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MULTIDIMENSIONAL POVERTY AND ITS DETERMINANTS AMONG ARTISANAL FISH FARMERS IN KWARA STATE, NIGERIA

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Abstract

This study investigates the poverty status of artisanal fish farmers in Kwara State, Nigeria, using the Multidimensional Poverty Index (MPI). Data were collected from 150 respondents through a two-stage sampling technique and analyzed using descriptive statistics, the MPI, and logit regression. The findings revealed a Multidimensional Headcount Ratio (H) of 0.63, indicating that 63% of the households are multidimensionally poor. The primary contributors to poverty include deprivation in living standards (48.15%), health (29.63%), and education (22.22%). Logit regression analysis identified household size, age, annual income, credit access, and extension services access as major drivers of poverty among the artisanal fish farmers' households. The results underscore the need for targeted policy interventions that improve living conditions, healthcare access, educational opportunities, and financial support mechanisms to alleviate poverty among artisanal fish farmers.

***Keywords**: Multi dimentional, Poverty, determinants, Artisanal, fish farmers.*

1.0 Introduction

Poverty is one of the main problems facing sub-Saharan Africa, where many people depend on farming for their livelihood (Adeyeye et al., 2023; Saidi et al., 2024). In Nigeria, poverty is a complicated issue with many dimensions. It represents lack in not only income but also education, healthcare facilities, sanitation and basic infrastructure (Dzungwe & Oluwatoyin, 2024). Data from the National Bureau of Statistics (NBS) shows that more than 40% of Nigerians live below the national poverty line. The rural families involved in small-scale farming operations are affected in great measures. Among these vulnerable groups are the artisanal fish farmers; whose contributions to Nigeria. aquaculture sector cannot be overemphasized (National Bureau of Statistics (NBS), 2024).

Artisanal fish farming is vital in providing food security and uplifting the living conditions of rural areas in Nigeria (Falola et al., 2022). This sector has experienced a steady growth rate in Kwara State because there are available water sources; friendly climatic conditions for fishing; also there's an expanding demand for fish - one of the affordable animal protein sources. Some of the challenges faced by this sector which are contributing factors to persistent poverty among the farmers despite its potential are high production cost, poor market linkage, the impact of climate change, and high production cost (Falola et al., 2022).

Multidimensional poverty dimensions include lack of good education, healthcare, sanitation and economic issues. The Multidimensional Poverty Index (MPI) measures deprivations across different aspects of human life, offering a wider view on poverty (Bernards, 2023). Looking at the poverty status of small-scale fish farmers with this method can offer deeper insights into the factors that perpetuate their vulnerability and inform more targeted and effective policy interventions. While there are several existing studies (Adeleke & Ademola, 2021; Adomi et al., 2023; Ubabukoh & Imai, 2023) on poverty among agricultural households in Nigeria, their focus are majorly on crop farmers. Also, poverty was measured by the majority of these studies using income metrics, with limited studies on MPI as the methodology of poverty. Additionally, there are limited studies on artisanal fish farmers, despite their critical role in Nigeria's agricultural economy.

2.0 Objectives of the study

This study seeks to assess the multidimensional poverty status of artisanal fish farmers in Kwara State. Specifically, the research aims to identify the key dimensions of poverty affecting fish farming households and analyze the factors contributing to these deprivations. By adopting the multidimensional poverty approach, the study will contribute to more nuanced and effective poverty reduction strategies tailored to the needs of fish farming communities in the State.

3.0 Methodology:

The study was carried out in Kwara State (Fig 1) The State has sixteen (16) Local Government Areas (LGAs) and four (4) agricultural zones, A, B, C, and D. According to the National Population Commission (2012), its population is predicted to be 3,192,893. The State makes up 74,256 square kilometres of Nigeria's total land area (923,768 square kilometres). The State has 254,242 hectares of agricultural land and 246,975 farm households. The State lies within latitudes 7°45'N and 9°30'N and longitudes 2°30'E and 6°35'E (Oladimeji et al., 2015). The State witnesses the lowest amount of rainfall (600–1,500 mm), between April and October, with May–June and September–October experiencing the highest amounts (Tarfa et al., 2019). The average temperature is between 20°C and 22°C. During the dry season, the humidity is 50%, while during the wet season, it may reach 85%. Kwara State is situated in the nation's agro-ecological zone. The ecosystem of the State is made up of forested savannah in the majority of the State and rainforest in the southern regions, with agriculture being the main economic sector. The State's agricultural sector is characterized by cultivation of key crops such as rice, cotton, sugar cane, cassava, maize and ginger. Additionally, because of the availability of water bodies, the State is favourable for fish farming and other livestock

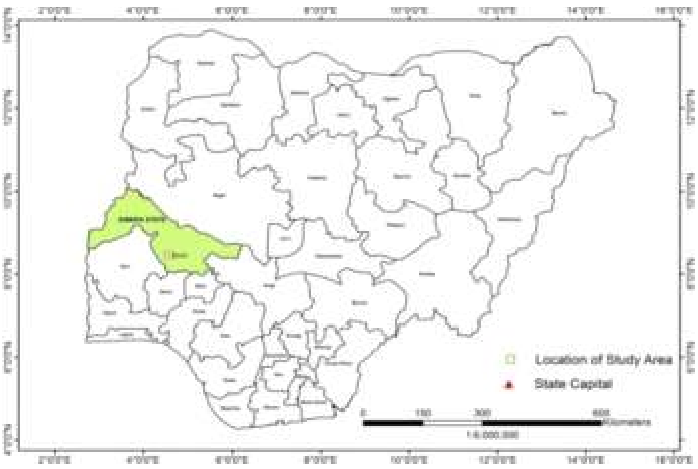

Figure 1: Map of Nigeria showing Kwara State. Source: UN cartographic section: Available from https://www.nationsonline.org/oneworld/map/nigeriaadministrative-map.htm accessed on July 18, 2024

Sampling Technique and Sample Size

This study used a Two-stage sampling technique to collect Data from a specific population of Artisanal fishermen. In Stage 1: purposive selection of two LGAs from Kwara State, Asa and Patigi LGAs, respectively. These LGs, were chosen because of the dominance of artisanal fish farmers in the LGA (Falola et al., 2022). In Stage 2: From the registered list of the Association of Artisanal Fishermen, a total of 150 respondents were selected for this study. A total of 98 respondents were from Patigi, and 52 respondents were from Asa LGAs, respectively. These selections were proportionate to the total number of Registered Artisanal Fish farmers with the Association

Method of Data Analysis

The data collected were analyzed with descriptive statistics, Logit regression, and Multidimensional Poverty Index (MPI).

Table 1 : MPI dimensions, indicators, deprivation cut off, and their SDG area.

DIMENSIONS (Weight)	INDICATORS (Weight)	DEPRIVATION CUT OFF	SDG AREA
	Child mortality rate (1/5)	Deprived if the dead of any child age 5 years and below has been experienced in the last 5 years.	SDG 3: Health and well being
	Maternal Health (1/5)	Deprived if the mother of a suckling or infant never had access to skilled health professionals	SDG 3: Health and well being
	Medical Care (1/5)	Deprived if the distance from the house to the medical center/clinic is more than 5km	SDG 3: Health and well being
	Nutritional status (1/5)	Deprived if any child or children of the household has stunted growth due to nutritional deficiency	SDG 3: Health and well being
	Incidence of Diseases (1/5)	Deprived if the rate of common diseases (e.g malaria, respiratory infection) is prevalent in the household	SDG 3: Health and well being
	Year of schooling (1/5)	Deprived if no household member completed 6 years of schooling	SDG 4: Quality education
	School enrolment (1/5)	Deprived if child aged (5-14 years) is present in the household and not attending school.	SDG 4: Quality education
	Literacy rates (1/5)	Deprived if any adult in the household between (18 years and above) can neither read nor write	SDG 4: Quality education
	Digital literacy (1/5)	Deprived if any adult in the household between (18 years and above) does not have the basic knowledge of a computer	SDG 4: Quality education
	Educational infrastructure (1/5)	Deprived if any school-aged child (5-14 years) do not have books and necessary materials required for learning.	SDG 4: Quality education
	Cooking fuel (1/12)	Deprived if the household cooks with dung, wood, or charcoal	SDG 7: Affordable and clean energy
	Sanitation/toilet (1/12)	Deprived if the household is using pit latrine, bucket, open defecation, and hanging toilet or improved sanitation but shared with another household	SDG 6: Clean water and sanitation
	Drinking water (1/12)	"Deprived if the main source of water for the household is from an unprotected well, open spring, or surface water or they require more than 30 minutes (round trip) to fetch water"	SDG 6: Clean water and sanitation
	Electricity (1/12)	Deprived if the household has no access to electricity	SDG 7: Affordable and clean energy
	Housing floor (1/12)	"Deprived if the household lives in a single room, a house made of wood, and straws"	SDG 11: Sustainable cities and communities
	Assets ownership (1/12)	"Deprived if the household does not own more than one either radio, TV, telephone, bike, motorcycle, or refrigerator and does not own a car".	SDG 1: No poverty

Source: Adapted from Alkire et al., (2021) .

Where P is the probability of being poor, is the Intercept, are the predictor variables (health, education, standard of living indicators), are the coefficients and $_{E}$ is the error term.

Binary variable (1 indicates poor, 0 implies not poor). The coefficients represent the following:

(Intercept)

The intercept is the baseline value of the log-odds of being poor when all predictor variables X_1, X_2, **…,** X_n,are equal to zero. It essentially provides the starting point for the model. B_i (Coefficients for predictor variables)

Each B_i (where i = 1, 2,…,n) represents the change in the log-odds of being poor associated with a one-unit change in the predictor variable X_i, holding all other predictor variables constant. In other words, B_i quantifies the strength and direction of the relationship between the predictor variables X_i, and the likelihood of being poor.

A positive B_i indicates that as X_i, increases, the log-odds of being poor increases, i.e., the probability of being poor increases.

A negative B_i indicates that as X_i, increases, the log-odds of being poor decrease, i.e., the probability of being poor decreases.

Health Indicators (X_1, X_2, …)

1. **Nutrition** (X_1): Binary variable (1 if the household experiences malnutrition, 0 if otherwise).
2. **Child Mortality** (X_2): Binary variable (1 if any child below the age of 5 in the household has died, 0 if otherwise).
3. **Medical Healthcare** (X_3): Binary variable (1 if the distance from the house to

the clinic is more than 5km, 0 if otherwise)

4. **Maternal Health** ($X_{4)}$: Binary variable (1 if the mother of a suckling or infant never had access to skilled health professionals, 0 if otherwise)
5. **Incidence of Diseases** ($X_{4)}$: Binary variable (1 if the rate of common diseases is prevalent in the household, 0 if otherwise)

Education Indicators ($X_6, X_7, \ldots$)

1. **Years of Schooling** (X_6): Binary variable (1 if no member of the household has completed six years of schooling, 0 if otherwise)
2. **School Enrolment** (X_7): Binary variable (1 if any school-aged child (5-14 years) in the household is not attending school, 0 if otherwise)
3. **Literacy rate** (X_8): Binary variable (1 if any adult in the household between (18 years and above) can neither read nor write, 0 if otherwise)
4. **Digital Literacy** (X_9): Binary variable (1 if the household is deprived, 0 if otherwise)
5. **Educational Infrastructure** (X_{10}): Binary variable (1 if any school-aged child (5-14 years) does not have books and necessary materials required for learning, 0 if otherwise)

Living Standard Indicators ($X_{11}, X_{12}, \ldots$)

1. **Cooking Fuel** (X_{11}): Binary variable (1 if the household is deprived, 0 if otherwise)
2. **Sanitation/Toilet** (X_{12}): Binary variable (1 if the household is deprived, 0 if otherwise)
3. **Drinking Water** (X_{13}): Binary variable (1 if the main source of water for the

household is from an unprotected well, open spring, or surface water or they require more than 30 minutes (round trip) to fetch water, 0 if otherwise)

4. **Electricity** (X_{14}): Binary variable (1 if the household has no access to electricity, 0 if otherwise)
5. **Housing floor** (X_{15}): Binary variable (1 if the household lives in a single room, a house made of wood, and straws, 0 if otherwise)

Asset Ownership (X_{16}): Binary variable (1 if the household does not own more than one of either radio, TV, telephone, bike, motorcycle, or refrigerator and does not own a car, 0 if otherwise).

Using the predictors listed above, the logit regression can be written as:

$$\text{Log}\left(\frac{\rho}{1-\rho}\right) = \beta_0 + \beta_1(Nutrition) + \beta_2(Child\ Mortality) +$$

$$\beta_3(Medical\ Healthcare) + \beta_4(Maternal\ Health) + \beta_5\ (Incidence\ of\ diseases) +$$

$$\beta_6(Years\ of\ schooling) + \beta_7(School\ enrolment) + \beta_8(Literacy\ rate) +$$

$$\beta_9(Digital\ Literacy) + \beta_{10}(Educational\ Infrastructure) + \beta_{11}(Cooking\ fuel) +$$

$$\beta_{12}(Sanitation/Toilet) + \beta_{13}(Drinking\ Water) + \beta_{14}(Electricity) +$$

$$\beta_{15}(Housing\ floor) + \beta_{16}(Asset\ Ownership)$$

4.0 Results and Discussion

4.1 Socio-economic characteristics

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4.1 Socio-economic characteristics of fishermen

Sex: Table 2 shows that majority (79.3%) of the fish farmers are males. This gender disparity is expected in many regions of Nigeria, where men are more involved in farming activities like artisanal fishing when compared to women because of the rigorous fishing activities (Addo et al., 2024). Most women are more involved with the processing of fish. This result agrees with previous studies (Omoruyi & Eronmhonbor, 2017; Anyim et al., 2021) who affirmed in their studies that women participate in processing of fish, rather than artisanal fish farming. About 88.7% of them are married, implying that family households are predominant among fish farmers in the study area. The presence of single (7.3%) and widow (3.3%) signifies that, the population involved in artisanal fish farming is not only married and that should be considered in implementing development initiatives. This was at variance with Ogunremi *et al.* (2021), who found the married and the singled to be equally engaged in artisanal fish farming. In terms of age, the mean age of the fish farmers was 46 years, with farmers within the age range 41-50 years group constituting the majority (34%). This was followed by the age range 31-40 years group (27%). This age distribution implies that farmers constitute young and experienced farmers. The majority of the fish farmers had a household of 6 or more. The large household size might be connected with the dominance of the Islam religion among the respondents, which allows polygamy. Large household size can be an advantage to the farmer in the supply of family labour, which however according to Soyinka & Kusemiju, (2007), depends on their age group. In a case where they are dependants, they can effect the family's resources.

Table 2: Respondents socioeconomic Characteristics (n=150)

Variables	Frequency(N=150)	MEAN	Percentage (%)
Sex			
Male	119		79.3
Female	31		20.7
Marital Status			
Single	11		7.3
Married	133		88.7
Divorced	1		0.7
Widowed	5		3.3
Age (years)			
21-30	13		8.7
31-40	40	46 Years	26.7
41-50	51		34.0
51-60	34		22.7
>60	12		8.0
Household Size			
<=3	17		11.3
4-6	68	7	45.3
7-9	40		26.7
10-12	20		13.3
13+	3		2.0
Level of Education			
No formal Education	16		10.7
Primary School	39		26.0
Secondary School	48		32.0
Vocational/Technical Training	18		12.0
University/Poly/College Of Education	27		14.7
Fish Farming Experience (yrs)			
<=5	29		19.3
6-10	80		53.3
11-15	24	10	16.0
16-20	9		6.0
21-25	6		4.0
26-30	1		0.7
>30	1		0.7
Religion Of Respondents			
Christianity	42		28.0
Islam	108		72.0

Source: Field survey (2024).

Table 3 shows that out 32% of the respondents had secondary education while 10.7% had non formal education. These results also show that those who had secondary education were more than those who had other levels of education. Education plays a vital role in shaping farmers' adaptive capability and influencing them to adopt modern technologies in agriculture. The mean fish farming experience was 10 years, with the majority (63%) having 6-10 years' experience, closely followed by < 5 years' experience (19%). The majority of the fish farmers had more than 10 years of farming experience. This aligns with Olaoye *et al.* (2012) who asserted that most artisanal fish farmers have years of experience correlating with their ages because they are involved in the activities right from their early life as a tradition or family business. The farmers were predominantly Muslim (72%) and with a mean household size of 7 members. This is expected because the selected LGAs were Muslim-dominated (Oluwatimilehin & Ayanlade, 2021).

4.2 Multidimensional poverty status of the households

Table 3 indicated a Multidimensional Headcount Ratio (H) of 0.63, signifying that 63% of households engaged in artisanal fishing are multidimensionally poor. Consequently,

Table 3: Multidimensional Poverty Indices of Artisanal Fishermen Household

Variables	Value
Deprivation cut-off (c)	0.33
Total deprivation score (k)	40.32
Multidimensionally poor people (q)	96
Total population (n)	150
Multidimensional headcount ratio (H)	0.64
Poverty intensity (A)	0.42
Multidimensional Poverty Index (MPI)	0.27

4.3 Contribution of dimensions to poverty

Table 4 reveals that, the following deprivations contributed to poverty intensity: education (25.05%), health (28.08%) and living standard (46.88%). These results show that the standard of living contributed most to poverty intensity, followed by Health, and education. This implies that, deprivation in living standard facilities such as toilets, electricity, house floor, roof, etc. contributed most to poverty intensity among the Artisanal Fishermen households in the study area. Aboaba *et al.* (2019) also confirmed that rural farming households are mostly deprived in Living standard dimension. The implication is that, deprivation in living standard indicators like electricity will affect the availability of storage and processing facilities, forcing fishermen to sell fish quickly at lower prices, reducing potential income. Also, illnesses like waterborne diseases and absenteeism from work can result from Poor sanitation and access to clean drinking water.

Table 4: Contribution of dimensions to poverty intensity

Variable	**Deprivation score**	**Intensity**	**Relative contribution**
Education	10.1	0.11	25.05
Health	11.32	0.12	28.08
Standard of living	18.9	0.20	46.88
Total	40.32	0.42	100.00

4.4 Determinants of Poverty status

Table 5: The result of the Logit regression

Variable	**Marginal effects**	**Coefficient**	**Standard error**	***t*-value**	***p*-value**
Gender	0.0013692	0.0075374	0.0160361	0.47	0.638
Education level	0.0019638	0.0108108	0.0379274	0.29	0.776
Household size	0.0338776	0.1864968**	0.0760321	2.45	0.014
Age	–0.455455	–2.50728***	0.4829231	–5.19	0
Marital status	–0.0175371	–0.096542	0.3570244	–0.27	0.787
Farming experience	0.0001664	0.0009161	0.0144224	0.06	0.949
Annual Income	–6.87e–07	3.78e–06*	2.08e–06	–1.82	0.069
Membership in farmer associations	–0.0677365	–0.372891	0.3796054	–0.98	0.326
Access to Credit	–0.1547144	–0.851706**	0.3471226	–2.45	0.014
Access to extension	–0.1420457	–0.7819646*	0.434154	–1.80	0.072
Constant		1.564154*	0.8686549	1.8	0.072
Diagnostic test					
Wald chi2(10)	43.6				
Prob > chi2	0				
Pseudo *R*2	0.1807				
Log-likelihood	–120.44789				
Number of observations	225				

*****p < 0.01, **p < 0.05, *p < 0.1.**

The households were categorized into poor and non-poor, using the MPI (Deprivation cut-off greater than or equal to 0.33 were classified as poor, and below 0.33 were considered non-poor). Table 5 indicates that, the chi-square value of 43.60 signifies that the variables in the model are adequately fit to explain the artisanal fishermen households' poverty. Additionally, the chi-square value of 0.0000 shows the overall significance of the model at a 1% probability level ($p < 0.01$). The pseudo-R-squared value demonstrated that 18.07% of the change in the poverty status of artisanal fishermen households was collectively explained by vital explanatory variables, with findings showing household size ($p < 0.05$), age (p cu p0.01), annual income ($p < 0.1$), access to credit ($p < 0.05$), and access to extension agents, insignificance levels affecting the poverty status of artisanal fishermen households in the study area. The household was a significant variable in influencing poverty among the respondents. A unit increase in respondents' household size increases the probability of being poor by 3.39%. These results are consistent with Offor (2021) who stated that negative and highly significant coefficient ($p < 0.01$) indicates that older age significantly reduces the probability of being poor. In artisanal fishing, experience plays a crucial role. It can lead to improved fishing efficiency, and resource management, which will eventually lead to higher income stability. Also, younger households often have higher expenses due to child-rearing, school fees, and early-stage business investments. This result is, however, at variance with Osabohien et al. (2021) who found that ageing increases the likelihood of being poor.

Annual Income has a negative coefficient and borderline significance ($p = 0.069$), suggesting that higher annual income decreases the probability of being poor. This implies that, as annual income increases, the likelihood of being poor decreases, although this effect is marginally significant. This is expected, increases in income are associated with individuals or households having greater financial stability and reducing their probability of being poor. This finding aligns with previous studies (Jaiyeola & Choga 2021; Ogbeide-Osaretin, 2021) which found a negative relationship between income and poverty among farming households in Nigeria.

The negative and significant coefficient ($p = 0.014$) of access to credit, suggests that having access to credit significantly reduces the probability of being poor. Access to credit reduces the likelihood of being poor by 85.1%. Households with credit access have a high likelihood of handling unexpected expenses. Also, credit allows small-scale farmers, to invest in productive activities, such as purchasing better farming equipment, or diversifying income sources. This result contradicts Nwosu and Orji (2023) who found that access to credit does not always lead to poverty reduction, because of the high interest rates.

Access to extension was significant, with a negative coefficient and borderline significance ($p = 0.056$), which implies that access to extension services tends to reduce the probability of being poor, with a reduction of 78.1% in the probability of being poor. This is expected because the education of farmers on modern farming and management which can lead to higher productivity and income can be received from extension agents. This is in consonant with the studies of Malu *et al.* (20210) and Omodero (2024) who found that farmers with regular access to extension services, experienced higher food production levels and improved incomes, thus reducing poverty.

5.0 Conclusion and Recommendations

5.1 Conclusion

The study employed the MPI framework to assess poverty among artisanal fish farmers in Asa and Patigi, Kwara State. Results showed that 63% of the households were multidimensionally poor, with living standards, health, and education as the major contributors. Larger household sizes, younger household heads, low income, and limited access to credit and extension services were significant determinants of poverty. To reduce multidimensional poverty, policy efforts should focus on improving infrastructure, facilitating access to credit, enhancing healthcare and education services, and supporting fish farming communities through technical assistance and income diversification programs. Addressing these factors holistically can foster sustainable improvement in the well-being of artisanal fish farmers in the study area.

5.2 Recommendations

It is recommended that: **1.** Various entities, including governments, financial institutions, development agencies, and community groups should work together to tackle the complex poverty issues faced by artisanal fish farmers. This collaboration is essential for the implementation of economic empowerment, infrastructure progress, healthcare improvement, educational advancement, and supportive policies. **2**. The government and financial institutions should enhance credit availability and financial services for fish farmers. This will facilitate their investment in the latest equipment and enable them to diversify their revenue streams. **3**. Local and national government authorities need to make infrastructure development their top priority. This includes improving housing, providing access to clean water and sanitation services, and ensuring electricity availability. These measures are essential in decreasing poverty levels and improving overall quality of life. **4**. The Ministry of Health along with NGOs and global groups should bolster healthcare to address malnutrition and illness, while **educational institutions and policymakers** must expand access to **quality education and literacy**

programs to break the cycle of poverty. Agricultural development services and research bodies have the responsibility to improve outreach services by offering technical guidance and sharing expertise that can help fish farmers employ more productive and eco-friendly methods. **5**. Additionally, cooperatives, farmer alliances, as well as community organizations must encourage communal support, resource pooling, and joint negotiation efforts for enhancing resilience and financial security in artisanal fishing communities.

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