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Farm Income and Profitability among FNLP Beneficiary and Non-Beneficiary Rice Farmers in North Western Nigeria

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ABSTRACT
This paper compares rice-farm costs, revenue and net benefit among beneficiaries and non-beneficiaries of the Feed the Future Nigeria Livelihoods Project (FNLP) in Kebbi and Sokoto States, Nigeria. Survey data were obtained from 720 smallholder rice farmers, divided equally between the two groups. A farm-budget framework aggregated variable and fixed costs and compared them with revenue. Beneficiaries recorded a mean total cost of ₦2,022,502.29 and mean revenue of ₦2,530,816.86, yielding a net benefit of ₦508,314.57. Non-beneficiaries recorded a higher mean total cost of ₦2,300,833.62 and slightly lower revenue of ₦2,488,959.34, producing a net benefit of ₦188,125.72. The observed net-benefit difference was ₦320,188.85 in favour of beneficiaries. Fertiliser was the largest cost item for both groups, accounting for about 56% of total cost, followed by manure at approximately one-fifth. The results suggest that the advantage recorded by beneficiaries arose more from lower production cost than from a large revenue gap. The benefit-cost ratios calculated from the reported totals were approximately 1.25 for beneficiaries and 1.08 for non-beneficiaries. These descriptive differences are consistent with better input access, technical support or production coordination, but the cross-sectional design does not establish that programme participation caused them. Policies should prioritise efficient fertiliser use, timely input delivery, soil-fertility management and better market coordination. Future research should standardise results per hectare and use longitudinal or quasi-experimental designs.
Keywords: farm income; profitability; farm budget; production cost; smallholder rice; Nigeria

INTRODUCTION

Rice farming requires substantial expenditure before harvest. Smallholders must finance land preparation, seed, fertiliser, agrochemicals, labour, irrigation and marketing while facing uncertain yields and prices. The resulting timing mismatch makes profitability sensitive not only to output but also to the price and efficiency of input use.

Livelihood interventions may influence farm income through training, access to inputs, savings, credit, extension and links to markets. Studies in African smallholder settings show that irrigation, technology adoption and financial support can be associated with income and welfare gains, although effects differ by context and programme design (Mango et al., 2018; Ayuba et al., 2020).

This paper compares the reported cost structure, revenue and net benefit of beneficiary and non-beneficiary rice farmers in FNLP communities. It focuses on where the observed net-income difference arose and identifies the cost components most relevant to policy and farm management.

Analytical framework

Farm budgeting evaluates the financial performance of an enterprise by subtracting production costs from revenue. Net benefit was calculated as total revenue minus total cost. A benefit-cost ratio was also derived as total revenue divided by total cost. Values above one indicate that reported revenue exceeded reported cost, but they do not capture the opportunity cost of all family labour or every long-term asset.

The comparison is descriptive. Beneficiaries and non-beneficiaries may differ in characteristics that pre-date the programme, and cost data may reflect farm scale as well as technical efficiency. Accordingly, the paper avoids treating the net-benefit gap as an experimental impact estimate.

Study context and intervention logic

Kebbi and Sokoto States form part of Nigeria's north-western agricultural belt, where rural livelihoods depend heavily on crop production, livestock, petty trade and seasonal labour. Rice is produced under both rain-fed and irrigated conditions. The production calendar creates a recurring financing problem: expenditure on land preparation, seed, nutrients, crop protection and labour is concentrated before harvest, whereas cash revenue is realised later. Households must therefore coordinate farm investment with food, health, education and other consumption needs.

The livelihood setting also exposes households to covariate and household-specific shocks. Rainfall variability, changes in river flow, insecurity, transport constraints, input-price inflation and unstable output markets may affect many farmers at once. Illness, loss of employment or an unexpected family obligation may affect a single household but produce the same immediate consequence: productive assets or food consumption may be reduced to bridge a cash deficit. These pressures explain why financial practices, production performance and food-related welfare should be analysed as connected rather than independent outcomes.

FNLP was designed as a multi-component intervention rather than a single input-distribution scheme. Its combination of livelihood mentoring, agricultural extension, financial education, savings mechanisms, nutrition and water, sanitation and hygiene activities created several possible pathways to household outcomes. Training could improve knowledge; group-based mechanisms could facilitate saving and information exchange; extension could improve production decisions; and nutrition-sensitive activities could influence the use of income and food within the household. Whether these pathways operated as intended depends on exposure, service quality and the wider economic environment.

The Sustainable Livelihoods Framework provides a useful organising perspective because it connects household assets, vulnerability, institutions, livelihood strategies and outcomes (DFID, 1999; Scoones, 2009). Human capital includes knowledge and health; financial capital includes cash, savings and credit; physical capital covers equipment and infrastructure; social capital includes groups and networks; and natural capital includes land and water. An intervention may strengthen one asset while a shock weakens another. Consequently, a favourable outcome in one domain does not necessarily imply that the household is resilient in all domains.

For farm income, the principal pathway runs from extension, input access and financial support to changes in the quantity, timing and efficiency of production expenditure. Improved profitability may arise from higher yield or price, but it may also arise from avoiding unnecessary cost. A meaningful enterprise analysis must therefore examine the structure of cost and revenue rather than report gross sales alone.

Figure 1. Farm profitability pathway examined in the study

Source: Authors' conceptualisation based on the study framework.

MATERIALS AND METHODS

Study design and setting

The study used a cross-sectional comparative design to examine rice-farming households in selected communities of Kebbi and Sokoto States in north-western Nigeria. The setting combines rain-fed and irrigated rice production, and farm households operate under seasonal cash-flow constraints, variable access to inputs and extension, and exposure to price and climatic risks. The Feed the Future Nigeria Livelihoods Project was implemented from 2013 to 2018 through Catholic Relief Services and partner organisations with support from the United States Agency for International Development. Its activities combined livelihood support, financial education, savings mechanisms, agricultural extension, nutrition, and water, sanitation and hygiene interventions (Papineni et al., 2016; Larson et al., 2019).

Sampling and data collection

A multistage procedure selected six local government areas and 24 communities. Fifteen beneficiary and 15 non-beneficiary rice farmers were surveyed in each community, giving 720 respondents: 360 beneficiaries and 360 non-beneficiaries. Data were collected with a structured questionnaire covering household characteristics, financial practices, farm costs and returns, food-related experiences, nutrition-related conditions, access to services and respondents' assessments of programme implementation.

Analytical approach

The analysis used frequencies, percentages, farm-budget calculations and separate multiple-regression models for beneficiary and non-beneficiary households. The comparison is observational. Participation was not randomly assigned, baseline equivalence was not established and no propensity-score matching procedure was applied. Consequently, group differences are interpreted as associations within the study sample rather than definitive causal effects of the programme.

Farm-budget measures

The questionnaire recorded quantities, unit prices and costs for labour operations, material inputs and selected fixed assets. Reported totals were used without alteration. Net benefit equals revenue less total cost; the benefit-cost ratios reported below were calculated from those totals. Results are presented in Nigerian naira.

RESULTS

Table 1. Summary of rice-enterprise costs and returns

Indicator	Beneficiaries ₦	Non-beneficiaries ₦	Difference ₦
Total cost	2,022,502.29	2,300,833.62	-278,331.33
Total revenue	2,530,816.86	2,488,959.34	41,857.52
Net benefit	508,314.57	188,125.72	320,188.85
Benefit-cost ratio	1.25	1.08	0.17

Source: Field Survey, 2024.

Beneficiaries recorded slightly higher revenue but substantially lower total cost. Thus, most of the net-benefit advantage was associated with the cost side of the enterprise. Both groups returned more than one naira of revenue per naira of reported cost, but the margin was much narrower among non-beneficiaries.

Table 2. Major cost components

Cost item	Beneficiaries ₦	Share %	Non-beneficiaries ₦	Share %
Fertiliser	1,131,779.30	55.96	1,287,980.97	55.98
Manure	392,485.91	19.41	463,527.33	20.15
Land preparation	140,307.45	6.94	142,995.33	6.21
Storage bags	91,024.76	4.50	99,066.19	4.31
Tube well	91,063.07	4.50	101,281.50	4.40
Agrochemicals	27,381.51	1.35	32,749.69	1.42
Pumping machine	25,481.35	1.26	28,541.79	1.24

Source: Field Survey, 2024.

DISCUSSION

The beneficiary group combined lower total cost with a modest revenue advantage. This pattern suggests that the observed profitability gap was linked primarily to cost containment rather than to a dramatic difference in output value. Programme-related training, coordination or input access may have contributed, but farm size, location, irrigation conditions and selection into participation are alternative explanations that cannot be excluded.

Fertiliser and manure together represented roughly three-quarters of total cost in both groups. Their dominance means that profitability is highly exposed to input prices and to the efficiency with which nutrients are applied. Blanket input subsidies may reduce immediate expenditure, but extension on soil testing, timing and integrated soil-fertility management is also needed to protect yields and reduce waste.

The result is broadly consistent with evidence that irrigation and agricultural support can improve income when they change both productivity and production risk (Mango et al., 2018). It also complements Nigerian evidence associating organised finance and programme support with rice-farm profitability (Ayuba et al., 2020). However, the present estimates should be interpreted as sample means, not treatment effects.

Enterprise management and policy implications

The cost structure shows that nutrient management is central to the economics of the sampled enterprises. Fertiliser expenditure exceeded half of total cost in both groups, so changes in fertiliser price, quality or application efficiency can materially alter net benefit. Procurement through credible farmer organisations may reduce transaction costs, but quality assurance and timely delivery are as important as the nominal price.

Manure was the second-largest reported component. Its use may complement mineral fertiliser and support soil condition, but transport and application can be labour intensive. Extension recommendations should be location specific and should consider soil characteristics, water management, the nutrient content of available organic material and farmers' capacity to apply it at the appropriate time.

The modest revenue difference suggests that cost management deserves at least as much attention as production expansion. Higher output is valuable only when the additional revenue exceeds the additional cost and when farmers can market the crop without excessive loss or delay. Storage, aggregation and buyer coordination can reduce distress sales and allow the enterprise to capture more value from existing production.

For policy evaluation, future budgets should distinguish cash expenditure, family labour, depreciation and the imputed value of owned inputs. Results should be reported per hectare and per unit of output, with sensitivity analysis for changes in fertiliser price, yield and paddy price. These additions would allow a clearer assessment of efficiency and would make comparisons across locations and seasons more meaningful.

Conclusion and policy implications

Beneficiary farms achieved a substantially larger reported net benefit than non-beneficiary farms. The difference was driven mainly by lower total cost, while revenue differed only modestly. This finding directs attention to input procurement and use, not only to output expansion.

Interventions should combine timely input supply, agronomic advice, group purchasing, access to seasonal finance and post-harvest marketing. Farm records should be strengthened so that producers can track cost per hectare and cost per unit of output. A follow-up study should collect plot-level area and yield data, value family labour consistently, deflate monetary values to a common price period and test group differences statistically.

Study limitations

The budget is based on cross-sectional self-reports and does not establish causal impact. The reported totals are not standardised per hectare, and some fixed-cost entries may represent asset values rather than annual depreciation.

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