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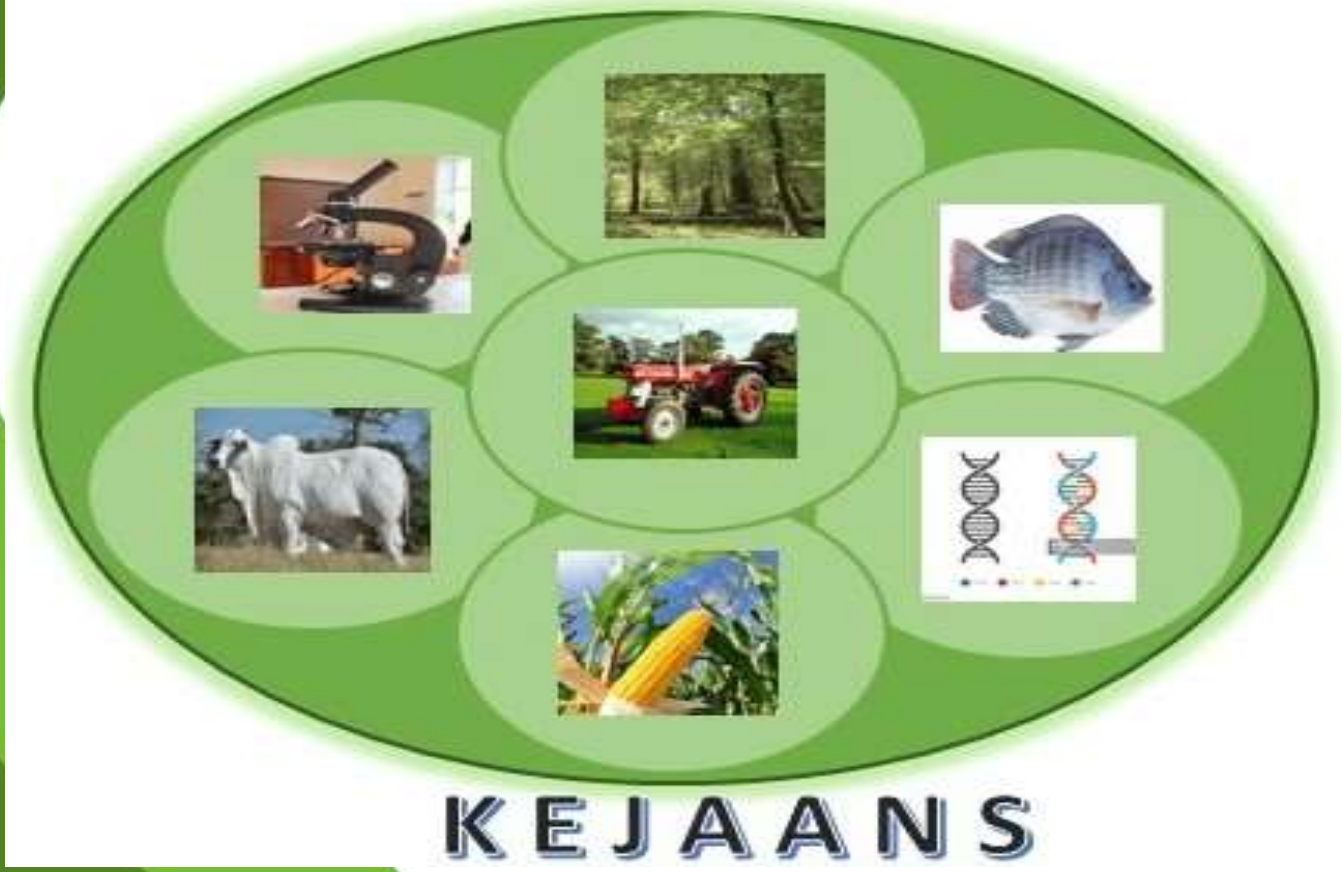

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DETERMINANTS OF FOOD SECURITY STATUS OF FISHING HOUSEHOLDS ALONG KAINJI DAM, NIGERIA

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ABSTRACT

The study determined the food security Status of fishing households along Kainji Dam, Nigeria. There is a persistent food insecurity experienced by fishing households along Kainji Dam despite their engagement in fishery activities. This study identified the key socio-economic and environmental factors influencing their food security status. Multi-stage and proportionate sampling techniques were used to select 460 respondents from the study area. Both descriptive and inferential statistics were used for data analysis. The results of the study revealed that the majority of respondents (51.3%) were within the age range of 29–41 years, with a mean age of approximately 35 years, indicating that the fishing population comprised predominantly middle-aged and economically active individuals. In terms of marital status, 87.0% of the respondents were married, with an average household size of about 9 persons, reflecting the prevalence of large family units among fishing households. The Logit regression estimates of the determinants of food security status of fishers shows that the coefficients with respect to household size Access to credit (0.063), age of fishers (1.647), fishing experience (0.0009), livelihood diversification (0.060), and income from fishing (1.848) were all statistically significant at the 1% level, indicating their strong influence on the food security status of fishing households. Access to extension services (0.713) was also significant at the 5% level, suggesting that extension contact plays a moderate but meaningful role in enhancing household food security. In conclusion, the study showed that, artisanal fisheries is an important livelihood activity in the lives of the fishers as it enhances food security among the fishers along the dam and most of the fishers were middle-aged and economically active individuals, predominantly married and living in relatively large households with low levels of formal education. The study therefore recommended that government should give financial assistance and provide subsidized improved fishing and processing inputs to enable them to seamlessly undertake their fishing activities aimed at improved food security. Fishers should form cooperative societies to access credit, markets, and modern fishing technologies. Establishing community-based value addition and processing centers through public–private partnerships will empower fishers to increase income, reduce post-harvest losses, and strengthen long-term food security.

Keywords**:** Determinants**,** Food Security, Fishing households, Kainji Dam

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Introduction

Given the role of agriculture in the Nigerian economy, food insecurity and poverty could be attributed to the poor performance of the agricultural sector, which in turn, creates food availability and accessibility problems at the household and national levels (Augustine, 2018). In other words, the poor performance of the sector directly creates supply shortages and indirectly creates demand shortages by denying the rural farming households' access to sufficient income. The Nigerian economy, in terms of revenue and foreign exchange, is undoubtedly dominated by the oil sector but agriculture holds the key to sustainable development of the country with respect to provision of employment opportunities, the provision of raw materials for agro-industries, as a source of income for rural families, and perhaps most importantly, provision of food for the population. The right to an adequate standard of living including food security is recognized in the universal declaration of human right. It is a widely accepted fact that food is a basic necessity of life. As such, adequate intake of quality food is a key requirement for a healthy and productive life (Temilola, 2023). Food security is defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Mannas and Uddi, 2023). Food security entails ensuring sustainable access, availability and affordability of adequate quantity and quality food to all citizens to meet up with their physiological requirements (Leisner, 2020). The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilize the food to meet the body's needs. Food security is multifaceted. Fish occupies a vital place in Nigeria's economy and food system, serving as a major source of animal protein and livelihood for millions. It contributes about 3–5% to the national GDP and provides direct and indirect employment to over 10 million Nigerians engaged in fishing, processing, and marketing activities. Annual fish demand in Nigeria is estimated at 3.6 million metric tonnes, while local production accounts for roughly 1.2 million tonnes, leaving a substantial supply gap met through imports (Mannas and Uddi, 2023). Beyond its economic significance, fish enhances nutritional security, supplying essential amino acids, vitamins, and minerals crucial for healthy growth and cognitive development. Its physical accessibility through inland water bodies and coastal fisheries, and socio-economic importance in rural livelihoods, make it indispensable for poverty reduction, income generation, and sustainable food systems across Nigeria (Mannas and Uddi, 2023).

Maitra *et al.* 2022), identified three pillars underpinning food security; these are food availability, food accessibility, and food utilization. This infers from the concept that food security is not just a production issue.Food security refers to a situation whereby individuals have access at all times to quality and sufficient food resources to maintain a healthy and active life (Kuwonu*et al.*, ,2019). It is against this backdrop that the study described the socio-economic characteristics of the artisanal fishers and determined the food security status of the fishing households along Kainji Dam.

Methodology

Study Area

Kainji Dam is located between latitudes 9°5' and 10°55'N and longitudes 4°21' and 4°45'E. It cuts across the Niger and Kebbi States, and is mostly located in Niger State. Kainji is the second largest Dam and the largest man-made lake in Nigeria (Kidane*et al.*, 2022). It was created in 1968

following the impoundment of the Niger River by the construction of the Kainji Dam at New Bussa, in Borgu Local Government Area of Niger State. The climate of the Kainji Lake usually alternates between dry and rainy conditions. The total annual rainfall for the Lake ranges between 1,100 mm and 1,250 mm, spreading from April to October (Baruwa*et al.,* 2021).

Sampling Procedure and Sample size

The study identified 550 fishing communities along Kainji dam. The fishing communities have a fishing population of (2,823) along Kainji. These figure represents the sampling frame out of which the sample size of the study was drawn. The study employed multi-stage and proportionate sampling techniques. Firstly, Kainji dam in North central region where artisanal fisheries activities are widely practiced was purposively selected. Secondly, 50 Villages were randomly drawn along Kainji dam for the study. Thirdly, proportionate sampling was applied to obtain a sample size of 460 respondents from communities along the dam, based on a sampling proportion of 15%. Below is the summary table for the sampling procedure and sample size.

Table 1: Sampling Procedure and Sample Size for Kainji Dam

Selected Villages	Number of Registered Fishers per Village	15% of the Population of Fishers (Sample Size)
Fakun	108	16
Malali	40	6
Garafini	80	12
Awuru	25	4
Yankade	105	16
Tungan Libata	99	15
Tungan Mangoro	61	9
Farin Dutse	60	9
Tungan Alhaji Isah	75	11
Gidan Auna	66	10
Tungan Bala	60	9
Babu Dole	125	19
Tungan Samiya Bala	54	8
Amboshidi	32	5
Tsoho Dilli	148	22
Toro	104	16
Kukubawa	75	11
Tungan Alhaji Manu	61	9
Gungun Tagwaye	33	5
Tungan Maisaje	98	15

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Selected Villages	Number of Registered Fishers per Village	15% of the Population of Fishers (Sample Size)
Audu Gungu	109	16
Tungan Magariya	130	20
Libata	17	3
Tungan Alhaji Baba	77	12
Agwata Samaila	66	10
Tungan Wata	148	22
Barashi	150	23
Dadabo	72	11
Gidan Ikum	18	3
Dugu	72	11
Total = 30	**2,823**	**≈ 460**

Source: Computed by the Researcher (2025)

Method of Data Collection and Analysis

Primary data were used for the study obtained using structured questionnaires designed in line with the study objectives. The copies of which were administered through trained enumerators using face-to-face interviews, while literate respondents completed them under supervision to ensure accuracy and completeness.to the respondents selected for the study. Data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics such as frequency distribution count, percentages and mean were used to analyze objectives (i) similarly, inferential statistics (Logit registration) was used to analyze objective ii.

Logit Regression Analysis

Specification of the Model

Logit Regression Analysis (LRA) was employed to analyze objective 2. The **Logit model** is an inferential statistical regression model that describes the relationship between a censored continuous dependent variable y_i and a vector of independent variables x_i.Y_i is the dependent variable and X_1 – $X_9$are the independent variables. The general Logit regression model is mathematically expressed as:

$$Y = \alpha + \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots + \beta_9 X_9 + u)$$

Where Y = Food Security Status (Implying a binary dependent variable valued as 1= when Household are food secured and 0= when otherwise.

X_1= Marital status (1 for married, 0 for otherwise)

X_2=Household size (Number)

X_3= Fishing experience (Years)

X_4= Membership of association (1 for member, 0 for otherwise

X_5=Access to credit (1 for access, 0 for otherwise)

X_6= Access to extension (1 for access, 0 for otherwise)

X_7= Age of fishers (Years)

X_8= Livelihood diversification (1 for diversified livelihood, 0 otherwise)

X_9= Income from fishing (Naira)

U = Error term, βi =Constant term

α = Alpha.

$\beta_1 - \beta_9$=Regression coefficient to be estimated.

Results and Discussion

Table 1 indicated that (2.8%) of the respondents which is the least in the age distribution structure fell within the age grade of 16-28years, (51.3%) are within the age bracket of 29-41 years, (24.1%) fell within the ages of 42-54 years and (21.7%) grouped within the ages of 55years and above with a mean of 47 It is evident from the table that majority of the respondents are middle aged young fishers who fell within the active fishing age with high vigour and energy to contribute meaningfully to fishery development. There was a significant reduction in the number of fishers within the younger age group of 16–28 years and the older age group of 55 years and above. However, those fishers that were between the ages of 55years and above who are supposed to be dependent age group were still active in fishing (Baruwa*et al.* 2021).

Table 1: Socio- economic Characteristics of the Artisanal Fishers (n = 460)

Variables	Frequency	Percentage	Mean
Age			
16-28	13	2.8	
29 – 41	236	51.3	
42 – 54	111	24.1	46
55+	100	21.7	
Gender			
Male	378	82.2	
Female	82	17.8	
Marital Status			
Married	400	87.0	
Single	41	8.9	
Divorced	6	1.3	
Widow	9	.9	
Widower	4	2.0	
Level of Education			
Primary Education	65	14.1	
Junior Secondary Education	75	16.3	
Senior Secondary Education	150	32.6	
Tertiary Education	34	7.4	
No Formal Education	136	29.6	
Household Size			
≤ 5	69	15.0	
6 – 13	185	40.2	12.0
14 – 21	166	36.1	
22+	40	15.0	
Total	**460**	**100**	
Membership of Association			
Member	115	25.0	
Non-Member	345	72.0	

Source: Field Survey, 2023

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The results in Table 1 also showed that 82.2% respondents were male while female formed the minority with only (17.8%). As regards marital status, (87.0%) of the respondents were married, (8.9%) were single, (1.3%) were divorced, (0.9%) widows and 2.0% widowers. It is revealed from this result that greater percentage of the respondents were married indicating that they were saddled with the responsibility of meeting their family basic needs of life such as ensuring that their households are food secured. The findings of Temilola (2023) also conforms to this study which reported male dominance of artisanal fishing. The results in table 1 showed that (14.1%) of the respondents acquired only primary school education, (16.3%) had only junior secondary school, (32.6%) schooled up to senior secondary school, (7.4%) obtained tertiary education and the rest of the respondents with (29.6%) had no formal education but only had either Qur'an or adult education. This may to some extent influence their food security, as the decline in younger and older fishers reduces labor availability, limits productivity, and weakens knowledge transfer across generations. Consequently, lower fishing output and income may restrict households' ability to access sufficient and nutritious food.

Table 2: Logistic Regression Estimates of the Determinants of Food Security Status of Fishers in the Study area (n = 460**)**

Variables	**Parameters**	**Coefficient**	**Standard Error**	**t-Value**
Period of fishing	X^1	0.041	0.161	0.26
Household Size	X^2	-0.063***	0.018	3.42
Membership of Association	X^3	0.179	0.255	0.70
Access to Extension	X^4	0.713**	0.328	2.17
Access to Credit	X^5	1.647***	0.461	3.57
Age of the Fishers	X^6	0.0009***	0.000	4.24
Fishing Experience	X^7	0.060***	0.022	2.77
Livelihood diversification	X^8	1.848***	0.449	4.12
Income from fishing	X^9	0.655***	0.297	2.21
Lr Chi^2			268.19	
Prob> Chi^2			0.00	
Pseudo R^2			0.85	
Log Likelihood Value			-23.06	

Source: Field Survey, 2023 *significant at 10% level, **significant at 5% level, ***significant at 1%level

The results presented in Table 1 indicate that 15.0% of the respondents had household sizes of fewer than five persons, while the majority (40.2%) had between six and thirteen members. Additionally, 36.1% of the respondents reported household sizes ranging from fourteen to twenty-one members, and 15.0% had twenty-two or more members. Furthermore, the findings show that only 25.0% of the respondents belonged to a fishing

association, whereas the majority (75.0%) were not affiliated with any form of fisher organization. As shown in Table 1, the number of years the respondents have been engaged in fishing reveals that majority (48.7%) has more than 20 years of experience. (25.9%) have between 13-19 years of fishing experience in enlightening fishers on new fishing techniques through periodic organization/arrangement of capacity building programmes targeted at improving fishing efficiency. However, majority of the fishers years while (22.6%) have between 6 and 12 years' experience in fishing and the least respondents with (2.8%) have less than 5 years' experience with a mean of 19.0. This findings aligns with the results of several studies conducted on fishing communities in Nigeria and other parts of West Africa. For instance, *Adebayo et al.* (2021) reported that most fishing households in Kainji Lake area had large family sizes ranging between 6 and 14 members, which served as a source of family labor for fishing and processing activities. Similarly, *Olayemi and Adedayo* (2020) found that a majority of fishers in coastal communities of Ondo State operated within extended family structures, with household sizes exceeding the national average, and that membership in fisher associations was generally low due to weak cooperative organization and limited institutional support. These studies corroborate the current findings, emphasizing that large household size and low cooperative participation are common characteristics among fishing households in Nigeria.

The results presented in Table 2 provide insights into the factors influencing the food security status of fishing households in the study area. The logistic regression model produced a Pseudo R^2 value of 0.85, indicating that approximately 85 percent of the variation in the food security status of the respondents was explained by the explanatory variables included in the model. The model's overall significance is confirmed by the likelihood ratio (LR) Chi-square value of 268.19 with a probability value of 0.00, suggesting that the included variables jointly and significantly explain the food security status of fishers along Kainji Dam. The coefficient for household size (-0.063) was negative and statistically significant at the 1 percent level. This implies that an increase in household size reduces the likelihood of being food secure. Larger households tend to have higher dependency ratios and food consumption requirements, which may exert pressure on limited household resources, thereby lowering per capita food availability and consumption.

Access to extension services (0.713) exhibited a positive and statistically significant relationship at the 5 percent level. This finding suggests that respondents who had contact with extension agents were more likely to be food secure. Extension services play a crucial role in improving awareness and adoption of modern fishing techniques, post-harvest handling, and resource management practices, which enhance productivity and food availability. The coefficient for access to credit (1.647) was positive and highly significant at the 1 percent level, indicating that credit accessibility enhances the food security status of fishing households. Access to financial resources enables fishers to invest in quality inputs, improved gear, and efficient fishing technologies, which contribute to increased output and income, and consequently, improved food security. Similarly, age of fishers (0.0009) was positive and significant at the 1 percent level. This suggests that older fishers, with greater maturity and experience, are more capable of making informed decisions that enhance productivity and food access. In the same vein, fishing experience (0.060) was positively and significantly related to food security at the 1 percent level, implying

that experience enhances fishing efficiency, resource utilization, and household welfare.

Livelihood diversification (1.848) had a strong positive coefficient, also significant at the 1 percent level, indicating that fishers engaged in multiple income-generating activities were more likely to be food secure. Diversification reduces vulnerability to shocks, stabilizes income, and broadens access to food and other essential needs. Likewise, income from fishing (0.655) was positive and significant at the 1 percent level, suggesting that higher income directly improves household purchasing power, access to quality food, and overall welfare. Conversely, period of fishing (0.041) and membership in fisher associations (0.179) were not statistically significant, implying that these factors did not have a meaningful influence on the food security status of respondents in the study area.

Conclusion/ Recommendations

The study assessed the determinants of food security among fishing households along Kainji Dam in Nigeria. It was evident from the findings that artisanal fisheries play a critical role in enhancing food security in the region. The majority of the respondents were middle-aged, married, and had large household sizes. However, a substantial proportion of the fishers had low educational attainment, which may limit their access to information and best practices in fisheries management. Logit regression analysis revealed that household size, access to credit, age, fishing experience, livelihood diversification, income from fishing, and access to extension services significantly influenced food security status among the fishing households. Specifically, household size had a negative effect, while all other significant variables were positively associated with food security. Notably, access to credit and livelihood diversification were among the strongest predictors of improved food security. The findings highlight the importance of empowering fishers with productive resources, diverse livelihood options, and access to relevant institutional support to sustainably secure their households' food needs. The study also underscores the value of fishing as a primary livelihood activity for ensuring food sufficiency in riparian communities.

Based on the key findings, the following recommendations are proposed to improve the food security status of fishing households along Kainji Dam:

i. Government and NGOs should initiate adult literacy programs and fisher-focused educational outreach to improve the ability of fishers to understand and utilize information on fisheries management, markets, and nutrition.
ii. Financial institutions, supported by government policies, should provide microloans or revolving funds with flexible terms to help fishers invest in better gear, storage, and processing facilities, thereby improving productivity and household food security.
iii. Training and support should be provided to encourage alternative income-generating activities such as aquaculture, fish trading, agriculture, or small-scale businesses, reducing over-reliance on fishing and increasing household resilience.
iv. Regular and accessible extension services should be made available to fishers, focusing on sustainable fishing practices, environmental conservation, and value chain development.

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