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SOCIO-ECONOMIC CHARACTERISTICS OF FISH INGREDIENTS VALUE CHAIN ACTORS ACROSS NIGERIA'S SIX GEO -POLITICAL ZONES

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ABSTRACTS

Socio-economic analysis of ingredient producers, ingredients suppliers, feed millers, and fish farmers across six geopolitical zones in Nigeria was conducted using data from 975 randomly selected respondents. Structured questionnaires were administered to ingredient producers, suppliers, feed millers and fish farmers in 65 LGAs across 22 States and the Federal capital territory. Data was collected digitally using kobo collect and analyzed through descriptive statistics. The gender assessment showed more males across sector: 60% of ingredient sellers, 76% of producers, 85% of feed millers, and 77% of fish farmers. Most were in the active age groups (18-40 and 41-60), with education levels varying: producers and feed millers had high tertiary education (60% and 72%, respectively). A majority were married (81%-82%) across groups, with varying levels of literacy and education. Most ingredient producers (68%) farm ingredients, while 14% are formally employed and 18% run other businesses. Among feed millers, 41% engage in feed milling, while fish farmers mainly farm fish (61%) and 18% hold formal jobs. Others combine fish farming with small businesses (15%) and waged labour (5%). Farming is the main occupation of a larger number of respondents supporting the importance of aquaculture in providing employment for out-of-school graduates and provides vital livelihoods for both young and middle-aged individuals, with a majority being married.

Keywords: ingredients' suppliers, value chain, geopolitical zones, socio-economic characteristics, enumerators

Introduction

Nigeria, the most populous country in Africa with an estimated 229.5 million people (Sasu, 2024) has a demand for fish of about 3.6 million tonnes annually. However, domestic production is just 1.2million metric tonnes from aquaculture, artisanal and industrial sectors, out of which 90% of this is consumed domestically. In Nigerian households, fish plays a vital role and important dietary element contributing about seven percent of the daily per capital consumption of animal protein. Nevertheless, per capital fish consumption is 11.3kg below the global average value of 21kg. (WorldFish, 2024 and FAO, 2024). Nigerian's aquaculture sector faces challenges in development, primarily due to the high cost of production. The high cost of fish feed continues to be a challenge, particularly for small-scale fish farmers in the aquaculture industry. A significant portion, about 70% of the total cost of raising fish to market size is attributed to feed (Rashid and Kurt, 2018; Onyekuru et al., 2019 and Omeje et al., 2020). Feed plays a critical role in stimulating feeding behaviour and promoting growth in fish, while feed intake is the key factor that impacts efficiency and costs, making it a determinant in maximizing production efficiency in aquaculture industry (Assan et al., 2021). The production of feed ingredients and fish farming business can generate employment, improve the socio-economic conditions of feed millers and fish farmers, and contribute to generating foreign exchange earnings. According to Oluwasola and Ajayi (2013), fish farming has the potential to create jobs, improve the socio-economic well-being of farmers, and contribute to foreign exchange earnings.

In Nigeria, most fish feed is produced either locally by small-scale feed millers and medium scale on farm by fish farmers, using ingredients sourced from local marketers and producers. However, many stakeholders face challenges such as limited access to funds and high transportation costs, which inflate the price of feed ingredients (Nnaji et al., 2019). Addressing these issues and ensuring access to high – quality, affordable feed ingredients is crucial for fostering sustainable growth in Nigeria's aquaculture sector. This study was designed to assess the socio-economic characteristics of fish farmers, fish feed millers, feed ingredients producers and ingredients suppliers/marketers to know how they influence the aquaculture sector as a business and means of income diversification.

Methodology

Study area

Nigeria being the most populous country in Africa with highest population estimated at around 229.5 million (Sasu, 2024) covers 356,668sq miles (923,768 sq kilometers) located between latitude 4^{O}N and 14^{O}N of the equator and between longitude 3^{O}E and 15^{O}E of the

Greenwich meridian. Nigeria experiences a tropical climate characterized by distinct wet and dry seasons with rainfall varies considerably across the country. Nigeria is one of the largest fish -producing countries in Africa. The most cultured species are African catfish and tilapia because of their fast growth, adaptability and high market demand. The country has a large and diverse population of fish farmers engaged in small-scale, medium- scale, and commercial scale across the country. Fish farming, which is the fastest-growing component of fisheries sector has become a major means of increasing domestic fish supply. Nigeria is divided into six geopolitical zones administratively comprising of 36 states and Federal Capital Territory (FCT) and twenty-two (23) states with Federal Capital Territory (FCT) (Figure 1) were randomly selected and sixty-five (65) Local Governments for this study

Survey design

Data was collected from nine hundred and seventy-five (975) respondents with structured questionnaires to obtain information from sixty-five Local Governments Areas. A simple random sampling method was employed to select respondence from the sixty-five local government areas. This ensured that each potential participant had as equal chance of inclusion thereby minimizing bias and enhancing representativeness of the data. The questionnaires were structured to target information on the demographic profile and socio-economic characteristics of the ingredient's producers, ingredients sellers, feed millers and fish farmers in the selected local government areas in six geo -political zones. Respondents' years of experience, gender, marital Status, educational attainments as well as challenges faced were accessed.

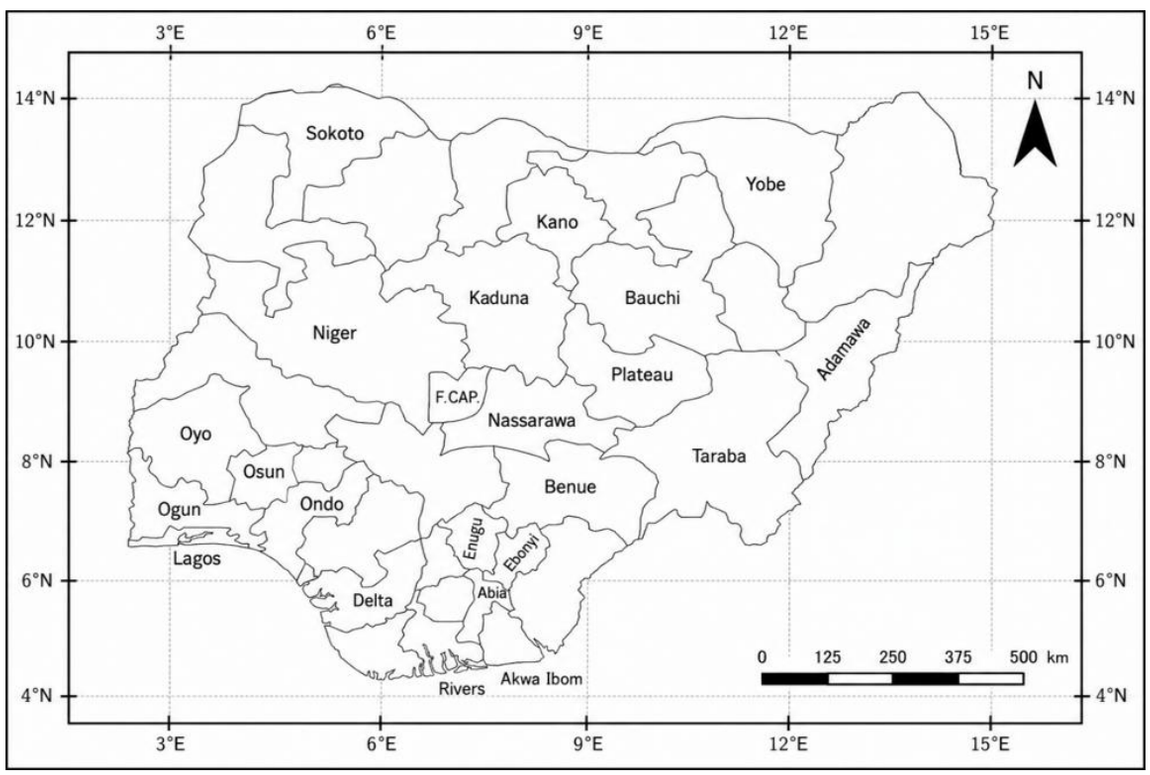


Figure 1: Map of Nigeria showing surveyed States.

Data collection

Questionnaire forms were imported from Kobo collect; powerful and reliable software used for data collection. Respondents were interviewed one-on-one by the trained enumerators assigned to them in the selected Local Government Area. The data collected was deployed, digitalized, backed up, and recorded to an iCloud storage system for safety and availability.

Data Analysis

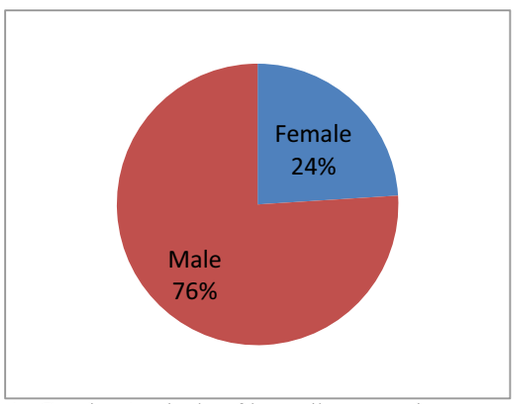
All the data collected were recorded and inputted into a Microsoft Excel spreadsheet for statistical analysis and analysed using statistical packages for social Sciences (IBM SPSS statistics 25). The data were represented using descriptive statistical analysis.

Results

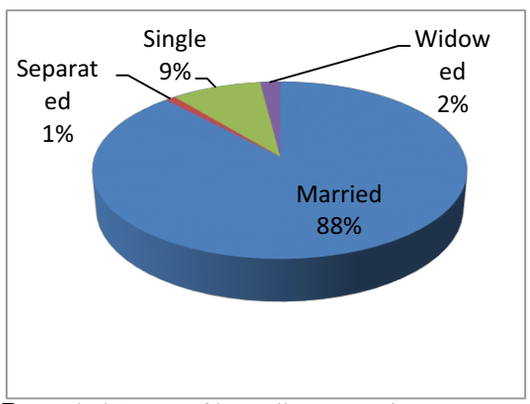
1. Socio-economic Characteristics of Ingredients Producers in the six Geopolitical zones of Nigeria

Figures 2A-E depict the socio-economic characteristics of ingredients' producers across Nigeria's six geopolitical zones. The gender analysis reveals that 76% of the producers are male, while 24% are female (Figure 2A). The marital status assessment showed that 88% and 9% of

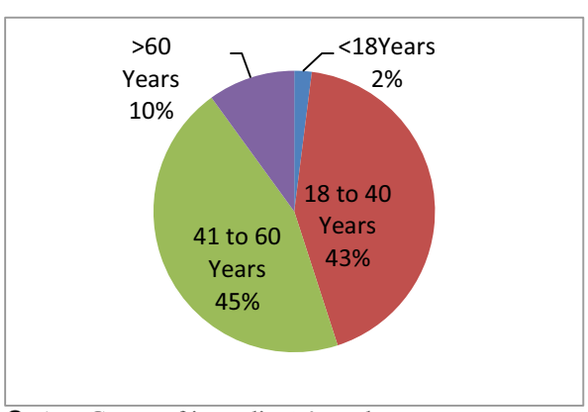
the producers were married and single, respectively, while 2% were widows and 1% separated (Figure 2B). Many are within economically active age, with 43% aged 18-40 and 45% between 41 to 60 years. In contrast, 10% are over 60 years old, while 2% are below 18 years (Figure 2C). Figure 2D indicates that most ingredients' producers are literate with 60% attaining tertiary education, 30% secondary education and 10% primary education. Farming was the predominant occupation among ingredients producers (68%) while 14% were formally employed, 18% engaged in other business activities as shown in figure 2E.



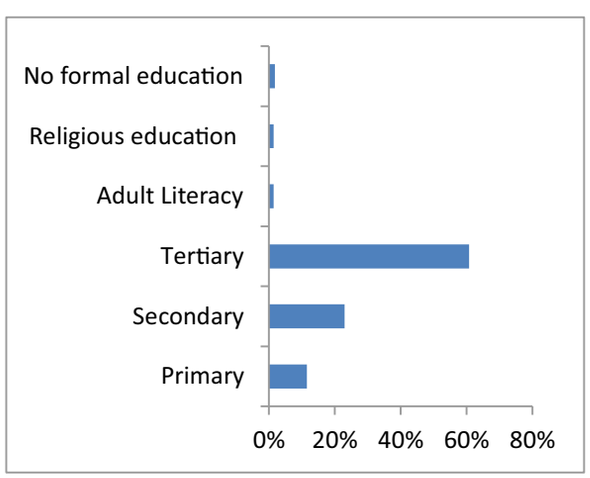
A. Gender Analysis of ingredients producers



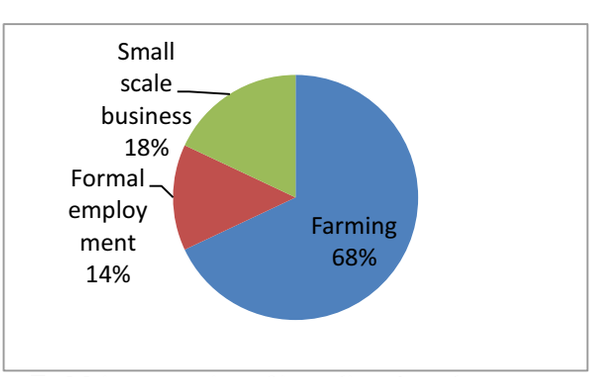
B. Marital Status of ingredients' producers



C. Age Group of ingredients' producers



D. Educational Status of Ingredients' Producers

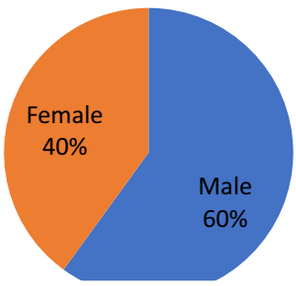


E. Main occupation of ingredients' producers

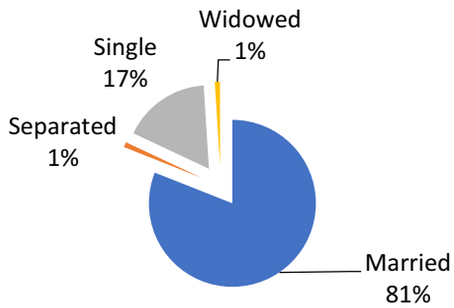
Figure 2 A - E: Socio-economic Characteristics of Ingredients Producers in the six Geopolitical zones

2. Socio-Economic Characteristics of Ingredients sellers

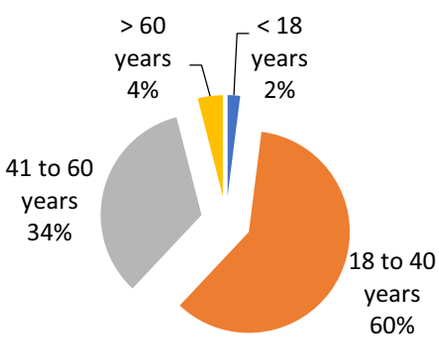
The socio-economic characteristics of the ingredients' sellers are illustrated in Figure 3A-E, showing that 60% are males and 40% female. Most sellers (81%) are married and belong to the active age group of 18 to 40 years. In terms of education, 45% have secondary education, 27% have tertiary education, and 7% have no formal education. Small-scale businesses account for 18%, formal employment 14% and farming 68%.



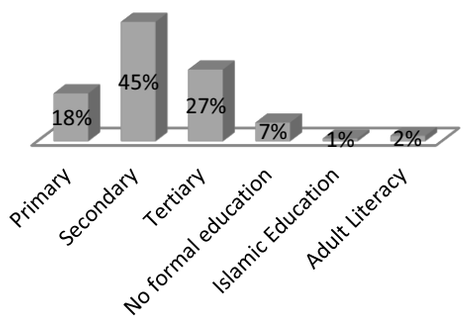
A: Gender of Ingredients' **Sellers**



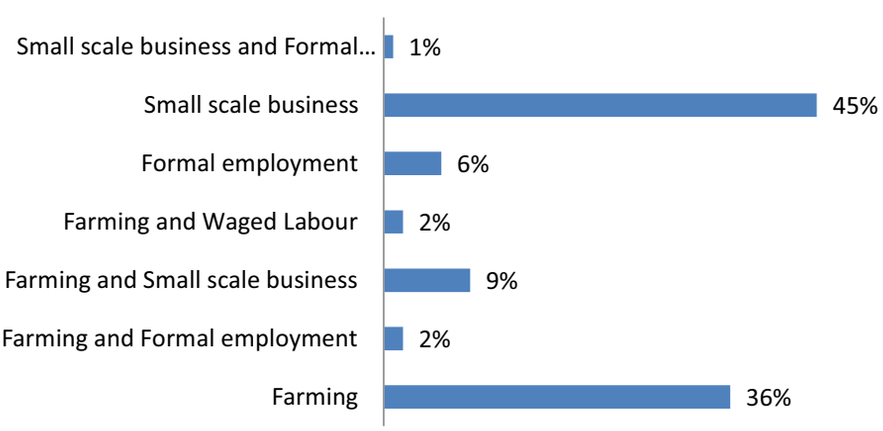
B: Marital Status of ingredients' Sellers



C: Age of ingredients' Sellers



D: Educational Attainment of ingredient sellers



E: Other Occupations of Respondent

Figure 3A - E: Socio-Economic Characteristics of Ingredients sellers

3. Socio-economics characteristics of the feed millers in the six geopolitical zones

The gender assessment revealed that 85% of feed millers were males, while 15% were females (Table 1). Most feed millers were within active groups, with 37% aged 18 to 40 and 55% aged 41 to 60, while 8% were over 60 years old. The marital status assessment showed that 88% and 12% of the feed millers were married and single respectively. Majority of feed millers are literate with 78% having tertiary education, 17% had secondary education, 4% had primary and 1% adult literacy education. 44% of the respondents had been in the business of feed milling for more than 10years while 38% for 5 - 10years and 18% for less than 5years. The occupation of some of the feed millers was majorly farming (41%) while others were involved in other businesses, wagged labour, formal employment and farming as shown in Table 1.

Gender	Frequency(n)	Percentage (%)
Male	110	85
Female	20	15
Total	130	100
Marital Status		
Married	114	88
Single	16	12
Total	130	100
Age		
18 to 40 years	48	37
41 to 60 years	71	55
> 60 years	11	8
Total	130	100
Educational Attainment		
Primary	5	4
Secondary	22	17
Tertiary	102	78
Adult Literacy	1	1
Total	130	100
Other Occupation		
Farming	53	41
Farming and formal employment	**11**	9
Farming, formal employment and small scale business	3	2
Farming and small scale business	11	9
Farming and waged labour	1	1
Farming, waged labour, formal employment and small scale business	3	2
Formal employment	13	10
Formal employment and farming	3	2
Formal employment and small-scale business	7	5
Metal work	3	2
Small scale business	19	15
Waged Labour	3	2

4. Socio-economic Characteristics of the fish farmers in the six geopolitical zones

Table 2 indicated the socio-economic characteristics of the total respondents. Gender-wise the females were not left out so there were 77% male and 23% female fish farmers. The marital status data showed that 82% were married while 14% of the fish farmers were single. Majority were within the age group of 18-40 and 41-60 with 45% and 44% respectively, while 72% had tertiary education, 20% had secondary, 5% primary and others adult and religious literacy.

In all 61% of the fish farmers had farming as their main occupation while 18% were doing fish farming along with their formal employment and others had small scale business (15%) and waged labour (5%).

Gender	Frequency (n)	Percentage (%)
Female	76	23
Male	253	77
Total	329	100
Marital status		
Married	271	82
Separated	6	2
Single	47	14
Widowed	5	2
Total	329	100
Age		
< 18 years	1	0
18 to 40 years	148	45
41 to 60 years	145	44
> 60 years	35	11
Total	329	100
Educational qualification		
Primary	18	5
Secondary	66	20
Tertiary	237	72
Adult Literacy	3	1
Religious education	2	1
No formal education	2	1
Total	329	100
Main Occupation		
Farming	202	61
Formal employment	60	18
Small scale business	49	15
Waged Labour	18	5
Total	329	100

Discussion

The socio-economic characteristics of the ingredient's sellers reveal a notable gender suggesting that marketing of ingredients in Nigeria. Market is not dominated by a single gender but reflect inclusive participation (Ogunremi *et al.* 2025). This balance may enhance market efficiency by drawing on the strength and contribution of both men and women. Furthermore, the high proportion of married respondents (81%) indicates that most marketers are likely to have significant household responsibilities. This may partly explain their commitment to the business, as it serves as a key source of livelihood for meeting daily family needs. Consequently, their marital status could be associated with a stronger sense of responsibility and dedication to sustaining and growing their business activities. However, majority complained about lack of enough fund to boost the business (Nnaji *et al*., 2019) and high cost of transportation which is affecting the retail price of the ingredients. Seasonality is one of the major criteria that the feed millers could exploit to acquire ingredients at cheaper price during harvesting period to be able to produce at relatively moderate cost across the year if funds are available to carry out such exercise. Thus, explain why 36% of them have farming as other occupations and 45% with small scale business.

The socio-economic characteristics show that most feed millers and fish farmers are male indicating a male dominating sector and 82% of the fish farmers were married suggesting strong family's responsibilities and implies that aquaculture activities are largely driven by the need to support household welfare. Marriage status may also influence farmers' decisions to engage in stable income-generating ventures like fish farming (Oluwemimo and Damilola, 2022; Brummett, 2020; Omeje et al., 2020). The finding agrees with the earlier reports that fishery activities are predominantly carried out by adult, married men rather than females, youths, or unmarried individuals (Fakoya and Daramola, 2008, Omobepade, 2022). The age distribution of fish farmers, with 44% aged 41-60 years and 45% aged 18-40 years, indicates that aquaculture serves as an important livelihood option across both young and middle-aged groups. This suggests that the sector provides income opportunities for individuals who may otherwise struggle to support their families, especially since most respondents are married. The involvement of these age groups highlights aquaculture as a key source of employment and household sustenance in the study area (Akinrotimi *et al*., 2018; FAO, 2022; Maina *et al*., 2023). This suggest that these feed millers and fish farmers are still in their productive years and have the potentials for aquaculture expansion in Nigeria. The educational qualification also showed that aquaculture had been able to put smiles in faces that would have been under frustration as majority of the fish farmers had tertiary education. Good education is believed to enhance innovation as well as enhance proper documentation in

farm business (Olasunkanmi et al., 2012). Farming is the main occupation of a larger number of respondents supporting the importance of aquaculture in providing employment for out-of-school graduates.

Across all the stakeholders assessed, men were observed to be more prominent suggesting that there is a limit to women participation in these specific activities especially feed ingredients production, feed production and fish farming. This observation aligns with the findings of Adam et al., (2025) who reported that men derive greater benefits than women within these segments of the aquaculture value chain. A key factor contributing to this disparity may be women's reduced access to capital, which constrains their ability to invest in such ventures. Furthermore, the operation of feed mill machine is often perceived as a male -oriented task, a perception reinforced by the gender distribution in feed milling industries: only 15% women compared to 85% men.

The occupational distribution of fish farmers shows that aquaculture is primarily practiced as a main livelihood activity, with 61% identifying fish farming as their primary occupation. This suggests that aquaculture is not merely a supplementary source of income but a central economic activity for the majority of the participants. Similar findings have been reported in other studies, where aquaculture has been recognized as a key livelihood strategy in rural communities (FAO, 2024; Adams et al., 2025). Fish farmers combining aquaculture with formal employment or small-scale businesses demonstrate aquaculture flexibility as an enterprise that can complement other occupations. It may also indicate that fish farming does not yet provide sufficient income security, pushing farmers to diversify.

Conclusion and recommendation

Aquaculture provides vital livelihoods for both young and middle-aged individuals, with a majority being married. It also offers employment opportunities for tertiary-educated and out-of-school graduates, highlighting its importance in reducing unemployment, supporting families and alleviating poverty. Studying these characteristics provides insight into the capacity of stakeholders in the fish feed value chain, enabling the design of targeted intervention that improves productivity, sustainability and livelihoods.

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References

Adam, R.I., Njogu, L.G., Ouko, K.O., Rajaratnam, S., Adeleke, L., Ogunya, L. Akuwa, E., Farnworth, C. and Fregene, B. (2025). Unveiling gender dynamics and disparities in the aquaculture value chain: evidence from Ogun and Delta States, Nigeria. *Aquaculture International*, 33: e343, 1-30. https://doi.org/10.1007/s10499-025-01966-1

Akinrotimi, O. A., Abu, O. M. G., George, O. S. (2018). Socio-economic characteristics of fish farmers in the Niger Delta, Nigeria. *International Journal of Fisheries and Aquatic Studies*, 6(2), 123–129.

Assan, D., Huang, Y., Mustapha, U.F., Addah, M.N., Li Guangli and Chen, H., (2021). Fish feed intake, feeding behavior, and the physiological response of apelin to fasting and refeeding. *Front. Endocrinol*., 12: 1-12. https://doi.org/10.3389/fendo.2021.798903

Brummett, R. E., Youaleu, J., Tiani, L. N., and Kenmegne, A. M. (2020): Women's traditional fishery and alternative aquatic resource livelihood strategies in the southern Cameroonian Rainforest. *Fisheries Management and Ecology*, 17, 221 – 230. 28.

Doris Dokua Sasu (2024): Population of Nigeria selected years between 1950 and 2024 https://www.statista.com/statistics/1122838/population-of-nigeria

FAO (Food and Agriculture Organization). (2022). The State of World Fisheries and Aquaculture (SOFIA). Rome: FAO. https://www.fao.org

Food and Agriculture Organization (FAO). (2024). Nigeria - Fisheries and Aquaculture Country Profile. Rome: FAO.

Fakoya, E.O. and Daramola, B.G. (2008). Socioeconomic factors influencing farmers' participation integrated fish farming in Ogun State. *Nigerian Journal of Rural Sociology* 81: 9-17.

Omeje, J.E., Achike, A.I., Nwabeze, Ibiyo, L.M.O and Jimmy, S.P. (2023): Economic Analysis of Locally Produced Aquaculture Feeds with Complements of Plant-based Ingredients in Kainji Lake Basin, Nigeria. Research on World Agricultural Economy Volume 04 Issue 01 Research on World Agricultural Economy https://ojs.nassg.org/index.php/rwae

Maina, J.G., Mbuthia, P.G., Ngugi, J., Omolo, B., Orina, P., Wangia, S.M., Karuri, E.G., Maitho, T., and

Owiti, G.O. (2023). Influence of social-economic factors, gender and the Fish Farming Enterprise and Productivity Project on fish farming practices in Kenya. *Livestock Research and Rural Development*, 26, 2-12.

Nnaji, J. O, Abdulshakur M. M., Al-Mustapha, A., Haruna Fatima, Fatima Z I. and Eze P. U. (2019): Socio-Economic Characteristics of Palm Oil Marketers in Nkanu East L.G.A. of Enugu State, Nigeria. *South Asian Research Journal of Agriculture and Fisheries.* 143 – 147.

Ogunremi, J. B., Akinyemi, M., Onimisi, M. M., Yusuf, A., and Adesina, S. A. (2025). Socio- Economic Characteristics of Fish Farmers and fingerling procurement In Ibi Local Government, Taraba State, Nigeria. *Nigerian Journal of Animal*

Production, 1819–1822. https://doi.org/10.51791/njap.vi.8671

Oluwasola, O. and Ajayi, D. (2013). Socio-Economic and Policy Issues Determining Sustainable Fish Farming in Nigeria. *International Journal of Livestock Production.* 4 (1), 1-8.

Olasunkanmi, J.B., Omitoyin, B.O and Ipinmoroti, M.O. (2012). Social structure of fish farmers Osun State, South-Western Nigeria. *Biological and Environmental Sciences Journal for the Tropics.* 9(1): 406-411.

Omeje, J.E., Sule, A.M., Aguihe, E.O., (2020). An assessment of aquaculture table-size fish farmers activities in Kainji Lake Basin, Nigeria. *Agro-Science*. 19(2), 36-40. DOI: https://doi.org/10.4314/as.v19i2.6

Omobepade, B.P., Adebayo, O. T., Amos, T.T and Adedokun, B.C. (2022). Profitability analysis of aquaculture in Ekiti State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 11(1), 114-119. 6.

Onyekuru, N.A., Ihemezie, E.J. and Chima, C.C., (2019). Socioeconomic and profitability analysis of catfish production: A case study of Nsukka Local Government area of Enugu State, Nigeria. *Agro-Science*. 18 (2), 51-58. DOI: https://doi.org/10.5539/jfr.v7n5p57

Rashid, S., Kurt, A.R., (2018). Techno-economic analysis of extruded aquafeeds. *Journal of Food Research.* 7(5), 57-68. DOI: https://doi.org/10.5539/jfr.v7n5p57

WorldFish. (2024). Aquatic Food Systems in Nigeria: Supply, Demand, and Security Summary. WorldFish Center. https://www.worldfishcenter.org/annual-report2024/