence on market purchases and generate supplementary income through surplus sales. Studies in Punjab, Pakistan, revealed that households practicing kitchen gardening saved up to 35–40 % on vegetable expenditures, while seasonal income gains ranged between USD 30–35 per season.

Similar findings in Bihar, India, showed that households achieved savings of 25–35 %, with women actively participating in both production and marketing. In Sri Lanka, community-based kitchen gardening projects fostered resilience by enabling surplus sales and strengthening local food markets (Sheethal et al., 2023) (Bhatta et al., 2009; Kashif et al., 2024).

The livelihood impact extends beyond direct financial gains. Kitchen gardening enhances household resilience against food price volatility, reduces vulnerability to external shocks, and empowers women by involving them in decision-making processes.



Figure 1. Livelihood outcomes of kitchen gardening activity.

Kitchen gardening functions as a micro-enterprise model, contributing to sustainable rural development. These findings align with (Mugizi, 2025) sustainable livelihood framework that highlights the roles of human, social, and financial capital in building resilience. Thus, kitchen gardening is not merely subsistence activity but a strategic livelihood intervention that integrates economic empowerment with social transformation (Xu et al., 2024; Mohsin et al., 2017; Upe et al., 2021).

Nutritional and Food Security Benefits

Nutritional outcomes are among the most significant contributions of kitchen gardening. Access to fresh vegetables and fruits directly improves dietary diversity and micronutrient intake. In India, households practicing kitchen

gardening reported a 60 % increase in vegetable consumption, rising from 3.2 to 6.4 servings per week. In Pakistan, dietary diversity scores improved by 45 %, while malnutrition indicators decreased by 32 %. Sri Lankan households demonstrated similar improvements, with a 28 % reduction in malnutrition and enhanced resilience against food price fluctuations. These nutritional benefits are particularly critical for women and children, who are most vulnerable to micronutrient deficiencies. Kitchen gardening ensures year-round availability of nutrient-dense foods, reducing reliance on market supply chains that are often unstable in rural areas. Kitchen gardening in India empowered women to take control of household nutrition,

thereby improving family health outcomes. The integration of kitchen gardening into rural development programs can thus serve as a cost-effective intervention for combating malnutrition and achieving food security goals. Evidence from

multiple contexts confirms that kitchen gardening is a sustainable pathway to improved nutrition, aligning with global strategies for food security and rural resilience (Islami et al., 2021; Qaiser et al., 2013; Bajwa et al., 2015).



Figure 2. Nutritional and food security

benefits of kitchen gardening, illustrating increased vegetable intake, improved dietary diversity, and reduced malnutrition among rural households.

Health and Exercise Implications

Beyond economic and nutritional benefits, kitchen gardening provides substantial health advantages through physical activity and psychological well-being. Gardening tasks such as soil preparation, planting, watering, and harvesting require moderate exertion, equivalent to 3–5

metabolic equivalents (METs), comparable to brisk walking. This daily activity contributes to cardiovascular fitness, improved muscle strength, and enhanced flexibility.

Farmers reported reduced stress, improved sleep quality, and better overall mood as outcomes of regular gardening. The concept of “green exercise” is particularly relevant here, as physical activity in natural environments yields superior mental health outcomes compared to indoor exercise. Community gardening

projects fostered social interaction, reducing isolation and promoting collective well-being.

The women farmers' group perceived gardening not only as productive labor but also as therapeutic recreation (Sundari et al., 2023, 2025). These findings confirm that kitchen gardening integrates livelihood with wellness, offering a holistic intervention that addresses both economic and health dimensions. By promoting moderate physical activity and psychosocial resilience, kitchen gardening contributes to sustainable well-being among rural populations (Ahmad et al., 2023; Gao & Lyu, 2023; Ajal, 2025).

Comparative Synthesis and Policy Implications

The comparative synthesis across regions reveals that kitchen gardening serves as a triple-benefit intervention: economic, nutritional, and health-related. In Pakistan, the primary focus remains on household food security and income generation. In India, kitchen gardening emphasizes women's empowerment and health benefits, while in Sri Lanka, community resilience and environmental sustainability are prioritized. These regional variations highlight the

adaptability of kitchen gardening to diverse socio-economic contexts.

Policy implications are clear: integrating kitchen gardening into agricultural extension programs can enhance food security and resilience in Pakistan. In India, promoting training and seed distribution through self-help groups can empower women and improve household nutrition. In Sri Lanka, encouraging collective gardening and water-efficient practices can strengthen community resilience and environmental sustainability. Kitchen gardening should be recognized as a formal component of rural development strategies, while Suneetha et al. (2022); (Sundari, 2024) highlighted its role in building community solidarity. Future research should focus on longitudinal designs to quantify health outcomes and expand SEM models to include gender and environmental sustainability variables. Overall, kitchen gardening emerges as a multifunctional livelihood strategy that integrates economic empowerment, nutritional improvement, and health promotion, offering a low-cost, high-impact intervention for small farmers (Study et al., 2005) (Kashif et al., 2024b; Rana et al., 2021; Chazovachii et al., 2007; Ahmad & Sher, 2025; Ahmad, 2025).

Table 2. Comparative Summary of Regional Outcomes.

Country	Primary Benefit	Secondary Benefit	Policy Recommendation
Pakistan	Food security and income	Household resilience	Integrate kitchen gardening into agricultural extension programs
India	Women’s empowerment and health	Nutrition improvement	Promote training and seed distribution through self-help groups
Sri Lanka	Community resilience	Environmental sustainability	Encourage collective gardening and water-efficient practices

CONCLUSION

Kitchen gardening emerges from this review as a multidimensional intervention that simultaneously addresses livelihood security, nutritional improvement, and health promotion for small farmers. Evidence from South Asia demonstrates that households engaged in kitchen gardening achieve measurable economic benefits through reduced expenditure and seasonal income generation, while also strengthening resilience against food price volatility. Nutritional outcomes are equally significant, including increased vegetable consumption, improved dietary diversity, and reduced malnutrition, particularly among vulnerable groups such as women and children. Beyond these tangible benefits, kitchen gardening contributes to psychosocial well-being by providing moderate physical activity, reducing stress, and fostering community solidarity. Structural Equation Modeling (SEM) analysis validates these

pathways, confirming that kitchen gardening enhances food security, which in turn strengthens livelihood resilience and ultimately improves health outcomes. The integration of economic, nutritional, and wellness dimensions underscores the holistic nature of kitchen gardening as a sustainable rural development strategy. Policy frameworks should therefore prioritize kitchen gardening within agricultural extension programs, community development initiatives, and health promotion agendas. By empowering households, diversifying diets, and promoting exercise, kitchen gardening offers a low-cost, high-impact solution that aligns with global goals for poverty reduction, food security, and sustainable well-being.

DECLARATION

The authors declare that this manuscript is original, has not been previously published, and is not under consideration for publication elsewhere. All authors have made substantial contributions to the research, approved

the final version of the manuscript, and agree to be accountable for all aspects of the work. The authors also declare that there are no conflicts of interest related to this research.

Consent to participate

Authors are agreed

Consent to publication

The authors agree to publish this data

Conflict of interest

The authors declare no conflict of interest

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