ARAŞTIRMA MAKALESİ   **RESEARCH ARTICLE**

Artisanal fish farmers' welfare in Nigeria: Drivers and challenges

Nijerya'da geleneksel balıkçılık yapan çiftçilerin refah düzeyleri: Etkili faktörler ve sorunlar

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Ö Z E T / A B S T R A C T

Aims: Despite the contribution of artisanal fishery to the fishery sector, there is a dearth of information on the welfare of artisanal fish farmers. Therefore, this study investigated the welfare of artisanal fish farmers in Nigeria.
Methods and Results: The study used primary data collected from 330 artisanal fish farmers, which were analysed with descriptive statistics, Foster-Greer-Thorbecke index and multiple regression. The results indicated that the artisanal fish farmers had poor access to credit facilities, standard medical facilities, quality and nutritious food, quality education for their children, shelter, drinkable water and environmental security. While the highest share (52.42%) of farmers' expenditures was allocated to food expenditures, only 15.02% was allocated to basic non-food items such as children's education, shelter, clothing and health. Analysis of the relative poverty indices of the farmers showed that the poverty incidence, depth and severity were 0.633, 0.165 and 0.062, respectively. Their welfare was significantly influenced by gender, age, income from artisanal fish farming, income from other sources, access to credit, household size, farming experience and assets. The major constraints to the welfare of the farmers were inadequate credit facilities and a lack of government support.
Conclusions: The artisanal fishing households had a low standard of living, poor welfare and high poverty incidence. This study, therefore, advocates institutional support by relevant agencies to improve the welfare of this group of farmers. This could be in form of the provision of modern fishing equipment, adequate and necessary information, modern health care centres, free standard schools and loans at little or no interest rate.
Significance and Impact of the Study: This study contributes to the body of knowledge by using the expenditure approach to measure artisanal fishing households' welfare and the results will serve as a reference point for policymakers to improve the artisanal fish farmers' and rural households' welfare.

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INTRODUCTION

The fisheries sector is a means of growing the economy, creating jobs, enhancing food security and reducing poverty (Asiedu et al., 2017; Garlock et al., 2020). In sub-Saharan Africa, it plays a major role in the livelihoods and food and nutrition security of people (Aheto et al., 2019). Fisheries accounted for about 20% of the global animal protein production and provide protein to one-fifth of the global population (FAO 2016; Folorunso et al., 2021; Kent 2019). Apart from improving food and nutrition security, fish also prevents diseases (mental illness, stroke and cardiovascular), generates income and serves as a means of livelihood for millions of households in developing countries (Thompson and Amoroso, 2014; Bene et al., 2015; FAO, 2018).

The Nigerian fisheries are grouped into three: artisanal, industrial, and aquaculture (Aminu et al., 2017). Artisanal fishing is an ancient human tradition that involves the activity of trying to catch fish and other aquatic foods for human consumption and economic benefits. The techniques that are used in this system of fishing include trapping, angling, netting, spearing, and hand gathering. The activities of this artisanal fish farming, either seasonally, full-time or part-time, are frequently aimed at providing both domestic and international markets with fish and aquatic foods (Iruo et al., 2019).

Artisanal fishing is an age-long livelihood in many countries with water and other fishery resources. It contributes immensely to such economies by providing them with high animal food protein sources and employment. Nigeria is not excluded from this livelihood as it is blessed with marine water, brackish water, and inland water fishing resources. The country is endowed with a coastline of 853 km^2, inland waters of 125,470.82 km^2, and a maritime area of 46,300 km^2 which can accommodate more than six billion artisanal fish farmers and can produce more than 980,000 metric tonnes of fish per year (Mabel et al., 2018; Oladimeji, 2018). The coastline spans from the Republic of Benin's western border to the Republic of Cameroon's eastern border, with an abundance of marine, brackish, and inland water resources.

Despite the artisanal fishery's contribution to the economy of Nigeria, the country still finds it difficult to be self-sufficient in fish production. The country is the largest African importer of fish and the fourth-largest global importer of fish (Oparinde, 2021). Reports show that Nigeria produces 1,212,470 metric tonnes and imports 611,600 metric tonnes of fish and seafood annually (FAOSTAT, 2021). This implies that 33.5% of the demand for fish and seafood in the country is met through imports. This is not unconnected with the nature of artisanal fish farming in the country. According to Kareem et al. (2012), the Nigerian artisanal fishery is largely made up of small-scale farmers with a traditional, labour-intensive and low capital base. This calls for an improvement in the welfare of this group of farmers.

However, formulating relevant policies that will improve the standard of living of artisanal fishing farm households requires a good knowledge of their current welfare status as well as the challenges encountered in the venture. While many studies concentrate on the economics of culture fish production (Kareem et al., 2012; Yuan et al., 2017; Oladimeji, 2018; Mabel et al., 2018; Iruo et al., 2019; Andegbe et al., 2021; Bergamo et al., 2021; Long, 2021; Martinez-Cordero and Sanchez-Zazueta, 2021; Falola et al., 2022a), there is little or no empirical emphasis on the welfare of the artisanal fish farmers.

For this, this study examined the welfare status of artisanal fish farmers in Nigeria. Specifically, the study described artisanal fish farmers' perception of welfare matters, determines the poverty status of artisanal fish farmers, investigated the determinants of artisanal fish farmers' welfare, and identified the constraints faced by artisanal fish farmers. The outcome of this study will inform policy-makers on measures that can be put in place to improve the welfare of artisanal fish farming households.

MATERIALS and METHODS

Study area

The research was carried out in Kwara State, Nigeria located between latitude 8^{0}30' and 8^{0}50'N and longitude 4^{0}20' E and 4^{0}35' E. Kwara state has 16 Local Government Areas (LGAs), out of which four (Moro, Asa, Edu and Patigi LGAs) are renowned for artisanal fish farming. The preponderance of artisanal fishers in the LGAs is due to the numerous tentacles of water, streams and flood plains of the River Niger that stretches from Bacita/Jebba in Moro LGA to Gakpon in Patigi LGA of the state. Traditional fishing methods such as the use of traps, hook and line sets, long lines, cast nets, gill nets, and canoes either with paddlers or motorized are common means of fishing among the people. A few of them also used trawlers and outboard engine boats. The major fish species found in Kwara state are *tilapia melanopleura* (Tilapia), *Gymnachus niloticus* (African knifefish), *Synodentis filamentosa* (longfin synodonti), *hemichromis fasciatus* (banded jewelfish) and *clarias anguillaris* (mudfish). Artisanal fish farming significantly

contributes to the socio-economic livelihood of the people in those LGAs due to the economic influx of people from other parts of the state and beyond to buy fish and other aquatic products.

Sampling techniques and data collection

This study used a two-stage sampling technique. Four LGAs renowned for artisanal fish farming in the state were purposively selected, in the first stage. This was followed by a proportionate selection of respondents across the four LGAs. The Cochran formula (Cochran, 1963) was employed to determine the ideal sample size. The finite population correction factor was applied to derive a significant proportion of the artisanal fishers for the study. It is given by

$$n = \frac{n_0}{1+(\frac{n_0-1}{N})} \qquad (1)$$

Where n is the representative sample size and N is the population size.

$$n_0 = \frac{Z^2 pq}{e^2} \qquad (2)$$

Where Z is the critical value of the normal distribution, p is the sample proportion and e is the level of precision. Preliminary investigations revealed that there were 2751 registered artisanal fish farming households in the study area. Meanwhile, a confidence interval of 95% and ±5% precision were desired for this study. This gave a minimum sample size of 318 respondents for the study. This was followed by a proportionate random selection of 18% of the artisanal fishers in the LGAs. This gave a total of 330 respondents that were used for the study.

Primary data were collected from the artisanal fish farmers using a semi-structured questionnaire. The data covered information such as their socio-economic characteristics, welfare matters, household consumption expenditures, and constraints to artisanal fish farming.

Data analysis

The data were analysed with descriptive statistics, Foster-Greer-Thorbecke's (FGT) measure of poverty and multiple regression. Descriptive statistics were used to describe the socio-economic characteristics of the artisanal fish farmers, describe their perception of welfare matters and identify the constraints faced by the respondents. The FGT measure of poverty was used to determine their poverty status. The approach has the advantage of making use of aggregate poverty indices,

namely, incidence, depth and severity to assess the welfare of a group of individuals (Falola et al., 2016). Besides, it defines a household as being poor relative to others in the same venture or economy.

Foster-Greer-Thorbecke index: The use of the FGT measure requires the definition of a poverty line and this was calculated based on aggregated data on the household expenditure of the respondents. The choice of expenditure as the basis for estimating the poverty line and the welfare of the respondents was premised on four reasons. First, measuring a household's income in many developing nations is hard because its larger part is from self-employment (Ahmed and Mefsin, 2017). Second, expenditure data contains detailed information as consumption decisions are linked to other household decisions like health and nutrition (Meyer and Sullivan, 2003). Third, income changes throughout a person's life, whereas consumption expenditure is less irregular and easier to estimate (Haughton and Khandker, 2009). Furthermore, when compared to consumption expenditures, respondents are likely to understate their household income (Getahun and Villanger, 2015).

As employed by previous studies (Falola et al., 2016; Mukaila et al., 2022), the FGT measure of poverty is expressed as:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{z-y_i}{z}\right)^\alpha, \alpha \geq 0 \qquad (3)$$

Where:

n = the total number of households;

q = the number of households below the poverty line;

y_i = the per capita consumption expenditure of household i;

α i = the poverty aversion parameter

When α = 0, P_α = the poverty headcount ratio (incidence);

When α = 1, P_α = the normalized poverty gap (depth);

When α = 2, P_α = poverty severity;

z = the poverty line

z - y_i = poverty gap of the ith household

$$\frac{z - y_i}{z} = \text{poverty gap ratio}$$

The poverty line is a well-defined and predetermined standard value of consumption expenditure. Household monthly expenditure was used in this study as a base for the poverty line. The per capita household expenditure of the respondents was estimated as follows adopting the World Bank (1996):

Per capita household expenditure =

$$\frac{\text{Total household expenditure}}{\text{Household size}} \quad\text{...(4)}$$

The mean per capita expenditure was computed as:

Mean per capita expenditure =

$$\frac{\text{Total per capita household expenditure}}{\text{Total number of households}} \quad\text{..............................(5)}$$

Two-thirds of the mean per capita expenditure (MPCE) was used as the poverty line while one-third was used as a baseline for extreme or core poverty. Thus, the respondents were grouped into three categories based on their levels of poverty: the extremely poor (those whose consumption expenditure was less than one-third of the MPCE), the moderately poor (those whose consumption expenditure lies between one-third and two-thirds of the poverty line), and the non-poor (those whose consumption expenditure was above two-third of the poverty line).

Multiple regression: The multiple regression analysis was employed to examine the factors influencing the welfare of the respondents. The Cobb-Douglas functional form was used such that the original variables were transformed into logarithms so that the coefficients approximate the elasticity concept. It is expressed implicitly as follows:

$$LY_i = \beta_0 + \beta_1 LX_1 + \beta_2 LX_2 + \beta_3 LX_3 + \beta_4 LX_4 + \beta_5 LX_5 + \beta_6 LX_6 + \beta_7 LX_7 + \beta_8 LX_8 + \beta_9 LX_9 + \beta_{10} LX_{10} + \mu_i \text{.. (6)}$$

Where:

The dependent variable, Y_i, is the per capita expenditure of ith household (a proxy for household welfare).

The independent variables were a set of socio-economic factors:

X_1 = Gender (dichotomous)
X_2 = Age (years)
X_3 = Educational status
X_4 = Distance to the fishing site (km)
X_5 = Income from artisanal fish farming (Naira)
X_6 = Income from other sources (Naira)
X_7 = Access to credit (amount in Naira)
X_8 = Household size (number)
X_9 = Farming experience (years)
X_{10} = Assets (Fishing equipment and non-farm assets in Naira)
β_0 = Constant
$\beta_1 - \beta_{10}$ = Coefficients
ui = error term

RESULTS and DISCUSSION

Socioeconomic characteristics of artisanal fish farmers

Table 1 presents the socio-economic profile of the respondents. The majority of the artisanal fish farmers were male while the female constituted only 16.1%. Thus, artisanal fish farming is a male-dominated venture, which could be a result of energy requirements in paddling a canoe and throwing the net and other fishing gears. The majority were below forty years of age. The modal age group was 31 to 40 years and constituted 28.2% of the fish farmers. Further analysis revealed that the mean age of the fish farmers was 38.09 years. This indicates that most of the artisanal fish farmers were still in their productive and economically active age. A larger proportion of the artisanal fish farmers were married. They had a mean household size of about five persons. About 71% of the farmers had formal education, though at a low level. This indicates a literacy level among the farmers which could influence their decision-making process, positively (Mukaila *et al.*, 2021). Furthermore, the more an individual is educated, the higher the probability of having a high income to boost food consumption (Olawuyi, 2019). Fifty per cent of them attained secondary education while 26.4% attained only primary education. However, only 4.5% of the farmers had tertiary education. This may result from the preference of graduates for white-collar jobs (Falola et al., 2016).

Table 1 further shows that 57.4% had been in artisanal fish farming for more than 10 years. Further analysis showed that the mean artisanal fishing experience was 14.1 years. This indicates that artisanal fish farming is an age-long activity in the study area. However, only 27.3% of the artisanal fish farmers were members of cooperatives while 72.7 % were not. The main source of finance available to the respondents was personal savings. The majority of those who had access to credit got it from the informal source of finance like cooperative society and friends and family. Only 2.4% of the respondents got their funding from banks. This may be due to the dearth of banks in rural areas. It may also be due to the high-interest rates charged by banks, which may be beyond what the farmers can cope with. The implication of this is that the farmers would have limited funds to undertake their activities. The majority (67.6%) of the artisanal fish farmers live in a mud house with their families, 28.5% live in a concrete house and 3.9% live in a thatched house. These show a low level of welfare among the artisanal fish farmers' households. Regarding the major source of energy for artisanal fish farmers' household consumption, the majority used

wood (72.4%) as the source of energy for cooking in their households. This is followed by the use of kerosene (18.8%), used in the cooking stove, lanterns and lightening the firewood, in the household. Only a few used electricity (5.5%) and cooking gas (3.3%) as a means of energy source for household consumption. These further suggest a low or poor welfare status of artisanal fish farmers and their households. The use of wood which is common among them is not an environmentally friendly source of energy as it contributes significantly to the greenhouse effect.

Table 1. Socio-economic characteristics of the artisanal fish farmers

Variable	Category	Frequency	Percentage	Mean
Gender	Male	277	83.9	
	Female	53	16.1	
Age	≤ 20	45	13.6	38.09
	21-30	78	23.6	
	31-40	93	28.2	
	41-50	63	19.1	
	51-60	30	9.1	
	> 60	21	6.4	
Marital status	Married	229	69.4	
	Single	81	24.5	
	Divorced	12	3.6	
	Widowed	8	2.4	
Educational level	No formal	63	19.1	
	Primary	87	26.4	
	Secondary	165	50.0	
	Tertiary	15	4.5	
Household size	1 − 5	225	68.2	4.59
	6 − 10	105	31.8	
Farming experience	≤ 5	57	17.3	14.1
	6-10	84	25.5	
	11-15	60	18.2	
	16-20	57	17.3	
	21-25	15	4.5	
	> 25	57	17.3	
Membership of cooperatives	Member	90	27.3	
	Non-member	240	72.7	
Access to credit	Yes	105	31.8	
	No	225	68.2	
Source of finance	Personal savings	245	74.2	
	Friends and family	41	12.4	
	Cooperatives	36	10.9	
	Banks	8	2.4	
Type of shelter	Mud	223	67.6	
	Concrete	94	28.5	
	Thatched	13	3.9	
Major sources of energy for household consumption	Electricity	18	5.5	
	Kerosene	62	18.8	
	Wood	239	72.4	
	Gas	11	3.3	

Source: Authors' computation from field survey, 2021.

The fishers' perception of welfare matter

Table 2 presents the perception of artisanal fish farmers on some welfare matters. Only 8.5% and 6.1% strongly agreed and agreed that they can borrow credit anytime they need cash, respectively. A larger proportion strongly disagrees with this, suggesting a low level of availability of credit to the artisanal fish farmers which could lower their welfare. About 16% strongly agreed that finding adequate, quality and nutritious food to eat is not a problem for them and their households. About 17% agreed with this, while the majority (55.5%) strongly disagreed that finding adequate, quality and nutritious food to eat is not a problem for them and their households. This suggests the inability of most of the artisanal fish farmers to provide quality and nutritious food for themselves and their households, portraying low welfare among them. Only 6.1% of the artisanal fish farmers agreed that they have access to standard medical facilities. A larger proportion (42.1%) strongly disagreed with having access to standard medical facilities and 39.4% disagreed that they have access to standard medical facilities. This portrays a poor medical facility at their disposal and poor welfare status. Only 4.8% of the respondents strongly agreed that they can afford quality education for their children, 8.5% agreed with this, while the majority strongly disagreed that they can afford quality education for their children.

Regarding payment of house rent comfortably, only 10.3% and 12.7% strongly agreed and agreed that they can comfortably pay for their house rent, respectively. While 32.1% strongly disagreed and 19.4% disagreed that they can pay for their household rent comfortably. This further portrays a low standard of living and poor welfare among a larger proportion of the artisanal fish farmers. About 19% strongly agreed that they have access to drinkable water, 16.7% agreed to this; while 32.7% and 27.9% disagreed and strongly disagreed that they have access to drinkable water, respectively. This suggests a low level of access to drinkable water among the artisanal fish farmers and their households. Access to stable electricity supply was low among the artisanal fishing households as only 0.9% and 12.1% strongly agreed and agreed to have access to stable electricity, respectively. The majority strongly disagreed (46.1%) and disagreed (20.3%) that they have access to a stable electricity supply. About 10% of artisanal fish farmers strongly agreed that they can interact with others and move within the community without any security threat; 17.9% agreed to this. About 21% strongly disagreed that they can interact with others and move in their community without any security threat, and 21.5% disagreed with this. This suggests some level of insecurity in their community which could be due to herdsmen attacks and other conflicts. This further portrays low welfare among the artisanal fish farmers and their households.

Table 2. Perception of respondents on welfare issues

Welfare matters	SA Freq (%)	A Freq (%)	I Freq (%)	D Freq (%)	SD Freq (%)
I can borrow credit anytime I need cash	28 (8.5)	20 (6.1)	42 (12.7)	94 (28.5)	146 (44.2)
Finding adequate quality and nutritious food to eat is not a problem for me and my household	52 (15.8)	55 (16.7)	8 (2.4)	32 (9.7)	183 (55.5)
I have access to standard medical facilities	0 (0.0)	20 (6.1)	41 (12.4)	130 (39.4)	139 (42.1)
I can afford quality education for my children	16 (4.8)	28 (8.5)	45 (13.8)	98 (29.7)	143 (43.3)
I can comfortably pay for house rent	34 (10.3)	42 (12.7)	84 (25.5)	64 (19.4)	106 (32.1)
I have access to drinkable water	63 (19.1)	55 (16.7)	12 (3.6)	108 (32.7)	92 (27.9)
I have access to stable electricity	3 (0.9)	40 (12.1)	68 (20.6)	67 (20.3)	152 (46.1)
I can interact with others and move in my community without any security threat	32 (9.7)	59 (17.9)	100 (30.3)	71 (21.5)	68 (20.6)

SA = Strongly disagree, A = Agree, I = Indifference, D = Disagree, SD = Strongly disagree
Source: Authors' computation from field survey, 2021.

Consumption expenditure of the respondents

Table 3 provides a breakdown of the consumption expenditure of the artisanal fish farmers. The highest proportion of the farmer's expenditure (52.42%) was spent on food. A similar finding was reported by Travassos et al. (2021) that food expenditure accounted for a high share of households' monthly expenditure in Brazil. This was followed by investment (14.47%). Further investigations on the artisanal fish farmers revealed that the items invested in usually include spears, traps, hooks and lines, boats, fishing rods and tackle, fishing arrows and harpoons, cast nets and kiln.

Only 9.27% of the consumption expenditure of the farmers was on savings, portraying a low level of saving. This could result from their poor access to funds (credit facilities) from financial institutions like banks (See Table 1) to invest in modern fishing methods. The farmers still have to save from their income to fund their fishing business. Transportation costs incurred in the venture had a share of 8.82% of the total consumption expenditure of artisanal fish farmers.

It is worthy of note that a relatively small proportion (15.02%) of the farmers' consumption expenditure went into basic non-food items such as education for children, health and medicine, clothing and housing. This portrays a poor standard of living among the farmers. This finding serves as empirical support to the opinions of previous authors who emphasize the need for rural development in the Nigerian artisanal fish farming sector (Chilaka *et al.*, 2014; Oladimeji, 2018).

Table 3. Consumption expenditure of the respondents

Expenditure category	Consumption expenditure (Naira)	Consumption expenditure (USD)	Percentage of consumption
Food expenses	36,657.92	96.22	52.42
Clothing	3,390.13	8.90	4.85
Savings	6,481.81	17.01	9.27
Investment	10,119.48	26.56	14.47
Education	1,900.00	4.99	2.72
Health	1,589.09	4.17	2.27
Transport	6,170.37	16.20	8.82
Housing	3,623.38	9.51	5.18
Total	69,932.18	183.55	100

Source: Authors' computation from field survey, 2021.

Poverty status of the artisanal fish farmers

Table 4 shows the analysis of the poverty line with respect to the expenditure of artisanal fishing households. The MPCHE was employed to determine this. Based on this, the artisanal fish farmers were considered poor if their household per capita consumption expenditure was less than ₦10,157.18 (2/3 of MPCHE) and considered non-poor if the household

per capita consumption expenditure was more or equal to ₦10,157.18 (USD 26.66). Also, if the household per capital expenditure was less than ₦5,078.59 (USD 13.33), the household was considered core or extremely poor. This, therefore, resulted in Part B of Table 4, which shows the distribution of the farmers by their poverty status.

Table 4. Household expenditure, poverty status and indices of the artisanal fish farming households

Part A: Monthly food and non-food expenditure profile of the artisanal fish farming households		
Variables	Value (Naira)	Value (USD)
Food expenditure	36,657.92	96.22
Non-food expenditure	33,274.26	87.33
Total monthly expenditure	69,932.18	183.55
Mean per capita household expenditure (MPCHE)	15,235.77	39.99
Poverty line (2/3 of MPCHE)	10,157.18	26.66
Poverty line (1/3 of MPCHE)	5,078.59	13.33

Part B: Poverty status of the artisanal fish farming household		
	Frequency	Percentage
Non-poor	121	36.67
Moderately poor	138	41.82
Core poor	71	21.51

Table 4 (continued). Household expenditure, poverty status and indices of the artisanal fish farming households

Part C: Poverty indices of the artisanal fish farming households
Incidence (P_0) = 0.633
Depth (P_1) = 0.165
Severity (P_2) = 0.062

Source: Authors' computation from field survey, 2021.

Table 4 (Part B) shows that 36.67% of the artisanal fish farmers were non-poor, 41.82% were moderately poor and 21.51% were core or extremely poor. This shows that the majority of the artisanal fish farming households were poor. This further implies that the majority had a low standard of living and welfare status. Aminu et al. (2022) also reported a high poverty level among rural farmers.

Table 4 (Part C) shows the poverty indices of the respondents. The poverty incidence was 0.633, indicating that 63.3% of fish farmers were poor. The poverty depth of the artisanal fish farmers was 0.165. This implies that for the fish farming households to be non-poor and come out of poverty, there is a need to increase their per capita household expenditure by 16.5%. The poverty severity measures the distance between each poor person to the others. Among the artisanal fish farmers, the distance was 0.062. This implies that there is room for more equality in the welfare of the artisanal fisherfolk in the study area.

Factors influencing the welfare status of the artisanal fish farmers

Table 5 shows the factors that influence the welfare status of artisanal fish farmers. The R^2 value is 0.6539 which indicates that 65.39% of the observed variations in the welfare status of the farmers were accounted for by the explanatory variables. The table shows that the significant variables that influence the welfare status of the farmers were gender, age, income from artisanal fish farming, income from other sources, access to credit, household size, farming experience and assets.

The gender of the farmers had a positive influence on their welfare at a 1% level of significance towards the male. This means that male artisanal fish farmers had better welfare than their female counterparts, which could be due to the required energy possessed by the male counterpart to effectively catch fish and other aquatic products.

Age had a negative influence on the welfare of the artisanal fish farmers (P < 0.1). This implies that the higher the age, the lower the welfare of the artisanal fish farmers. This means that younger fish farmers have a better welfare status compared to old fishers. All things being equal, young individuals are usually more active.

Thus, they may be more energetic to undertake the venture and/or other income-generating activities more actively than their older counterparts. As such, they may have the ability to spend more on consumption expenditure than their older counterparts. This was against the findings of Akaakohol and Aye (2014) that age positively influenced farm household welfare.

Income from artisanal fish farming had a positive significant effect on the welfare status of the artisanal farmers (P < 0.05). This implies that an increased income from artisanal fishing results in a better standard of living for the artisanal fish farmers. Ukoha et al., (2007) reported a similar result that income enhanced farmers' welfare. In the same vein, income from other sources positively influenced artisanal fish farmers' welfare. Therefore, the higher the income from other businesses, the better the welfare of the households. Thus, those that earned higher income from other businesses had better welfare than their counterpart, *ceteris paribus*. This supports Amfo et al. (2022) that income diversification improves peoples' welfare.

Access to credit had a positive influence on artisanal fish farmers' welfare status (P < 0.05). This suggests that the higher the accessibility and amount borrowed, the higher the welfare status of artisanal fish farmers. Thus, farmers who were able to get external funding have a better standard of living than their counterparts who have no access to credit. This could be because external funding serves as a means of increasing farmers' investment and adoption of technology (Akanbi et al., 2022; Falola et al., 2022b). This supports the findings of Amfo et al. (2022) that access to credit access enhances welfare.

The household size of the farmers is negatively related to their welfare status (P < 0.01). This is logical, as a farmer with a large household size will have to strive towards meeting the needs of the household members with the resources available at his disposal, which are likely to be limited. This may reduce the per capita expenditure of the household. An increase in household size will thus result in a decrease in the welfare status of such farmers. This was in tandem with the findings of Ademiluyi (2014) and Akaakohol and Aye (2014).

The farming experience had a positive effect on the welfare of the farmers (P < 0.01). This means the longer

the respondents are in the artisanal fish farming business, the more the welfare is likely to be. Artisanal fish farmers with much more experience are much more likely to have the relevant skills in the fishing business, resulting in more consumption expenditure and a better standard of living.

Assets positively influence artisanal fish farmers' welfare status (P < 0.1). This implies that artisanal fish farmers who have assets such as fishing equipment (canoe, traps, hook and line sets, long lines, cast nets, gill nets, trawlers and outboard engine boats) and other forms of the asset had better welfare than their counterparts who have no or little assets. Thus, the higher the assets, the better their standard of living and welfare, *ceteris paribus*. This could be because the use of fishing equipment enhances their output and consequently their income and consumption expenditure.

Table 5. Factors affecting the welfare status of the respondents

Variable	Co-efficient	Standard Error	t-value	p-value
Gender	0.337582***	0.107318	3.15	0.002
Age	-0.047960*	0.025312	-1.89	0.061
Education Qualification	-0.056960	0.063776	-0.89	0.374
Distance to fishing Site	0.050780	0.035581	1.42	0.159
Income from artisanal farming	0.097274**	0.044969	2.16	0.033
Income from other sources	0.765227***	0.176498	4.34	0.000
Access to credit	0.072734**	0.034147	2.13	0.044
Household size	-0.082830***	0.012178	-6.80	0.000
Fishing Experience	0.012775***	0.004273	2.99	0.004
Assets	0.043139*	0.021043	2.05	0.052
Constant	0.814480	0.044900	1.81	0.073

R^2= 0.6539   Adjusted R^2= 0.6154   F value= 13.35
Authors' computation from field survey, 2021; ***$p≤0.01$, **$p≤0.05$, *$p≤0.1$.

Constraints to artisanal fish farming

Table 6 shows the challenges faced by artisanal fish farmers. The most paramount constraints to the welfare of the artisanal fish farmers were inadequate credit facilities and a lack of government support. The artisanal fish farmers were unable to access the loan, especially from the commercial bank, to purchase modern fishing tools due to a lack of collateral coupled with high-interest rate charges and repayment terms. This supports the opinion of Aloo et al. (2017) that most of the constraints faced by the artisanal fish farmers are much about poor access to credit and government support. The lack of modern storage facilities was also a major constraint and ranked third among the constraints. The poor storage facilities result in spoilage of fish in case they were unable to sell. This further forced the fishermen to sell at a cheaper price to avoid further spoilage. This reduces the income derived from the venture and consequently lowers artisanal fish farmers' welfare.

The high cost of fishing gear was a severe constraint and ranked fourth among the challenges faced in artisanal fish farming. The artisanal fishermen complain about the inability to buy modern fishing equipment due to the high price. This, however, will have a negative impact on artisanal fish farmers' welfare. Lack of access to market information and poor pricing or price fluctuation were also severe constraints to artisanal fish farming as the respondents complained about a poor marketing system. Poor catch due to crude fishing gears was also a severe constraint to artisanal fish farming. These affected their welfare status, negatively, as it lowers their earnings from the venture.

Other major challenges faced by the majority of the artisanal fish farmers as being very serious were lack of extension programmes, lack of health facilities and inadequate processing equipment. These constraints also affected artisanal fish farmers' standard of living and welfare status.

Table 6. Severe constraints faced in artisanal fish farming

Challenges	VS	MS	LS	NS	Mean	Rank
Inadequate credit facilities	330(100.0)	0(0)	0(0)	0(0)	4.00	1st
Lack of government support	330(100.0)	0(0)	0(0)	0(0)	4.00	1st
Lack of modern storage facilities	318(96.4)	12(3.6)	0(0)	0(0)	3.96	3rd
High cost of fishing gears	315(95.5)	6(1.8)	9(2.7)	0(0)	3.93	4th
Lack of access to market information	300(90.9)	30(9.1)	0(0)	0(0)	3.91	5th
Price fluctuation	261(79.1)	21(6.4)	48(14.5)	0(0)	3.65	6th
Poor catch	210(63.6)	90(27.3)	30(9.1)	0(0)	3.55	7th
Lack of extension programmes	201(60.9)	75(22.7)	39(11.8)	15(4.5)	3.40	8th
Lack of health facilities	120(36.4)	210(63.6)	0(0)	0(0)	3.36	9th
Inadequate processing equipment	105(31.8)	159(48.2)	66(20.0)	0(0)	3.12	10th

Key: VS – Very serious; MS – Moderately serious; LS – Less serious; NS – A problem but not serious
Note: x (y): Frequency (percentage)
Source: Authors' computation from field survey, 2021.

This study shows that artisanal fish farmers are mostly made up of males and married individuals who are still in their productive age. However, most of the farmers are not members of cooperatives and fund their business through personal savings. The artisanal fishers had poor access to credit facilities, standard medical facilities, adequate, quality and nutritious food, quality education for their children, shelter, drinkable water and environmental security. This suggests a low standard of living and welfare status among the artisanal fish farmers and their households. A high proportion of the consumption expenditure of the farmers was on food while a small proportion of the farmers' consumption expenditure went into basic non-food items such as education for children, health and medicine, clothing and housing. This portrays a low standard of living among the farmers. This is further established by the relatively high poverty status of the farmers, which showed that more than half of them were poor. This study further revealed that the factors that influence the welfare status of the farmers were gender, age, income from artisanal fish farming, income from other sources, access to credit, household size, assets and farming experience. Moreover, this study shows that most of the challenges faced in artisanal fishing were more of resource and institutional constraints.

This study advocates that relevant agency should support this group of farming households. In this vein, agricultural agencies could assist the farmers by providing them with modern storage facilities and fishing equipment such as motorised canoes, outboard engine boats, fishing nets and trawlers at subsidized rates. This will reduce the expenditure of the farmers on investing in fishing equipment, enhance more catching of fish and better their welfare. The Ministry of Agriculture and other agricultural agencies should also

provide the farmers with necessary information. This could be through their extension services and programmes. The provision of modern health care centres in rural areas is of great importance as the farmers had poor access to standard medical facilities. The establishment of a free standard school in the rural areas will support the farmers to give their children standard education. Besides, financial institutions, like banks, should provide more support to the farmers by giving them loans at little or no interest rate. This will provide the farmers with funds to undertake their business conveniently. The artisanal fish farmers also have a role to play in this regard. They could form or join cooperatives so that they can enjoy various benefits such as credit facilities, price-fixing, and access to market information. In the same vein, the state's Ministry of Commerce and Cooperatives could assist the farmers by sensitizing them on the benefits and management of cooperatives. These would improve the welfare and standard of living of artisanal fish farmers and their households both in the short and long run.

ÖZET

Amaç: Geleneksel balık yetiştiriciliğinin balıkçılık sektörüne katkısına rağmen, bu balıkçıların refahı hakkında bilgi eksikliği bulunmaktadır. Bu nedenle, bu çalışma Nijerya'daki geleneksel üretim yapan balık çiftçilerinin refahını araştırmaktadır.

Yöntem ve Bulgular: Çalışmada, betimsel istatistikler, Foster-Greer-Thorbecke indeksi ve çoklu regresyon ile analiz edilen 330 geleneksel üretim yapan balıkçılık işletmelerinden toplanan birincil verileri kullanmıştır. Sonuçlar, bu çiftçilerin kredi olanaklarına, standart tıbbi tesislere, kaliteli ve besleyici gıdaya, çocukları için kaliteli eğitime, barınağa, içilebilir suya ve çevre güvenliğine

yetersiz erişime sahip olduğunu göstermektedir. Çiftçilerin harcamalarında en yüksek payı (%52,42) ile gıda harcamaları alırken, gıda dışı harcamalar içinde çocukların eğitimi, barınma, giyim ve sağlık gibi temel hizmetler yalnızca %15,02'lik pay almıştır. Çiftçilerin göreli yoksulluk endekslerinin analizi, yoksulluk insidansının, derinliğinin ve şiddetinin sırasıyla 0.633, 0.165 ve 0.062 olduğunu göstermiştir. Refahları; cinsiyet, yaş, geleneksel balık yetiştiriciliğinden elde edilen gelir, diğer kaynaklardan elde edilen gelir, krediye erişim, hane büyüklüğü, çiftçilik deneyimi ve varlıklarından önemli ölçüde etkilenmiştir. Çiftçilerin refahının önündeki en büyük sorun, yetersiz kredi imkanları ve devlet desteğinin olmamasıdır.

Genel Yorum: Geleneksel üretim yapan balıkçı ailelerinin yaşam standartları ve refah düzeyi düşük, yoksulluk oranı yüksektir. Bu nedenle çalışmada, bu üretici grubunun refahını artırmak için ilgili kurumlar tarafından destek verilmesi gerektiği gösterilmektedir. Bu destekler; modern balıkçılık ekipmanları, yeterli ve gerekli teknik bilgiler, modern sağlık merkezleri, ücretsiz standart okullar ve düşük veya faizsiz kredilerin sağlanması şeklinde olabilir.

Çalışmanın Önemi ve Etkisi: Bu çalışma, geleneksel balık üretim yapan üreticilerin refahını ölçmek için harcama yaklaşımını kullanarak bilgi birikimine katkıda bulunmakta ve sonuçlar, geleneksel balıkçıların ve kırsal hane halklarının refahını iyileştirmek için politika yapıcılara referans noktası sağlama olarak hizmet edecektir.

Anahtar Kelimeler: Geleneksel balık yetiştiriciliği, hane halkı, kısıtlamalar, harcama yaklaşımı, yoksulluk, refah.

CONFLICT OF INTEREST
The authors declare no conflict of interest for this study.

AUTHOR'S CONTRIBUTIONS
The contribution of the authors is equal.

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