

Potentials of homestead fish farming in food security and poverty reduction in Southeastern Nigeria



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Abstract

Homestead fish farming is an important strategy for household income generation and food security in Nigeria, yet its performance is influenced by socio-economic and infrastructural factors. This study was designed to assess the socio-economic characteristics, production practices, profitability, and constraints of homestead fish farmers in Imo State, Nigeria. A total of 162 respondents was selected using stratified random sampling across the state's three senatorial zones. Data were collected through a structured questionnaire and interviews and outcome were analyzed using descriptive statistics. Results showed that fish farming is predominantly male-led (75.93%), with most respondents being literate (62.96% tertiary education), married (72.22%), and within the productive age group of 30–49 years (57.41%). Farmers owned an average of 4–6 ponds, as most harvested three cycles per year, producing 2,000–3,000 kg per cycle. Cost production structure showed total variable cost of ₦5,910,000 with total revenue of ₦7,500,000 and a gross margin of ₦1,590,000. The net farm income gross ratio, and return on investment were ₦1,493,298, 1.25 and 0.27, respectively while return per naira invested was 27k. The greater than one value of gross ratio indicated that homestead fish farming is profitable. However, only 11% of respondents belonged to agricultural associations, limiting access to training, credit, and collective bargaining. Major constraints included high costs of feed and fingerlings, poor storage and marketing infrastructure, theft, inadequate extension services, and irregular electricity supply. In conclusion homestead aquaculture in Imo State contributes significantly to household income and livelihoods. Recommendations include advocacy of cluster farming to strengthen farmer cooperatives, improving access to low-interest credit, and upgrading infrastructure to enhance profitability, productivity, reduce cost and sustainability of the sector.

Keywords: Homestead aquaculture, food security, constraints, potential

Le potentiel de la pisciculture familiale pour la sécurité alimentaire et la réduction de la pauvreté dans le sud-est du Nigeria



Résumé

La pisciculture familiale constitue une stratégie importante pour la génération de revenus des ménages et la sécurité alimentaire au Nigeria, mais ses performances sont influencées par des facteurs socio-économiques et infrastructurels. Cette étude a été conçue pour évaluer les caractéristiques socio-économiques, les pratiques de production, la rentabilité et les contraintes des pisciculteurs familiaux dans l'État d'Imo, au Nigeria. Au total, 162 répondants ont été sélectionnés à l'aide d'un échantillonnage aléatoire stratifié dans les trois zones sénatoriales de l'État. Les données ont été recueillies à l'aide d'un questionnaire structuré et d'entretiens, et les résultats ont été analysés à l'aide de statistiques descriptives. Les résultats ont montré que la pisciculture est principalement dirigée par des hommes (75,93 %), la plupart des répondants étant alphabétisés (62,96 % ayant suivi des études supérieures), mariés (72,22 %) et appartenant à la tranche d'âge productive de 30 à 49 ans (57,41 %). Les éleveurs possédaient en moyenne 4 à 6 bassins, la plupart effectuant trois cycles de récolte par an, avec une production de 2 000 à 3 000 kg par cycle. La structure des coûts de production indiquait un coût variable total de 5 910 000 nairas, pour un chiffre d'affaires total de 7 500 000 nairas et une marge brute de 1 590 000 nairas. Le ratio brut du revenu agricole net et le taux de rendement des investissements s'élevaient respectivement à 1 493 298 nairas, 1,25 et 0,27, tandis que le rendement par naira investi était de 27 000. La valeur supérieure à un du ratio brut indiquait que la pisciculture familiale était rentable. Cependant, seuls 11 % des personnes interrogées appartenaient à des associations agricoles, ce qui limitait leur accès à la

formation, au crédit et à la négociation collective. Parmi les principales contraintes figuraient le coût élevé des aliments pour poissons et des alevins, la médiocrité des infrastructures de stockage et de commercialisation, le vol, l'insuffisance des services de vulgarisation et l'approvisionnement irrégulier en électricité. En conclusion, l'aquaculture domestique dans l'État d'Imo contribue de manière significative aux revenus et aux moyens de subsistance des ménages. Les recommandations comprennent la promotion de l'agriculture en grappes pour renforcer les coopératives d'agriculteurs, l'amélioration de l'accès au crédit à faible taux d'intérêt et la modernisation des infrastructures afin d'accroître la rentabilité et la productivité, de réduire les coûts et d'assurer la durabilité du secteur

Mots-clés : aquaculture familiale, sécurité alimentaire, contraintes, potentiel

Introduction

Nigeria faces a persistent fish supply deficit, consuming over 3.5 million tonnes annually while producing less than 1.2 million tonnes domestically (NIOMR, 2021). Aquaculture has been recognized as a sustainable strategy to bridge this gap, with potential to expand through intensive and semi-intensive pond systems, recirculatory aquaculture systems, integrated farming (e.g., rice–fish, poultry–fish), and cage culture in lakes, reservoirs, and coastal waters (Ozigbo *et al.*, 2014; FAO, 2022). Critical to this expansion are reliable hatcheries, improved fish breeds (e.g., fast-growing tilapia and catfish hybrids), and adoption of technologies for disease management, farm monitoring, and market access (Nwuba and Onuoha, 2021). Among the various aquaculture systems, homestead fish farming, though small-scale, contributes significantly to household food security, income generation, and rural livelihoods (Nwachukwu and Onyenweaku, 2007; Bhujel, 2012). This system typically involves rearing fish in human-made water bodies, such as earthen ponds, concrete tanks, or plastic tanks, with cultured fish serving as both a source of animal protein and income for farmers (Odebode and Arimi, 2011; Okwukenye and Onemolease, 2013).

Imo State, located in southeastern Nigeria, possesses favorable ecological conditions and water resources conducive to aquaculture development. However, the sector faces socio-economic and infrastructural constraints, including high costs of feed and inadequate quality fingerlings, limited access to credit, poor power supply, inadequate extension services, weak market information and pricing systems, and low levels of farmer registration in cooperatives or agricultural bodies (Eze *et al.*, 2010; Ugwumba and Okoh, 2010; Isa, 2019). These challenges have been implicated to limit

productivity, profitability, and the ability of homestead fish farmers to expand operations or adopt modern technologies.

Participation of farmers in homestead fish production and engagement with agricultural organizations can enhance knowledge transfer, technology adoption, and access to support services, which are critical for improving productivity and livelihoods (FAO, 2011). Evaluating the socio-economic characteristics of fish farmers is therefore essential to identify the constraints limiting production, determine income-generating capacity, and inform targeted interventions to support rural livelihoods. Several studies have examined fish farming in Nigeria, including socio-economic analyses in Ogun State (Olawunmi *et al.*, 2010), Oyo State (Olaoye *et al.*, 2013), Delta State (Nkamigbo *et al.*, 2014), Niger State (Yisa *et al.*, 2015), and Adamawa State (Ronald, 2016), as well as participation in homestead fish production for poverty alleviation in Bayelsa and Delta States (Okwukenye and Ikoyo-Eweto, 2016).

Building on these previous studies, this research examines the socio-economic characteristics, production status, income, and challenges of homestead fish farmers in Imo State, with the aim of providing evidence-based recommendations for improving productivity, profitability, and rural livelihoods.

Methodology

Study area

The study was carried out in Imo State, located in the South-East geopolitical zone of Nigeria, with Owerri as its capital and largest city. Imo State lies between the Lower River Niger and the Upper and Middle Imo River, occupying an estimated land area of about 5,100 km² (GIF, 2010). The state is geographically positioned approximately between latitudes 4°45'N and

7°15'N and longitudes 6°50'E and 7°25'E. Imo State is bounded by Abia State to the east, Delta State to the west, Anambra State to the north, and Rivers State to the south. Administratively, the state comprises 27 Local Government Areas (LGAs) and three major senatorial zones, namely Owerri, Orlu, and Okigwe zones according to INEC (2023).

This study covered the three senatorial zones of Imo State, namely Owerri Zone, Orlu Zone, and Okigwe Zone (GIF, 2010). These zones differ in socio-economic activities, population distribution, and agricultural practices, which makes them suitable for comparative assessment.

Study Design and Population

A cross-sectional study design was adopted for this research. The study population consisted of respondents drawn from the three senatorial zones of Imo State. The target population included individuals relevant to the objectives of the study across the selected Local Government Areas, irrespective of socio-economic or occupational differences.

Sample Size, Sampling Method and Data Collection

Imo State was stratified into its three senatorial zones: Owerri Zone (9 LGAs), Okigwe Zone (5 LGAs), and Orlu Zone (12 LGAs), giving a total of 27 LGAs. A stratified random sampling technique was employed to ensure fair representation of respondents from each zone. From each senatorial zone, two-thirds (2/3) of the LGAs were selected using a balloting technique, which ensured randomization. Respondents within the selected LGAs were further randomly sampled.

Primary data were collected using a well-structured questionnaire, which were personally administered to respondents. Where necessary, oral interviews were conducted to clarify responses and improve the reliability of the data collected. Secondary data were sourced from published journals, government documents, reports, and relevant literature.

Questionnaire Design and Administration

The questionnaire was designed based on the objectives of the study and relevant literature. It consisted mainly of close-ended questions structured to capture information relevant to the

study. The questionnaire was administered directly to respondents to ensure proper understanding and accurate responses.

Data Management and Statistical Analysis

Data collected were coded and entered into spreadsheets for analysis. Descriptive statistical tools were used to analyze the data, including frequencies, percentages, tables, and charts. The analyzed data were presented in a clear and concise manner to facilitate interpretation and to address the study objectives. The enterprise budgeting components technique (Adepoju and Oyebanji, 2021) was used to assess the profitability of the homestead fish farming ventures as given below:

$$GM = TR - TVC$$

$$NFI = GM - TFC$$

$$ROI = NFI / TC$$

$$GR = TR/TC$$

Where:

GM = Gross margin

TR = Total revenue

TVC = Total variable cost

NFI = Net farm income

TC = Total cost

TFC = Total fixed cost

ROI = Returns on investment

GR = Gross ratio

Results

The socio-economic characteristics of the respondents are presented in Table 1. The results indicate that fish farming in the study area was male dominated (75.93%) while the female were 24.07%. All respondents had some levels of formal education; 62.96% attained tertiary education, 35.19% had secondary education, and 1.85% completed only primary education.

Most respondents were married (72.22%), while 24.07% were single and 3.70% were widowed. The age distribution shows that the most of the farmers (75.93%) were within the productive age bracket of below 30–49 years, followed by 24.07% within 50–59 years. No respondent was above 60 years of age.

Household size was generally moderate, with 68.52% of respondents had 4–6 household members, 16.67% had 1–3 persons, and only 1.85% had large household sizes of 10–12

persons. In terms of residency, 70.37% of respondents had lived in their communities for 20 years and above, indicating strong community attachment and stability. All respondents were Christians.

Farm ownership patterns revealed that the most (88.89%) were landowners, while 11.11% operated as tenants. With respect to primary occupation, most respondents (62.96%) combined fish farming with other business activities, while 16.67% were full-time fish farmers. Civil servants and retired civil servants engaged in farming constituted 11.11% and 9.27%, respectively.

Agricultural organization membership

The distribution of respondents based on agricultural organization membership is shown in Table 2. The majority of fish farmers (88.89%) were not registered with any agricultural organization, while only 11.11% reported being members. Among those registered, 83.33% actively participated in organizational activities. Most members (50.00%) had less than 5 years of membership experience, 33.33% had 5–9 years, and 16.67% had 10–14 years of experience.

Living standards and access to basic services

The social distribution of respondents based on living standards is presented in Table 3. Most farmers (92.59%) reported had personal savings. Electricity supply was largely unreliable, as 88.89% depended on a combination of the national grid (EEDC) and private gasoline generators, while 11.11% relied solely on generators.

Cooking fuel sources varied, with 50.00% using cooking gas, 31.48% using firewood, and 18.52% relying on kerosene. Boreholes were the dominant water source (85.19%), while 9.26% used a combination of boreholes and streams, and 5.56% depended solely on streams or rivers. All respondents (100%) financed their fish farming activities through personal savings, with no access to bank loans, cooperatives, or other formal credit sources.

Table 1: Socio-economic characteristics of respondents

Characteristics	Categories	Frequency	Percentage (%)
Sex	Male	123	75.93
	Female	39	24.07
	Total	162	100.00
Age	<30	30	18.52
	30-39	45	27.78
	40-49	48	29.63
	50-59	39	24.07
	60 and above	--	--
	Total	162	100.00
Marital Status	Single	39	24.07
	Married	117	72.22
	Divorced	--	--
	Widow(er)	6	3.70
	Total	162	100.00
Educational Status	Primary	3	1.85
	Secondary	57	35.19
	Tertiary	102	62.96
	No formal	--	--
	Total	162	100.00
Family size excluding dependents/house help	1-3	27	16.67
	4-6	111	68.52
	7-9	21	12.96
	10-12	3	1.85
	Total	162	100.00
Religion	Christianity	162	100.00
	Islam	--	--
	Others	--	--
	Total	162	100
Tenancy status	Landlord	144	88.89
	Tenant	18	11.11
	Total	162	100
Years of residence in community	<5	21	12.96
	5-9	15	9.26
	10-19	12	7.41
	20 and above	114	70.37
Primary Occupation	Full-time farming	27	16.67
	Farming and business	102	62.96
	Civil Servant and farming	18	11.11
	Retired Civil Servant & farming	15	9.27
	Total	162	100.00

Source: Field survey, 2023.

Table 2: Distribution of respondents based on agricultural organization

Characteristics	Categories	Frequency	Percentage (%)
Registered in any agric. organization	Yes	18	11.11
	No	144	88.89
	Total	162	100.00
If yes, do farmer participate in organization	Yes	15	83.33
	No	3	16.67
	Total	18	100.00
Organization membership experience (years)	<5	9	50.00
	5-9	6	33.33
	10-14	3	16.67
	15-19	--	--
	20 and above	--	--
	Total	18	100.00

Source: Field survey, 2023

Table 3: Social distribution of farmers based on their living standard

Characteristics	Categories	Frequency	Percentage (%)
Do you have savings	Yes	150	92.59
	No	12	7.41
	Total	162	100.00
Source of Electricity	EEDC (only)	-	-
	Private generator (only)	18	11.11
	EEDC and generator	144	88.89
	Total	162	100.00
Cooking fuel	Electricity	-	-
	Gas	81	50.00
	Kerosene	30	18.52
	Wood	51	31.48
	Coal	-	-
	Total	162	100.00
Source of finance	Personal saving	162	100.00
	Friends/relatives	-	-
	Co-operatives	-	-
	Bank loan	-	-
	Total	162	100.00
Source of water	Streams/River	9	5.56
	Borehole	138	85.19
	Deep well	-	-
	Stream/River & Borehole	15	9.26
	Total	162	100.00

Source: Field survey, 2023.

Note: EEDC = Enugu Electricity Distribution Company

Production characteristics and management practices

Production characteristics and management practices are summarized in Table 4. Most respondents (90.74%) sourced their fish seed from private hatcheries, while 9.26% produced seed from their own farms. The dominant production cycle was three harvests per year, practiced by 70.37% of farmers. Smaller proportions harvested twice (14.81%), once (7.41%), or more than three times (7.41%) annually. In terms of pond ownership, 53.70% of farmers owned 4–6 ponds, 38.89% owned 1–3 ponds, and 7.41% owned 7–9 ponds. Management systems were predominantly intensive (94.44%), with very few farmers practicing semi-intensive (3.70%) or extensive (1.85%) systems.

Production output and income distribution

Production output and income distribution per harvest are presented in Table 5. The majority of farmers (59.26%) harvested between 2,001 and 3,000 kg of fish per cycle, while 29.63% harvested 1,000–2,000 kg. Only 1.85% produced above 3,000 kg, and 9.26% harvested below 1,000 kg. Income realized per harvest showed that 46.30% of respondents earned between ₦600,000 and ₦749,000, while 27.78% earned ₦450,000–₦599,000. Smaller proportions earned below ₦300,000, and only 1.85% earned above ₦900,000 per harvest.

Cost structure, profitability, and returns

The fixed and variable production costs are presented in Table 6, while cost and returns analysis is shown in Table VII. The average total variable cost (TVC) per annum for producing 3000 catfish was ₦5,910,000, with feed accounting for the largest share. The total fixed cost (TFC) was ₦6,006,702, with an average annual depreciation value of ₦96,702.

At an average selling price of ₦2,500 per kg, the total revenue from 3,000 kg of fish was ₦7,500,000. The resulting gross margin (GM) was ₦1,590,000, while the net farm income (NFI) was ₦1,493,298. The calculated return on investment (ROI) was 0.27 with a gross ratio of 1.25.

Table 4: Fish seed source, production cycle, pond ownership and management intensity			
Characteristics	Categories	Frequency	Percentage (%)
Source of fish seed	Own fish farm	15	9.26
	Fish hatchery	147	90.74
	Government fish farm	--	--
	Total	162	100.00
Harvest cycle	Once	12	7.41
	Twice	24	14.81
	Thrice	114	70.37
	Above thrice	12	7.41
	Total	162	100.00
No. of ponds/respondent	1-3	63	38.89
	4-6	87	53.70
	7-9	12	7.41
	Above 10	--	--
	Total	162	100.00
Management intensity	Intensive	153	94.44
	Semi-intensive	6	3.70
	Extensive	3	1.85
	Total	162	100.00

Source: Field survey, 2023.

Table 5: Production status and profit distribution of farmers per harvest			
Characteristics	Categories	Frequency	Percentage (%)
Weight of fish (kg/harvest)	< 1000	15	9.26
	1000 - 2000	48	29.63
	2001 – 3000	96	59.26
	Above 3000	3	1.85
	Total	162	100
Income range/harvest (₦))	< 150,000	6	3.70
	150,000-299,000	3	1.85
	300,000-449,000	30	18.52
	450,000-599,000	45	27.78
	600,000-749,000	75	46.30
	750,000-899,000	--	--
	900,000 and above	3	1.85
	Total	162	100

Source: Field survey, 2023.

Table 6: Fixed cost and Average variable production cost/1000 catfish

Variable cost	Value (₦) Per 1000 cat		
Fingerlings	50,000		
Feed (3-4 months)	1,750,000		
Medication	40,600		
Labour (during harvest)	20,000		
Transportation (feed purchase)	22,000		
Fuel (80L Petrol)	72,400		
Utilities/Miscellaneous	15,000		
Total	1,970,000		
Fixed cost	Total value (₦)	Lifespan (Years)	Depreciation (₦)
Pond	140,000	20	7,000
Net cover (Pond)	20,000	2	10,000
Gasoline water Pump	78,000	15	5,200
Weighing scale	52,000	12	4,335
Plastic tank	100,000	15	6,667
Bowls/buckets	15,000	3	5,000
Bowls/buckets	15,000	3	5,000
Borehole	850,000	20	42,500
Borehole pump	80,000	5	16,000
Total Fixed Cost	1,335,000		96,702

Source: Field survey, 2023.

Table 7: Average cost and returns of 1000kg catfish

Items	Average value /harvest ₦	Average value/Annum (3-cycle) ₦
Revenue		
Average weight	1000kg	3000kg
Average price per kg	₦ 2,500	₦ 2,500
Total Sales Revenue	₦ 2,500,000	₦ 7,500,000
70 bags feed @ average cost of ₦ 25,000/bag	1,750,000	5,250,000
Average 1000 fingerlings @ ₦ 50 each	50,000	150,000
Medication (2% of feed cost)	40,600	121,800
Fuel (80 litres for pumping water)	72,400	217,200
Transportation (feed purchase and inputs)	22,000	66,000
Utilities	15,000	45,000
Labour (during harvest)	20,000	60,000
Total Variable Cost	1,970,000	5,910,000
Total depreciated fixed cost	96,702	96,702
Total Cost	2,066,702	6,006,702

Source: Field survey, 2023.

Gross margin = Total Sales Revenue – Total Variable Cost

₦ 7,500,000 – ₦ 5,910,000 = ₦1,590,000

Net Farm Income = Gross margin – Total fixed cost (depreciation)

₦ 1,590,000 – ₦ 96,702 = ₦1,493,298

Return on Investment (ROI) = GM/TVC

₦ 1,590,000/₦ 5,910,000 = 0.27

Gross ratio (GR) = TR/TC

₦ 7,500,000/₦ 6,006,702 = 1.25

Perceived constraints and challenges

The major constraints faced by fish farmers are illustrated in Figure 1. These include high cost of

fish feed and fingerlings, poor access to credit facilities, theft, weak pricing and marketing systems, inadequate extension services, and irregular electricity supply. These constraints reflect systemic challenges affecting aquaculture development in Nigeria.

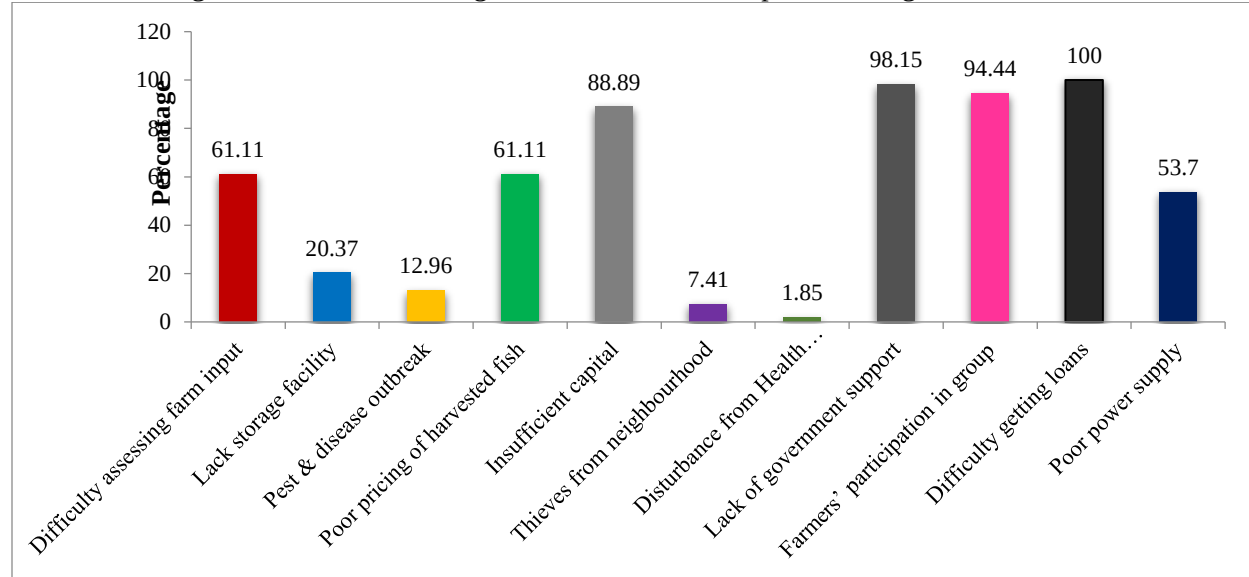


Figure 1: Perceived constraints of homestead fish farmers in Imo State

Source: Field survey, 2023

Discussion

Socio-economic characteristics of respondents

The socio-economic characteristics of the respondents revealed a marked male dominance (75.93%) in homestead fish farming, with females constituting 24.07% of the sample. This gender disparity may be attributed to the labor-intensive nature of fish farming, which demands substantial time, physical effort, and management commitment. This finding aligns with earlier reports that men generally dominate aquaculture activities due to their higher participation in physically demanding agricultural operations (Akinbile *et al.*, 2008). Similar male dominance in fish farming has been documented in Nigeria (Ogunlade, 2007; Adeoye *et al.*, 2012; Wuyep and Rampedi, 2018; George and Akinrotimi, 2021; Subasinghe *et al.*, 2021), across Africa (de Graaf and Garibaldi, 2014), and globally. Notably, the proportion of female fish farmers observed in this study is comparable to the approximately 25% reported by FAO (2024), suggesting gradual female inclusion in aquaculture.

Most respondents were married (72.22%), which may positively influence farm productivity through the availability of family labor and shared responsibility in farm management. Family labor reduces production costs and improves farm efficiency. The age distribution showed that 75.93% of farmers were within the productive age range of 30–49 years, with no respondents above 60 years. This implies a youthful and economically active farming population, capable of adopting innovations and taking calculated risks. Similar observations that younger farmers tend to be more productive and receptive to improved farming practices were reported by Gomna *et al.* (2020) in a study on profitability analysis of fish farming in Niger State, Nigeria and, on profitability of catfish production in Enugu metropolis, Enugu State, Nigeria by Okoh *et al.* (2021).

Household size was predominantly moderate (4–6 persons; 68.52%), likely due to predominant Christian population where monogamy is the norm and the relatively high level of tertiary education attainment. All respondents in this

study were Christians. This moderate household size supports efficient utilization of family labor for farm operations without excessive dependency burden. Larger household sizes (10–12 persons) were rare (1.85%), suggesting minimal strain on farm income. The educational profile revealed that fish farming was dominated by educated individuals, with 62.96% had tertiary education and 35.19% attaining secondary education, while only 1.85% had primary education. Higher educational attainment facilitates technology adoption, improved farm management, and better decision-making, which can enhance productivity and profitability (Gomna *et al.*, 2020). Land ownership patterns indicated that most fish farmers were landowners, which provides stability, security, and flexibility for farm expansion. However, the low level of membership in agricultural organizations (11.11%) suggests limited exposure to collective learning, extension services, and institutional support. Oboh *et al.* (2025) attributed low participation in farmers' organizations to lack of awareness and perceived benefits, despite evidence that group membership enhances peer learning and technology adoption.

Borehole water was the dominant water source (85.19%), reflecting limited access to natural water bodies and highlighting the importance of groundwater in sustaining aquaculture operations. Power supply remained unreliable, forcing farmers to depend on the Enugu Electricity Distribution Company (EEDC) and gasoline generators, thereby increasing operational costs. All farmers financed their operations through personal savings, indicating limited access to formal credit facilities. Most respondents combined fish farming with other income-generating activities, while only a small proportion practiced full-time fish farming. This supports earlier findings that fish farming often serves as a supplementary income source for households (Odebode and Arimi, 2011; Gomna *et al.*, 2020).

Production cycle and income generation

The majority of farmers (70.37%) operated three production cycles per year, reflecting efficient farm management practices likely influenced by ready market and relatively high literacy level among respondents. Most farmers (59.26%) produced between 2,001 and 3,000 kg of fish per

production cycle, while only 1.85% exceeded 3,000 kg. This output is consistent with the observed average farm size of 4–6 ponds (5 m × 5 m) and a production target of 800g–1,000kg per fish, commonly sold to processors involved in smoke-drying. Additional labour is usually engaged during harvest, while family members handle daily farm operations such as feeding and monitoring. The widespread adoption of intensive management systems (94.44%), characterized by the use of commercial feeds, likely contributed to the relatively high yields recorded. This finding is in tandem with Filli *et al.* (2023) who reported high output resulting from high stocking density, quality fingerlings, adequate feed, medication and good water quality management. Additionally, 90.74% of farmers sourced fingerlings from established hatcheries, suggesting awareness of the importance of quality seed for improved growth performance and survival. These practices underscore the influence of education and experience on farm productivity.

Several costs incurred by the homestead fish farmers during production include variable and fixed costs. The variable costs include fish seed (fingerlings), fish feed, labour, transportation, fuel, medication and utilities as articulated by Ugwumba (2005) Ugwumba and Chukwuji, (2010); Onyekuru *et al.* (2019) and Okoh *et al.* (2021), and presented in Table 6. Labour cost involves additional hands employed during harvest, as family members provide unpaid labour for daily farm operations. Transportation costs were incurred mainly for the purchase of feed and other inputs, as fish enclosures are located close to the homestead. Fuel cost were incurred for pumping water into holding tanks and draining ponds during harvest.

Fixed cost comprised depreciation values of fish pond, weighing scale, water pumps (gasoline and electric), plastic tanks, bowls/buckets and net cover. These assets last for more than one production cycle and does not change within the production period. The straight-line method (Okoh *et al.*, 2021) was used to calculate the depreciation. The total cost of production for three cycles per annum amounted to ₦6,006,702, of which total variable costs accounted for ₦5,910,000. Feed cost alone constituted about 87.83% of total production costs, corroborating the

findings of Ashaolu *et al.* (2006); Ugwumba and Okoh (2010) and Filli *et al.* (2023), that feed costs accounted for over 70% of total production costs. The unusually high feed cost observed in this study may be attributed to the sudden change in the exchange rate from ₦900 to ₦1,800 following government policy on the floating of the naira, which eliminated the previous exchange rate control by the Central bank of Nigeria (Olatunji, 2023).

Enterprise budgeting analysis was used to determine the profitability of homestead fish production in the study area. The analysis estimated total cost (TC), total revenue (TR), total variable cost (TVC), total fixed cost (TFC), gross margin (GM), net farm income (NFI), return on investment (ROI), Gross Ratio (GR). The annual three-cycle production yielded a gross margin of ₦1,590,000 and a net farm income of ₦1,493,298. Gross margin represents the difference between TR and TVC, while net farm income is the difference between GM and TFC, indicating enterprise profitability. A gross ratio of 1.25 was obtained indicating profitability, as values greater than one signify viable enterprises. According to Adepoju and Oyebanji (2021), positive gross margins, ROI, NFI and gross ratios greater than one indicate that an enterprise is profitable and worth sustaining. Thus, homestead fish farming, having recorded positive GR, NFI and ROI, is profitable in the study area. With a gross ratio of 1.25 and return on investment of 0.27, farmers earned an average of ₦ 0.27 for every ₦1.00. Similar profitability outcomes have been reported for homestead fish farming in Osun (Ogunlade, 2007), Oyo (Odebode and Arimi, 2011), Bayelsa (Okwuokenye *et al.*, 2016), Niger (Gomna *et al.*, 2020), and Enugu (Okoh *et al.*, 2021) states of Nigeria. This profitability likely explained why many respondents (62.96%) ventured into fish farming. These findings corroborate earlier studies that identified aquaculture as a viable income-generating enterprise when efficient management practices are adopted (Ashaolu *et al.*, 2006; Okwukenye and Ikoyo-Eweto, 2016). Most farmers had 1–5 years of experience (51.85%), while 33.33% had 5–10 years of experience, indicating a relatively young but expanding aquaculture sector. Previous studies have identified the southeastern geopolitical zone as the least fish-producing region in Nigeria

(FDF, 2015/2016), possibly due to limited awareness of the viability of fish farming. The region is traditionally known for oil palm production, which has remained the dominant enterprise over the past four decades. This finding corroborates the observation that most fish farmers embraced aquaculture within the last five years, unlike in the southwestern region where fish farming has been practiced for over three decades. Income generated from fish farming contributed significantly to household welfare by covering expenses such as school fees, healthcare, and electricity bills, supporting earlier findings that aquaculture positively impacts household income and poverty reduction (Olaoye *et al.*, 2013; Ronald, 2016) and years of experience enhances technical skills, reduces production costs, and improves profitability (Oyekale *et al.*, 2003).

Despite its profitability, fish farming in the study area faced several constraints. Major challenges include difficulty in accessing credit or low-interest loans, lack of standardized fish pricing and marketing information, high cost of feed and quality fingerlings, and inadequate government support. All respondents identified limited access to credit as a critical barrier to farm expansion. Similar constraints have been widely reported as limiting factors to aquaculture development in Nigeria (Adeoye *et al.*, 2012; Subasinghe *et al.*, 2021).

Other notable challenges included theft (92.59%), consistent with Ogunlade (2007), who reported predation as a major challenge among backyard fish farmers in Osun State and pest and disease outbreaks (87.04%). Multiple sourcing of fish seed to meet high stocking densities may contribute to disease outbreaks, especially in the absence of specialised hatcheries in the area. Disease and pest outbreaks have also been reported in Benue State (Filli *et al.*, 2023) and Imo State (Agbabiaka *et al.*, 2025). These challenges reduce profitability and discourage farm expansion, highlighting the need for improved farm security and effective management strategies.

Conclusion and Recommendation

Fish farming in Imo State contributes positively to poverty reduction and livelihood diversification. However, farm income could be substantially enhanced if constraints such as

limited access to credit, poor power supply, high input costs, and weak extension services are addressed.. Cluster farming would help mitigate challenges such as theft through shared security arrangements, reduce production costs, and improve access to extension services, as extension workers could serve farmers collectively. Furthermore, access to credit from microfinance banks through cooperative executives would be easier, and other identified constraints could be effectively addressed, leading to improved productivity and long-term sustainability of homestead fish farming in the study area.

References

- Adeoye, D., Akegbejo-Samsons, Y., Omoniyi, T., Dipeolu, A. 2012.** Challenges and investment opportunities for large-scale aquaculture farmers in Nigeria. *IIFET 2012 Tanzania Proceedings. (International Institute of Fisheries Economies and Trade)* P. 1-12
- Adepoju, A. A. and Oyebanji, O. 2021.** Gross margin and economic efficiency of yam production in Nigeria. *Journal of Agricultural Sciences*, 66(2), p. 185-197
- Agbabiaka, L. A., Onwuzuruigbo, F. O., and Jimoh, O. A. 2025.** Threat to fish food safety in Nigeria: Role of antimicrobial usage and resistance in aquaculture. *Aquaculture reports*, 40 (2025) 102643, 9 pp. <https://doi.org/10.1016/j.aqrep.2025.102643>. www.elsevier.com/locate/aqrep
- Akinbile, L. A., Hussain, L. A., Yekinni, O. T. 2008.** Participation in Community Based Poverty Reduction Projects in Selected Communities in Ekiti State, Nigeria. *Nigeria Journal of Rural Sociology*. 8 (1):41-47.
- Ashaolu, F. O., Akinyemi, A. A. and Nzekwe, L. S. O. 2006.** Economic Viability of Homestead Fish Production in Abeokuta Metropolis of Ogun State, Nigeria. *Assets Series A*. 6(2): pp. 209- 220.
- Bhujel, R. C. 2012.** Small-scale aquaculture: Global and national perspectives. pp. 10 – 18. In Shrestha, M. K. and Pant, J. (eds). *Small-scale aquaculture for rural livelihoods: Proceedings of the National Symposium on Small-scale aquaculture for Increasing Resilience of Rural Livelihoods in Nepal*. Institute of Agriculture and Animal Science, Tribhuvan University , Rampur, Chitwan, Nepal and the WorldFish Center, Penang, Malaysia.
- De Graff, G. and Garibaldi, L. 2014.** The Value of African fisheries. *FAO Fisheries and Aquaculture Circular No. 1093* Rome P.76
- Eze, C. C., Lemchi, J. I., Ugochukwu, A. I., Eze, V. C., Awulonu, C. A., and Okon, A. N. 2010.** Agricultural financing policies and rural development in Nigeria. *International Journal of Sustainable Development*, 2(1), 11–19.
- Food and Agriculture Organization (FAO) 2024.** The State of World Fisheries and Aquaculture 2024: Blue transformation in action. Rome. 264pp
- FAO. 2022.** Food and Agriculture Organization of the United Nations. The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation. Rome, 266pp <https://doi.org/10.4060/cc0463en>
- FAO. Food and Agricultural Organization, 2011.** Our Vision at Participation; Available: <http://www.fao.org/participation/ourvision.html> (September 30th, 2011).
- Filli, F. B., Bulus, G. and Inyang H. B. 2023.** Economic analysis of catfish farming in Makurdi Local Government Area, Benue State, Nigeria. *European Journal of Theoretical and Applied Sciences*, 1 (4), pp 1213 – 1222. DOI: 10.59324/cjtas.2023.1(4).111
- George, A. D. I. and Akinrotimi, O. A. 2021.** Socio-economic characteristics and bio-security measures among fish farmers in some coastal communities of Rivers State, Nigeria. *International journal of Research and Scientific innovation* 8 (1). 193
- GIF. Government of Imo State, 2010.** About Imo State”. Imo State, Nigeria: Imo State Government Retrieved 27 July 2017. Available: www.governmentofimo.com

- Gomna, A., Dan-Azumi, P. and Mamman, Z. 2020.** Profitability analysis of fish farming in Niger State, Nigeria. *International Journal of the Science of Food and Agric.* 4 (3): pp. 293-300
- Independent National Electoral Commission (INEC) 2023.** 2023 general elections: Abuja: INEC
- Isa, S.I. 2019.** Development of genetic improvement in the African catfish (*Clarias gariepinus*, Burchell, 1822). A thesis submitted for the degree of Doctor of Philosophy. Institute of Aquaculture, Faculty of Natural Sciences, University of Stirling,, Scotland, UK.
- NIOMR. 2021.** Annual Fisheries Statistics Report for Nigeria. *Nigerian Institute for Oceanography and Marine Research, Lagos.*
- Nkamigbo, J. A., Gunn, P., Adegboye, G. A. and Barnabas, T. M. 2014.** Assessment of Fish Farmers' Livelihood and Poverty Status in Delta State, Nigeria. *Journal of Agriculture, Forestry and Fisheries.* 3(5): pp.427-433.
- Nwachukwu, I. N., and Onyenweaku, C. E. 2007.** Resource use efficiency of rice farmers in Ebonyi State, Nigeria. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension*, 6(1), 34–41.
- Nwuba, L. A., and Onuoha, G. C. 2021.** Challenges and prospects of aquaculture development in Nigeria: A review. *Nigerian Journal of Fisheries Science*, 10 (2), 89–101.
- Oboh, A., Yusuf, N., and Dan-Kishiya, A. S. 2025.** A survey of fish farming activities in Gwagwalada Area Council, Abuja, Nigeria. *International Journal of Fisheries and Aquaculture.* 17 (1) pp 22-38
- Odebode S.O. and Arimi, K. 2011.** Contribution of Homestead Fisheries to Household Food Security in Afijio L.G.A, Oyo State, Nigeria. *African Journal of Agricultural Research and Development.* 4(3): pp. 50-58.
- Ogunlade I. 2007.** Backyard fish farmers' information needs in Osun State, Nigeria. *Agriculture and Applied economics* (AAAAE) *Conference Proceedings*, pp. 165 - 169
- Okoh, T. C., Umaru, I. I. and Ishiwu, R. C. 2021.** Profitability of catfish production in Enugu metropolis, Enugu State, Nigeria. *Open Journals Nigeria*, 2 (2): pp. 01-11 DOI: 10.52417/ojas.v2i2.229
- Okwuokenye, G. F. and Ikoyo-Eweto, G. O. 2016.** Farmers' Participation in Homestead Fish Production: Implications for Poverty Alleviation in Bayelsa and Delta States, Nigeria. *Journal of Agriculture and Ecology Research International.* 6(2): pp.1-13.
- Okwuokenye, G. F. and Onemolease, E. A. 2013.** Influence of Demographic Characteristics on Marketing Margins Among Fresh Fish Marketers in Delta State, Nigeria. *International Journal of Agricultural Economics, Rural Sociology and Development.* 1(5): pp. 29-42.
- Okwuokenye, G. F. and Ikoyo-Eweto, G. O. 2016.** Farmers' Participation in Homestead Fish Production: Implications for Poverty Alleviation in Bayelsa and Delta States, Nigeria. *Journal of Agriculture and Ecology Research International.* 6(2): pp.1-13.
- Olaoye, O. J., Ashley-Dejo, S. S., Fakoya, E. O., Ikeweinwe, N. B., Alegbeleye, W. O., Ashaolu, F. O., and Adelaja, O. A. 2013.** Assessment of Socio-Economic Analysis of Fish Farming in Oyo State, Nigeria. *Global Journal of Science Frontier Research.* 13(9): 12 pp.
- Olatunji Eniola 2003.** What does it mean to float the Naira? Business Day online Newspaper. June 14, 2023. <http://businessday.ng/analysis/article/what-does-it-mean-to-float-the-naira/>.
- Olawunmi, A. T., Dipeolu, A. O. and Bamiro, O. M. 2010.** Economic Analysis of Homestead Fish Production in Ogun State, Nigeria. *Journal of Human Ecology* 31(1); p13-17doi:10.1080/09709274.2010.11906292
- Onyekuru, N. A., Ihemezie, E. J. and Chima, C. C. 2019.** Socioeconomic and Profitability analysis of catfish \production: a case study of Nsukka

- Local Government Area of Enugu State, Nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension* 18(2): pp. 51-58
- Oyekale, A. S., Awoyemi, T. T. and Jaiyebo, A. 2003.** Marketing Functions and Determinations of Profits among Frozen Chicken Marketers in Ibadan. *African Journal of Livestock Extension*. 2(1): pp.19-23.
- Ozigbo, E., Anyadike, C. C., and Eze, P. 2014.** The role of fish farming in the economic development of Delta State, Nigeria. *Journal of Aquatic Sciences*, 29(1): pp. 45–52.
- Ronald, K. N. 2016.** Fish Farming Enterprises and Poverty Reduction in Adamawa State, Nigeria. Economics, Agricultural and Food Sciences. *Journal of Resource Development and Management*. 21: pp. 53 -59
- Subasinghe, R., Sinwardena, S. N., Byrd, K., Chan, C. Y., Dizyee, K., Shikuku, K., Tran, N., Adegoke, A., Adeleke, M., Anastasiou, K., Beveridge, M., Bogard, J., Chu, L., Fregene, B. T., Ene-Obong, H., Cheong, C., Nukpezah, J., Olagunju, O., Powell, A., Steensma, J., Williams, G., Shelley, C., Philips, M. 2021.** Nigerian fish futures. Aquaculture in Nigeria: Increasing income, diversifying ideas and empowering women. Report of the scoping study, Penang, Malaysia. *Worldfish. Program Report*. 2021-16: pp. 55-75.
- Ugwumba, C. O. A. 2005.** The economics of homestead concrete fish pond in Anambra State, Nigeria. *African Journal of Fisheries and Aquaculture*, 4 (2005): pp. 28-32
- Ugwumba, C. O. A., and Okoh, C. O. 2010.** The economics of catfish production in Anambra State, Nigeria: A profit function approach. *Journal of Agriculture and Social Sciences*, 6(4): pp.105–109.
- Ugwumba, C. O. A., and Chukwudi, O. O. 2010.** The economics of catfish production in Anambra State, Nigeria: A profit function approach. *Journal of Agriculture and Social Sciences*, 6(4): pp.105–109.
- Wuyep, S. D. and Rampedi, I. T. 2018.** Urban fish farming in Jos, Nigeria. Contributions towards employment opportunities, income generation, and poverty alleviation for improved livelihoods. *Agriculture* 8 (7): pp.110-116
- Yisa, E., Adebayo, C. Mohammed, U. S. and Anaweta, C. S. 2015.** Profitability analysis of catfish farming in Suleja local government area of Niger State, Nigeria. *Journal of Agriculture and Food Sciences* 13(1):1 doi:10.4314/jafs.v13i1.1
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