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Effect of Smallholder Horticulture Empowerment and Promotion Project on the Income of Farmers in Nasarawa State, Nigeria

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Abstract

This study examined the effect of Smallholder Horticulture Empowerment and Promotion (SHEP) Project on the income of farmers in Nasarawa State, Nigeria. A total of 120 smallholder farmers were randomly selected, and data were collected using questionnaire. Frequency, percentage, mean and a paired sample t-test were used for analysis. Results showed that mean annual income increased from ₦412,500 before participation to ₦685,000 after participation, representing a 66.1% increase. The paired sample t-test confirmed that the income difference was statistically significant (t = 9.84, p = 0.000). Despite the income gains, farmers faced key constraints such as inadequate access to credit (ms=3.42), high cost of farm inputs (ms=3.31), poor market access and price fluctuations (ms=3.18), and inadequate irrigation facilities (2.97). SHEP improved farmers' income greatly. Enhanced credit access, input support, market stabilization, improved extension services, and infrastructural development to sustain and strengthen project benefits are recommended by the researcher.

Key words: Horticulture, empowerment, smallholder farmers' income

Introduction

Agriculture remains one of the most important sectors of the Nigerian economy, contributing about 25% to the national Gross Domestic Product (GDP) and employing nearly 70% of the rural labour force (National Bureau of Statistics [NBS], 2022). Beyond its economic contribution, the sector plays a crucial role in food security, employment generation, poverty reduction, and rural development. Despite this strategic importance, Nigerian agriculture continues to face numerous structural and institutional challenges including low productivity, poor access to markets, inadequate rural infrastructure, weak extension services, post-harvest losses, and limited access to modern technologies (Ezeudu and Obimbua, 2024). These challenges are particularly severe among smallholder farmers who dominate agricultural production in the country (Mathew et al., 2024). Among the various agricultural sub-sectors, horticulture occupies an important position due to its contribution to nutrition, income generation, and livelihood improvement (Mukaila et al., 2022), horticultural crops such as vegetables, fruits, spices, and ornamental plants provide essential vitamins and

minerals required for healthy living while also serving as a major source of household income for rural farmers. In Nigeria, horticulture has increasingly become an important component of agricultural diversification and commercialization because of the rising urban demand for fresh produce and the growing awareness of healthy diets (Akinnagbe and Ipinmoye, 2022). The sub-sector also offers opportunities for employment generation, women empowerment, and poverty alleviation due to its labour-intensive nature (World Bank, 2021).

Nasarawa State is one of the major horticultural producing areas in North-Central Nigeria owing to its favourable climatic conditions, fertile soils, and proximity to large urban markets such as Abuja. Prior to the introduction of the Smallholder Horticulture Empowerment and Promotion (SHEP) Project, horticultural production in the state was predominantly characterized by subsistence-oriented farming systems, low productivity, poor market integration, and limited value addition where most smallholder horticultural farmers cultivated crops such as tomatoes, pepper, okra, onions, leafy vegetables, watermelon, and fruits mainly using traditional farming methods and relying heavily on rainfall. Production decisions were often based on farmers' experience and seasonal practices rather than market demand. Consequently, farmers frequently experienced market gluts during harvest periods which resulted in drastic price reductions and high post-harvest losses. Poor rural road networks, inadequate storage and processing facilities, limited access to market information, weak bargaining power, and insufficient extension support further constrained farmers' profitability and productivity (FAO, 2020).

In many communities across Nasarawa State, horticultural farmers lacked organised market systems and were dependent on middlemen who determined prices to the disadvantage of producers. These conditions contributed to low farm incomes, food insecurity, and persistent rural poverty despite the state's enormous horticultural potential (Sylvester et al., 2024). In addition, agricultural extension delivery in Nasarawa State prior to the SHEP intervention was largely production-oriented, focusing primarily on increasing output with inadequate attention to market dynamics and profitability (JICA, 2020). Farmers were generally encouraged to "grow and sell" rather than "grow to sell," resulting in situations where increased production did not necessarily translate into improved incomes (Akeredolu and Akinbile, 2021). Women and youth, who constitute a significant proportion of horticultural producers and traders, also faced constraints related to access to resources, training opportunities, credit facilities, and market participation (Alliance for a Green Revolution in Africa [AGRA], 2020).

The growing recognition of these challenges has created a need for innovative, market-oriented agricultural interventions capable of transforming smallholder horticulture from subsistence production to agribusiness-oriented production systems. It was within this context that the Smallholder Horticulture Empowerment and Promotion (SHEP) approach was introduced. The SHEP approach was developed by the Japan International Cooperation Agency (JICA) in Kenya in 2006 as a market-oriented agricultural extension model aimed at improving the incomes and livelihoods of smallholder farmers through commercialisation of horticultural production (JICA, 2020). The approach emphasises farmer empowerment, market research, collective action, record-keeping, gender inclusion, and production based on market demand rather than on speculative cultivation.

Following the remarkable success of the project in Kenya and other East African countries such as Ethiopia, JICA collaborated with the Federal Ministry of Agriculture and Food Security Development (FMAFS), Sasakawa Africa Association (SAA), and selected State Governments to pilot the SHEP approach in Nigeria. Nasarawa State and the Federal Capital Territory (FCT) were selected as pilot locations because of their strong horticultural potential and proximity to major urban markets (JICA, 2020). The pilot phase focused on strengthening extension services, training farmers and extension agents on market-oriented production, improving farmer-market linkages, and promoting profitable horticultural enterprises among smallholder farmers.

The implementation of the SHEP project in Nigeria involved several participatory activities, including baseline surveys, farmer group formation, market surveys, value chain analysis, capacity building for extension officers, demonstration plots, farm business planning, and training on post-harvest handling and marketing strategies (JICA, 2020). Farmers were encouraged to identify market opportunities before production and adopt improved production and marketing practices to enhance profitability. The project also promoted joint decision-making among household members, especially encouraging women's participation in production and marketing activities.

Following the success achieved during the pilot phase in Nasarawa State and the Federal Capital Territory (FCT), the Nigerian government requested further support from the Japan International Cooperation Agency (JICA) to expand the project. The SHEP project pilot implementation in Nigeria commenced in 2015 in Nasarawa State and the FCT with the objective of testing the applicability of the market-oriented extension approach among smallholder horticultural farmers. Based on the encouraging outcomes from the pilot phase, the rollout and expansion of the project to additional areas began in 2017 through increased collaboration among JICA, the Federal Ministry of Agriculture and Rural Development (FMARD), Sasakawa Africa Association (SAA), and participating state governments. Consequently, in August 2020, JICA officially launched a four-year technical cooperation project titled "Project on Promotion of Market-Oriented Agricultural Extension System for Livelihood Improvement" (JICA, 2020). The project aimed at institutionalisining the SHEP approach within Nigeria's agricultural extension system and expanding its implementation to additional states across the country. The project was implemented between 2020 and 2024 in collaboration with Federal and State agricultural institutions, while the technical cooperation phase officially wound up in 2024. Nevertheless, some extension activities, farmer groups, and adoption practices established under the project may continue through Sate Agricultural Development Programmes (ADP) and Community-Based Farmer Organizations (CBFO) beyond the official project period.

The SHEP project represents an important shift in agricultural extension philosophy from production-centered approaches to market-oriented agriculture, by encouraging farmers to produce according to market demand, the project seeks to increase incomes, reduce post-harvest losses, strengthen value chain linkages, and improve rural livelihoods. Studies conducted in Kenya and Ethiopia have reported significant improvements in farmers' incomes, market participation, crop diversification, and household welfare among SHEP beneficiaries (JICA, 2020). The project has also been associated with increased women participation in household decision-making and agribusiness activities (World Bank, 2021).

Despite the implementation of the SHEP project in Nasarawa State, there remains limited empirical evidence regarding its effectiveness and impact within the Nigerian context. Existing reports mainly focus on project activities, trainings, and implementation processes, with inadequate attention given to measurable outcomes such as changes in productivity, market access, farm income, livelihood improvement, and sustainability of the intervention (AGRA, 2020). Furthermore, there is limited localised empirical evidence assessing whether the project has successfully transformed farmers' production orientation from subsistence-based approach to market-oriented agribusiness system in Nasarawa State. This study therefore examined the outcomes of SHEP intervention by assessing changes in farmers' productivity, income, market orientation, and livelihood improvement after project implementation.

The absence of comprehensive evaluation studies creates uncertainty regarding the extent to which the project achieved its objectives in Nasarawa State. It also limits policymakers' ability to determine whether the SHEP approach should be sustained, modified, or scaled up further within Nigeria's agricultural extension system. Moreover, persistent challenges such as poor infrastructure, inadequate funding for extension services, market volatility, and socio-cultural constraints may have affected project outcomes and sustainability (AGRA, 2020; World Bank, 2021).

Against this background, this study seeks to evaluate the SHEP project among smallholder horticultural farmers in Nasarawa State. Specifically, the study assesses the project's effects on farmers' productivity, market access, income generation, and overall livelihoods. The study is expected to contribute to policy discussions on market-oriented agricultural extension, smallholder commercialisation, poverty reduction, and sustainable agricultural development in Nigeria.

The broad objective of this study was to evaluate effect of Horticulture Empowerment and Promotion Project on the income of farmers in Nasarawa State, Nigeria.
The specific objectives of the study were to:

i. ascertain the income difference of beneficiary farmers before and after participating in the SHEP project in Nasarawa State.
ii. identify the constraints faced by smallholder horticultural farmers participating in the SHEP project in Nasarawa State.

The study hypothesised that there is no significant difference in the mean income of farmers before and after participation in SHEP.

Methodology

The study was conducted in Nasarawa State, Nigeria. It covers a geographical area between latitudes 7°45′00"N and 9°25′00"N and longitudes 7°0'00"E and 9°37′00"E. (Audu et al., 2020). A multi-stage sampling proceudre was employed to select smallholder farmers who have participated in the JICA Smallholder Horticulture Empowerment and Promotion (SHEP) Project in Nasarawa State, Nigeria. In the first stage, four communities that participated in the project were purposively selected from Nasarawa State for their active involvement in the SHEP Project. In the second stage, all registered smallholder horticultural farmers participating in the project within the selected communities were purposively selected for the study. A total of 120 smallholder horticultural farmers were surveyed at baseline in May, 2024, and the same 120 farmers were revisited during the end-line survey in February, 2025

following the implementation of the SHEP Project. This made it possible to effectively compare respondents' conditions before and after participation in the project. The approach ensured that the study captured the diverse experiences and outcomes of farmers involved in the SHEP Project, thereby enabling a thorough analysis of its effectiveness in improving horticultural productivity, income, and livelihoods in Nasarawa State. Primary data were collected using questionnaires. Percentage and mean were used to analyse the socio-economic characteristics of the beneficiaries. A paired t-test was used to compare the income levels of beneficiary farmers before and after participation in the SHEP Project, and the t-test results were also used to test the study hypothesis. Mean score analysis was employed to examine the constraints faced by smallholder horticultural farmers participating in the SHEP Project using a four-point Likert-type scale. The Likert-type scale was measured as follows: Very Serious = 4, Serious = 3, Mild = 2, and Not Serious = 1. The cut-off mean was calculated as follows: (4 + 3 + 2 + 1) ÷ 4 = 2.50. Therefore, any mean score of 2.50 and above was regarded as a serious constraint, while mean scores below 2.50 were regarded as not serious constraints.

Results and Discussion

Level of Income of Farmers Before and After Participation in SHEP

Table 1 shows that before participating in SHEP, nearly half (46.7%) of the respondents earned less than ₦300,000 annually, while only 15.0% earned more than ₦600,000. The mean annual income before participation was ₦412,500. However, after participation, only 21.7% earned below ₦300,000, while the proportion earning above ₦600,000 increased substantially to 34.1%. The mean annual income increased to ₦685,000. This represented an average income increase of ₦272,500, indicating a marked improvement in earnings following participation in the project. Adekunle et al. (2020) found that participation in SHEP led to a substantial rise in farm revenue, with beneficiaries shifting from low-income categories to relatively higher income brackets after project exposure. The observed upward shift in income distribution demonstrated a significant improvement in the economic status of participating farmers. The reduction in the proportion of low-income earners (from 46.7% to 21.7%) and the substantial increase in high-income earners (from 15.0% to 34.1%) suggest enhanced productivity and commercialization. The increase in mean income can be attributed to improved market orientation, better production planning, adoption of improved horticultural practices, and strengthened linkage to output markets promoted under SHEP. The project's emphasis on producing for market demand rather than subsistence likely enhanced profitability and reduced post-harvest losses.

Table 1: Level of income of farmers before and after participation in SHEP

Income Level (₦)	**Before Participation**	**After Participation**
	Percentage (%)	Percentage (%)
< 300,000	46.7	21.7
300,000 – 600,000	38.3	44.2
> 600,000	15.0	34.1
Mean Income (₦)	**412,500**	**685,000**

Source: Field survey, 2025

Table 2 shows that farmers' mean income increased from ₦412,500 before participation in SHEP to ₦685,000 after participation, representing a mean difference of ₦272,500. The t-value of 9.84 shows that participation in SHEP had a clear positive effect on farmers' income.

Table 2: Farmers' income difference before and after participation in SHEP

Variable	Mean (₦)	Mean Difference (₦)	t-value	p-value
Income Before	412,500			
Income After	685,000	272,500	9.84	0.000

P < 0.05; n = 120
Source: Field survey, 2025

Constraints Faced by Farmers in Participation in SHEP

Table 3 shows that inadequate access to credit ($\bar{x}$ =3.42, SD=0.91) ranked as the most severe constraint faced by farmers in their participation in SHEP. This was followed by high cost of farm inputs ($\bar{x}$ = 3.31, SD=0.88) and poor market access/price fluctuation ($\bar{x}$ = 3.18, SD=0.92). Inadequate access to credit emerged as the most severe constraint. This indicates that despite participation in SHEP, many farmers still experience financial exclusion. Horticultural production is capital-intensive, requiring investment in improved seeds, fertilizers, irrigation facilities, agrochemicals, and hired labour. Limited access to credit restricts farmers' ability to scale production or fully adopt recommended technologies. Financial constraints also reduce risk-taking capacity, thereby limiting innovation and commercialization. Even when income increases, a lack of sufficient capital may prevent reinvestment, thus constraining the long-term sustainability of income gains. This suggests that credit facilitation mechanisms need to be strengthened to better complement project objectives. Adekunle et al. (2020) observed that although the SHEP approach improved farmers' market orientation, financial exclusion remained a major structural bottleneck.

High input costs were identified as the second most serious constraint. Rising prices of fertilizers, improved seeds, agrochemicals, and farm equipment significantly increase production costs. Since horticulture requires high-quality inputs to meet optimal yields and market standards, cost inflation directly reduces profit margins. Even when farmers increase output through improved practices, high input costs may offset income gains. This constraint reflects broader macroeconomic pressures and market inefficiencies. Without collective input procurement or subsidy support, farmers may struggle to sustain production levels achieved under SHEP. Ibrahim et al. (2021) similarly found that escalating input prices constrained full adoption of recommended horticultural practices under the SHEP model.

Market-related challenges remain critical. Although SHEP promotes market-oriented production, farmers still face unstable prices and limited bargaining power. Horticultural products are highly perishable, making farmers vulnerable to price crashes, especially during peak harvest periods. Price fluctuation creates income uncertainty and reduces predictability of returns. Weak value chain linkages and inadequate storage facilities further exacerbate this problem. This finding suggests that improving structured market linkages and value addition opportunities is essential to stabilize farmers' income. Adekunle et al. (2020) found that price fluctuation reduced

income predictability among Nigerian beneficiaries, despite improved marketing knowledge.

Inadequate irrigation facilities were also identified as a major constraint. Horticultural production often requires reliable water supply for year-round cultivation. Dependence on rainfall limits production cycles and restricts dry-season farming opportunities. Limited irrigation reduces yield potential and increases vulnerability to climate variability. Consequently, income remains seasonal and inconsistent. Addressing irrigation challenges would significantly enhance production intensity and income stability. Transportation difficulties affect the timely movement of perishable horticultural produce to markets. Poor rural road networks increase post-harvest losses and transaction costs. Delays in transportation reduce product quality and market value. High transportation costs also reduce net farm income. Even when production increases, logistical inefficiencies diminish profitability. This highlights the importance of rural infrastructure development in supporting agricultural commercialization. Transportation difficulties reported in this study correspond with Adekunle et al. (2020), who found that poor rural road infrastructure increased post-harvest losses and transaction costs for SHEP participants in southwestern Nigeria.
Although most farmers had access to extension services, inadequate follow-up was still reported as a constraint. Initial training without consistent monitoring may limit sustained adoption of recommended practices. Continuous technical backstopping is necessary for problem-solving, especially in pest control, market planning, and financial management. Without adequate follow-up, some farmers may revert to traditional practices, thereby undermining the project's long-term impact. Ibrahim et al. (2021) also reported that inconsistent follow-up visits reduced sustained adoption of recommended practices.

Pest and disease problems remain a production risk in horticulture. These challenges reduce yield quantity and quality, affecting market acceptability and income. While, SHEP may introduce improved pest management techniques, inadequate access to agrochemicals, high input costs, and limited technical support may limit effective control.

Limited land availability was ranked lowest among the constraints and fell close to the decision mean. This suggests that land is not the most critical barrier, as financial and market challenges are. However, small landholdings restrict expansion potential and economies of scale. Nevertheless, since horticulture can generate high returns per unit area, productivity improvements may compensate for limited land size. The ranking of land limitation as the least severe constraint is comparable to findings by Adekunle et al. (2020), who reported that although most SHEP farmers operated on small plots, land size was less critical than financial and market constraints because horticulture generates relatively high returns per unit area.

Table 3: Constraints faced by farmers in participating in SHEP

Constraints	Mean Score	SD
Inadequate access to credit	3.42	0.90
High cost of farm inputs	3.31	0.87
Poor market access/price fluctuation	3.18	0.91
Inadequate irrigation facilities	2.97	0.94
Transportation challenges	2.85	0.96
Inadequate extension follow-up	2.71	1.00
Pest and disease incidence	2.64	1.02
Limited land availability	2.48	1.06

Cut-off mean = 2.50
Source: Field Survey, 2025

Conclusion and Recommendations

The study concludes that participation in SHEP had a significant positive impact on the income of smallholder farmers in Nasarawa State. Structural constraints especially inadequate credit, high input costs, and market-related challenges restricted the long-term sustainability of project benefits. Based on the results, it is recommended that bulk purchasing and subsidized provision of seeds, fertilizers, and agrochemicals through cooperatives can reduce production costs and further enhance profitability.

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