COMPARATIVE ECONOMIC ANALYSIS OF UPLAND AND WETLAND RICE PRODUCTION IN EBONYI STATE, NIGERIA

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ABSTRACT

Comparative economic analysis of upland and wetland rice production in Ebonyi state was studied. Purposive and random sampling techniques were used in the collection of data from one hundred and twenty (120) registered rice farmers, using structured questionnaires. Descriptive and inferential statistics were employed to realize the objectives of the study. The results show that the mean ages of upland and wetland rice farmers were 43.80years and 36.60 years, respectively. Most farmers in both systems were married. The average farming experience for the upland and wetland rice farmers was 7.7years and 7.4years with an average farm size of 1.6ha and 1.7ha respectively. The yield per hectare of paddy for upland farmers, ranged from 800kg - 1000kg and for wetland farmers, from 1000kg – 1200kg. The total production cost for the upland and wetland farmers were ₦ 650,200.00 and ₦ 694,485.00 respectively, while the total revenues were ₦ 810,000.00 and ₦ 990,000.00, respectively. The gross margin for the upland and wetland farmers was ₦ 194,800.00 and ₦ 344,800 and BCR of 1.24 and 1.43 respectively. Farming experience, years spent in school, farm size, age and initial cost of production, have positive and significant effects on the decision to invest in rice production. Inadequate credit facilities and high incidence of pests and diseases were the two major problems faced by rice farmers in both production systems. It was recommended that adequate credit facilities be made available to rice farmers at the appropriate time, and that more research on rice diseases and pests be facilitated.

Keywords: Upland rice, Wetland rice, Economic analysis, Production, Comparative analysis

INTRODUCTION

Rice is the second most widely consumed cereal in the world next to wheat. It is the staple food for two thirds of the world's population (Ojo et al. 2022). In Nigeria, rice is one of the major staple foods in almost every household with small-holder farmers accounting for 80% of the country's annual harvest (Adenegan & Adewuyi, 2021). Production of rice in Nigeria started with the low yielding indigenous red grain species, *Oryza glaberrima,* which was commonly grown in the Niger delta area. The high yielding white grain, *Oryza sativa,* was introduce around 1890 and by 1960, accounted for more than 60% of rice grown in Nigeria (FMARD, 2024).

Today rice is cultivated in almost all the agro-ecological zones of Nigeria but on a relatively small scale by the small scale farmers. FAO (2013) stated that rice is cultivated on 1.8 million hectares of land out of the estimated 4.6million hectares of hectares for rice production in Nigeria.

The production of rice in Nigeria rose from 3.7 million metric tons in 2017 to 4.0 million metric tons in 2018. Despite the increase, only 57 percent of the 6.7 million metric tons of rice consumed in Nigeria by 2018 was locally produced, leading to a deficit of about 3 million metric tons (FAO, 2020).

Rice growing environment in Nigeria are usually classified into four rice ecosystems namely: Rain-fed upland, Rain-fed wet land, Irrigated wet land, and Mangrove swamp (Ojo et al. 2022). It further reported that the land area coverage of mangrove swamp ecology is the least important accounting for less than 1% of total rice area. Irrigated systems (including large-scale irrigation schemes and small-scale irrigation schemes) account for 16% of total rice area; rain-fed upland systems, 30% and rain-fed wet land systems, taking the remaining 53%.

Rice mainly contains carbohydrates, moisture, proteins, lipids, minerals, and vitamins and provides more calories than many cereal crops. According to Safdar et al. (2023), the nutritional components of polished rice are far less than those of brown rice (brown rice is obtained after removing the rice husk). Rice is proven to be cholesterol free and low in sodium salt, hence is a good food for those with high blood pressure (Prabha et al., 2018). Studies by Paul et al. (2018), show that rice is rich in vitamins and minerals like niacin, thiamine and vitamin D, calcium and iron. It is also known to prevent dysentery and chronic constipation (Cherie and Dagnaw, 2019)

Nigeria is Africa's largest rice producer and consumer, with domestic demand far exceeding supply due to inefficiencies in production and post-harvest systems (Etuah et al. 2024.) Rice is primarily a cash crop in Nigeria that is produced mainly for market. Therefore in rice producing areas, the enterprise provides employment for more than 80% of the inhabitants in various activities along the production/distribution chain from cultivation to consumption (Nnamani et al., 2022).

Nigeria is reported to be the world's fifth largest importer of rice in 2010 spending about $800 million US dollars annually (FAO, 2024). Nigeria is reported to have imported 1.7 million tonnes of rice in 2001, 1.5 million tonnes in 2002, 3.9 million tonnes in 2005 and 2 million tonnes in 2012 being the largest importer of rice in Africa (Ugwuja and Chukwukere, 201; CBN, 2012).

The World Bank projected that from 2010, the poorest income households in Nigeria may depend much on rice to obtain not less than 35% of their cereals based calories annually (Ogunniyi et al., 2021) This is due to changes or shift in consumption pattern from root and tuber crops in favour of rice.

If Nigeria is to be self-sufficient in rice production, productivity must increase. This implies that the resources allocated to rice production must be efficiently utilized.

Several researchers have done various works on rice production in Nigeria. Mudashir et al. (2025), examined the economics of rice production and its effect on household food security in Abaji area council of Abuja, Nigeria. The study found out that about 37.5% of Nigerians in the study area were food insecure. However, the study concluded that rice farming is profitable and contributes positively to household food security despite key production challenges. Mallam et al. (2025), studied the impact of fertilizer subsidy and tariff policies on rice production and productivity in Nigeria and discovered that rice productivity remained low, averaging 2.0–2.5 tons/ha, far below the global average of 7.5 tons/ha due to inadequate fertilizer use. Rilwanu et al. (2024), examined the factors influencing adoption of improved rice production technologies by rice farmers in Bauchi State, Nigeria and the result revealed that age, household size, farmers' cooperative and sex were significant factors influencing the adoption of improved rice production technologies. Ochiaka and Ogbonna (2023), analyzed the factors influencing the choice to invest in rice production in Enugu State, Nigeria. The study found out that profit motive, government policy on rice production, unemployment, availability of credit and support services were the major economic factors that influence individual's decision to invest in rice production. Nnamani et al. (2022) , analyzed farm input use efficiency in rice production in Ebonyi State, Nigeria and discovered that farm size, planting material and fertilizer, were under-utilized while labour, capital and agrochemicals were over- utilized.

Various governments in Nigeria have established different programmes and policies to boost rice production and productivity, notable among them include the Presidential Initiative on Rice in 2007, National Rice Development Strategy I in 2010 and II in 2020 and development programmes such as the Agricultural Transformation Agenda in 2011,(FMARD,2024). Government equally banned the importation of rice in 2019 to encourage local production of rice. In addition to other personal attributes that may influence the decision to invest in rice production, government policy on rice production in Nigeria has greatly influenced the choice of farmers to invest in rice farming (Ochiaka and Ogbonna, 2023; Awoyemi et al., 2022).

Rice is one of the most important staple foods in Nigeria and it plays a critical role in ensuring household food security, employment generation and rural income sustainability. In spite of the appreciable progress in increasing domestic rice production in Nigeria, farmers continue to face numerous challenges ranging from poor input supply to poor post-harvest management.

Ebonyi State has long been recognized as one of Nigeria's major producing hubs, contributing significantly to national output due to its favourable agro-ecological condition and strong cultural attachment to rice farming. Ebonyi State government has equally shown tremendous interest in rice production in the state. Several administrations have formulated and implemented policies and programmes aimed at encouraging rice farmers in the state. In spite of the availability of vast cultivable land suitable for rice production, only a fraction of the estimated hectares of suitable land is currently utilized for cultivation.

Despite the strategic importance of rice to food security and rural livelihoods, there remains insufficient comprehensive and comparative economic evidence to guide farmers, policy makers and development agencies in choosing the most efficient and profitable production system. The absence of clear economic benchmarks limits informed decision making regarding resource allocation, investment priorities and policy interventions aimed at boosting rice production in Ebonyi State.

Rice production in Ebonyi State occurs under different ecological systems, notably Upland and Wetland environment. These systems differ in their resource requirements, production techniques, environmental risk, labour intensity and economic outcome. While upland rice farming is typically rain fed and less capital intensive, wetland rice production often benefits from higher moisture availability and potentially greater yield stability. However, these advantages may come with higher input costs and labour demand.

Based on these problems, the following research questions are put forward: what are the socio-economic characteristics of rice farmers in the study area, what are the cost of input and output involved in rice production, is rice production profitable, what factors influence the choice to invest in rice production, what are the constraints involved in rice production.

The broad objective of this study is to do a comparative economic analysis of upland and wet land rice production in Ebonyi State, Nigeria.
The specific objectives were to:

i. describe the socio-economic characteristics of rice farmers under the upland and wet land rice production systems,
ii. estimate and compare the inputs and output of the two production systems,
iii. determine and compare the profitability of rice production under the two production systems,
iv. determine the socioeconomic factors that influence the choice to invest in either wetland or upland production system.
v. identify the production constraints faced by farmers under the two rice production systems.

The following null hypothesis was tested.

Ho: socio-economic characteristics of rice farmers have no significant influence on their choice to invest in either upland or wetland rice production.

MATERIALS AND METHODS

Ebonyi State is one of the 36 states in Nigeria and is located in the southeastern part of Nigeria. The state which has a land area of about 5,935 square kilometers, is located between latitude 5° 40' to 6° 45' North and longitude 7° 30' to 8° 30' East. The state is bounded in the north by Benue state, in the south by Abia State, in the west by Enugu state and in the east by Cross-river state. The state has an estimated population of 4,339,136 (NPC 2006). Its capital and largest city is Abakaliki. The State has thirteen Local Government Areas (L.G.A.) which includes; Abakaliki, Ebonyi, Ikwo, Izzi, Onicha, Afikpo North, Ezza North, Ishielu, Ohaozara, Afikpo South, Ezza South, Ivo, and Ohaukwu. The people of Ebonyi State are of Igbo extraction and majority of them are farmers. The major crops grown in the area include rice, yam, cassava, sweet potato, maize and vegetables.

Both purposive and random sampling techniques were employed in the selection of 120 registered rice farmers with the ministry of Agriculture, Ebonyi State. Four L.G.A.s namely, Onicha, Ezza North, Ivo and Ohaozara, with high concentration of rice farmers, were purposively selected for the study. From each L.G.A, a total of 20 wetland and 10 upland rice farmers were randomly selected for the study. This gave a total of 30 rice farmers per L.G.A.

Primary information that was relevant to the study was collected from the rice farmers through the use of structured questionnaire that were administered to them. The instrument for data collection were validated and pre-tested before they were administered to the farmers. Oral interview, where necessary, was equally used to gather primary information. Secondary information was obtained from ministry of agriculture, agricultural agencies, publications and seminar papers.

Descriptive statistics and profitability ratios were used to analyze the objectives of the study. The probit regression model was used to determine the socioeconomic factors that influence the choice to invest in either wetland or upland rice production system. The model is implicitly stated as $Y= (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9)$ and explicitly expressed as;

$$Y= \beta o +\beta_1 X_1+ \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 +\beta_8 X_8 + \beta_9X_9 + e$$

Where:

Y = dichotomous dependent variable which can be expressed as Y = 0, choice to invest in wetland rice production and Y = 1, choice to invest in upland rice production
β_i = regression coefficients that explains the factors that influence the choice to invest in either production system
e = error terms

The independent variables represented by Xi are;

X_1 = gender (dummy where male = 1, female = 0)

X_2 = marital status (dummy where married =1, single = 0)

X_3 = age of farmer (years)

X_4 = farming experience (years)

X_5 = years spent in school (years)

X_6 = household size (number of persons)

X_7 = farm size (ha)

X_8 = number of labour hired (number)

X_9 = initial cost of production (₦)

RESULTS AND DISCUSSION

Table 1: Percentage distribution of wetland and upland rice farmers according to their socioeconomic characteristics

	Wetland rice farmer (N = 80)			Upland rice farmer (N = 40)		
Parameter	Frequency	percentage	mean	Frequency	percentage	mean
Gender						
Male	58.0	72.50		25	62.50	
Female	22.0	27.50		15	37.50	
Age						
20 – 29	22	27.50		2	5.00	
30 – 39	28	35.00	36.60	8	20.00	43.80
40 – 49	22	27.50		22	55.00	
50 – 59	7	8.75		6	15.00	
≥ 60	1	1.25		2	5.00	
Marital Status						
Single	17	21.30		8	20.00	
Married	63	78.70		32	80.00	
Household size						
0 – 4	38	47.50		11	27.50	
5 – 9	41	51.25	5	28	70.00	6
≥ 10	1	1.25		1	2.50	
Level of Education						
Primary education	2	2.50		17	42.50	
Secondary education	33	41.25		15	37.50	
Tertiary education	45	56.25		8	20.00	
Years of Experience						
1 – 4	14	17.50		13	32.50	
5 – 8	39	48.75	7.4	8	20.00	7.7
9 – 12	18	22.50		9	22.50	
>13	9	11.25		10	25.00	
Farm size (ha)						
< 1	21	26.25		19	47.50	
1 – 2	48	60.00	1.7	15	37.50	1.6
3 – 4	6	7.50		4	10.00	
≥ 5	5	6.25		2	5.00	

From the findings in Table 1, majority of the wetland (72.50%) and upland (62.50%) rice farmers were males while the females constituted about 27.50% and 37.50% of the wetland and upland rice farmers respectively. This clearly shows that males dominate rice production in the area and this can be attributed to cultural and religious hindrances that prevent the females from active participation. The mean age of the wetland rice farmers in the area was 36.60 years while the upland farmers was 43.80 years, indicating that the rice farmers in Ebonyi state were still in their young and active stage. This finding corroborates the findings of Mudashir et al. (2025) and Ogunniyi et al. (2021), who noted that rice farming in Nigeria is dominated by middle-aged farmers with both energy and experience. About 78.70% of the wetland and 80.00% of the upland rice farmers were married. This finding were similar to that of Ojo et al. (2020), who stated that married farmers often have higher labour availability and social stability that support agricultural productivity.

The mean household size of the wetland rice farmers was 5 while that of the upland farmers was 6. Large household size provides cheap and readily available family labour. Most of the wetland farmers (56.25%) had tertiary education and a mean farming experience of 7.4 years while most of the upland farmers (42.50%) had primary education and a mean farming experience of 7.7 years. These findings clearly show that rice farmers in the area are literate and good education enhances farmer's rate of adoption of innovation. Equally, these findings agree with the earlier findings of Akinbode and Rahji (2020), who emphasized that long years of experience improve farmers' adaptation to production challenges and market conditions. Majority of the wetland farmers (60.00%) cultivated on 1 – 2 hectares of farm land while majority of the upland farmers (47.50%) cultivated on less than one hectare of farm land. This shows that rice farmers in the area operate on small scale. This finding confirms the earlier works of Nwosu et al. (2023), Adenegan and Adewuyi (2021), that majority of rice farmers in Nigeria operate on small scale level.

Table 2 shows the variable costs involved in wetland and upland rice production in Ebonyi state. The findings revealed that cost of harvesting rice constitute the highest variable cost in rice production in the area. For the wetland farmers, 15.50% of the variable cost involved in rice production, is the cost of harvesting rice while it is about 16.25% for the upland farmers. Cost of rice seeds is the second ranked variable cost in rice production after harvesting. Cost of rice seed account for 13.95% of the variable cost for the wetland farmers while it is about 14.63% for the upland farmers. After harvesting, planting of rice and transport of input, are the third ranked variable cost in rice production. This accounts for about 7.75% and 8.13% for the wetland and upland farmers respectively. Loading of the rice is the least variable cost of production for both the wetland and upland rice farmers. Variable cost constitutes about 92.90% and 92.60% of the total cost of rice production for wetland and upland farmers respectively. These results agree with the works of Mudashir et al.(2025) and Ogunniyi et al. (2021), who found that variable inputs dominate production expenditure in smallholder rice systems in Nigeria.

Table 2: Variable cost involved in rice production per hectare of land

	Wetland		Upland	
Farm Operation	Total cost (₦)	%	Total cost(₦)	%
Annual land rent	40,000	6.20	40,000	6.50
Land clearing	30,000	4.65	30,000	4.88
Land preparation	45,000	6.97	45,000	7.31
Cost of rice seed	90,000	13.95	90,000	14.63
Planting	50,000	7.75	50,000	8.13
Fertilizer	45,000	6.97	45,000	7.31
Herbicide	48,000	7.44	48,000	7.80
Insecticide	6,000	0.93	6,000	0.98
Fertilizer application	10,000	1.55	10,000	1.63
Herbicide application	18,000	2.79	18,000	2.93
Insecticide application	2,000	0.31	2,000	0.33
Water / application	30,000	4.65	-	-
Weeding	40,000	6.20	40,000	6.50
Bird scaring	20,000	3.10	20,000	3.25
Harvesting	100,000	15.50	100,000	16.25
Cost of bags	20,000	3.10	20,000	3.25
Loading	1,200	0 .18	1,200	0.19
Transport of inputs	50,000	7.75	50,000	8.13
Total Variable Cost	645,200	100.00	615,200	100 .00

Source: Field data 2026

Table 3 shows the total amount on depreciated fixed assets used in production. The finding revealed that water pumping machine account for the highest fixed cost asset for wetland farmers only. Packing sac is the highest fixed asset for the upland rice farmers and the second highest for the wetland rice farmers. The least depreciated fixed cost is cutlass. The total average fixed cost in rice production is ₦ 49,285.00 for wetland and ₦ 35,000.00 for upland farmers. Fixed cost accounted for about 7.10% and 5.40% of the total cost of rice production for wetland and upland farmers respectively, in the study area. Equally, Adenegan & Adewuyi (2021), Ojo et al. (2020) reported similar fixed cost pattern and noted that too much reliance on manual labour underscores the limited mechanization in smallholder rice farming systems.

Table 4 shows the average revenue from cultivating one hectare of rice for the wetland and upland rice farmers in the area. The yield per hectare for the wetland farmers was about 1000kg – 1200kg, while that of the upland farmers was 800kg – 1000kg. The average total revenue per hectare for wetland farmers, range from ₦ 900,000.00 – ₦ 1,080,000.00 while for upland farmers, the range was from ₦ 720,000.00 – ₦ 900,000.00.
Note that one major advantage of the wetland production system is that rice can be cultivated two times in a year unlike the upland production system that depends on rain and can only be cultivated only once in a year.

Table 3: Average Fixed Cost in rice production

Fixed Cost Item	Qty	Unit cost	Total Cost	Lifespan	Depreciated Cost
Sprayer	1	30,000	30,000	5	6,000
Cutlass	2	3,500	7,000	2	3,500
Hoe	2	4,500	9,000	2	4,500
Water Pumping machine (wetland)	1	100,000	100,000	7	14,285
Basin	3	5.000	15,000	3	5,000
Wheel barrow	2	30,000	60,000	10	6,000
Packing sac	5	4,000	20,000	2	10,000
Total Fixed Cost					49,285.00

Source: Field data 2026

Table 4: Average revenue of rice Production per hectare

	Wetland	Upland
Yield per hectare of rice paddy	1000kg – 1200kg	800kg – 1000kg
Cost of 100kg of paddy	₦ 90,000.00	₦ 90,000.00
Total revenue from 1 ha of paddy	₦900,000 - ₦ 1,080,000	₦ 720,000 – ₦ 900,000

Source: Field data 2026

Table 5: Summary of average costs and returns for rice production per hectare.

	Wetland (₦)	Upland (₦)
Total Revenue (TR)	990,000.00	810,000.00
Total Variable Cost (TVC)	645,200.00	615,200.00
Total Fixed Cost (TFC)	49,285.00	35,000.00
Total Costs (TC) = TFC + TVC	694,485.00	650,200.00
Gross Margin (GM) =TR – TVC	344,800.00	194,800.00
Net Farm Income (NFI) = GM –TFC	295,515.00	159,800.00
Profit Margin (%) = NFI/TR	0.30	0.19
Return/Naira (₦) = NFI/TC	0.43	0.24
Operating Expense Ratio (%) = TVC/TR	0.65	0.76
Benefit Cost Ratio (BCR) = TR/TC	1.43	1.24

Source: Field data 2026

The result on table 5 shows the summary of average costs and returns for rice production under the wetland and upland systems of production. From table 5, farmers for the wetland and upland production systems invested ₦694, 485.00 and ₦650,200.00 respectively for rice production per hectare. The gross margin (GM) for the wetland production system (₦ 344,800.00) was far higher than the upland production system (₦ 194,800.00). The reason for the disparity in gross margin may be because of the level of technology that was employed or the amount of input as well as labour deployed in the production as compared to the revenue generated. All the profitability measurement for the two production systems was quite appreciable.

The average net farm income (NFI) reveals that rice production under the two systems in the study area was appreciable. The profit margin (0.30) for wetland system and (0.19) for upland system, show that the production systems are able to convert 30% and 19% respectively of their generated revenues into profit. The rate of return per naira for the two production systems was 0.43 and 0.24 for wetland and upland systems respectively. This implies that rice producers under the wetland system and upland system make ₦ 0.43 and ₦ 0.24 respectively for every naira invested in rice production. The operating expense ratio for the wetland farmers was 0.65 and 0.76 for the upland farmers. This implies that variable cost consumed 65% and 76% of the generated revenue in the wetland and upland rice production systems respectively. The benefit cost ratio (BCR) for the wetland farmers was 1.43 and 1.24 for the upland farmers. This signifies that for every one naira committed into rice production, ₦ 1.43 and ₦ 1.24 were realized for the wetland and upland rice production systems respectively. Similar trend were reported by Mudashir et al. (2025), Nwosu et al. (2023) and Mogues and Ayoola, (2021). It is important to note that the estimates made in table 5 reflect only a single cycle of production. For an annual estimate, wetland rice farmers can cultivate twice per year. The total revenue per hectare per annum will double, bringing the annual estimate to ₦ 1,980,000.00, ceteris paribus.

Table 6 shows the results of the probit regression analysis of the socioeconomic factors that influence the choice to invest in either wetland or upland production system. The result of the individual socioeconomic attributes indicated that, farming experience and years spent in school, have positive influence on the choice to invest in either of the two rice production systems and were statistically significant at 1% ($P< 0.01$) level. This implies that farming experience and years spent in school have great influence on the choice of rice production system to embark on. This finding is in agreement with Okunola et al. (2020), who found that experience positively affects productivity among crop producers. According to Ogunniyi et al. (2021), educated farmers are more efficient in resource use. The coefficient of age, farm size, and the initial cost of production were positive and significant at 5% ($P< 0.05$). This implies that age, farm size and initial cost of production equally have influence on the choice of rice production system to embark on. In their view, Bose et al. (2020), opined that younger farmers are more likely to adopt new innovations while Akinbode and Rahji (2020), FAO (2022) were of the view that larger farm size increase farm income and enhance food security.

Table 7: Constraints faced by rice farmers under the two production systems

Item	SA(4)	A(3)	D(2)	SD(1)	TOTAL	MEAN
High incidence of pests / diseases	260	90	30	10	390	3.25
	(54.17)	(25.00)	(12.50)	(8.33)	(100.00)	
Inadequate rainfall	140	48	78	30	296	2.47
	(29.17)	(13.33)	(32.50)	(25.00)	(100.00)	
Lack of farm input	180	120	50	10	360	3.00
	(37.50)	(33.33)	(20.83)	(8.33)	(100.00)	
Inadequate storage facilities	220	120	30	10	380	3.16
	(45.83)	(33.33)	(12.50)	(8.33)	(100.00)	
Low price for rice	140	135	50	15	340	2.83
	(29.17)	(37.50)	(20.83)	(12.50)	(100.00)	
Theft	80	45	140	15	280	2.30
	(16.67)	(12.50)	(58.33)	(12.50)	(100.00)	
Lack of improved varieties	140	90	60	25	315	2.65
	(29.17)	(25.00)	(25.00)	(20.83)	(100.00)	
Inadequate credit facilities	300	75	30	5	410	3.41
	(62.50)	(20.83)	(12.50)	(4.17)	(100.00)	

Source: Field data 2026

Table 7 shows the mean scores of the constraints faced by rice farmers under the wetland and upland production systems. The finding revealed that inadequate credit facilities (3.41) constituted the major constraints faced by rice farmers in the area. About 62.50% and 20.83% of the farmers strongly agree and agree, that inadequate credit facilities, was their most problem. The next major constraint faced by the farmers was high incidence of pests and diseases (3.25). About 54.17% and 25.00% of the rice farmers, strongly agree and agree respectively, that high incidence of pests and diseases was their problem in the area. Theft (2.30) was the least recorded constraint faced by rice farmers in the area. These findings support the works of Mudashir et.al. (2025), Ogunniyi et al. (2021), FAO (2022) that escalating input costs limit production efficiency among smallholder farmers.

Limitations of the study

This study like most academic research had some limitations. The study was conducted in only four out of the thirteen Local Government Areas, (LGA), which make up Ebonyi state. It is possible that variations may arise as a result of factors peculiar to the other LGAs not covered. Only one production cycle was considered and the profitability compared, considered only one production cycle for the wetland farmers. Secondly, the study was based on information provided by the farmers/respondents. Some of this information was given based on their ability to recall past events/data. The authenticity of some of them cannot be verified as they were not documented.

CONCLUSION AND RECOMMENDATIONS

The findings of this study indicated that males dominated rice production in the study area with majority of the farmers in their active and youthful age. The level of education of the farmers has greatly increased as there are more educated farmers than non-educated farmers. Cost of rice seeds and harvesting of rice are the two major variable cost items suggesting that efforts should be put in place for researchers to produce improved and cheaper rice seeds as well as affordable and improved method of harvesting rice. The profitability ratios calculated indicated that rice production was profitable in the area. The problems of pests and diseases as well as inadequate storage facilities should be handled holistically as these are major threats to rice production. It was recommended that adequate and accessible credit facilities be made available by the government and financial institutions to encourage more farmers to enter the business. More research into the pests and diseases of rice should be facilitated by research institutes and universities, as these problems reduce the yield of rice and the income of the rice farmers.

Conflict of interest

The authors declare no conflict of interest.

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