Socio-Economic Characteristics and Extension Service Utilization among Fish Farmers in Oredo Local Government Area, Edo State, Nigeria

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ABSTRACT

This study examined the relationship between the socio-economic characteristics of fish farmers and their utilization of extension services in Oredo Local Government Area, Edo State, Nigeria. The study described the socio-economic characteristics of the farmers, identified their sources of fish farming information, Identify extension services utilized by fish farmers; and determine the relationship between socio-economic characteristics of fish farmers and their utilization of extension services

A multistage sampling technique was used to select 119 fish farmers. Data were analyzed using descriptive statistics, while Chi-square analysis was used to test the relationship between socio-economic characteristics and extension service utilization.

The results showed that 28.6% of the respondents were between 41 and 50 years old. Males constituted 52.9% of the farmers, while 53.8% were married. Most respondents (67.8%) were Christians. Only 11.8% had no formal education, while the majority had tertiary education. About 82.5% operated farms between 0 and 0.5 hectares, and 63.2% owned three ponds. The internet (80%), fellow farmers (65.5%), and extension agents (45.5%) were the major sources of information.

The Chi-square results revealed that educational level, farm size, and farming experience significantly influenced the utilization of extension services. The study recommends that extension programs should target farmers with lower education levels and smaller farm sizes to improve service utilization.

Keywords: Fish farming, Extension services, Information sources, Service utilization

INTRODUCTION

Fish farming, also called aquaculture, is the technology or process of rearing fishes in controlled settings in order to be used for commercial or even recreational purposes (Food and Agricultural organisation, 2023). This includes the raising of fish, either in a pond, a tank or cage, and providing them with food, water and other necessary resources to promote their growth and survival (World Bank, 2020). In Nigeria, fish farming is a popular and increasingly growing business that is led by the demand for healthy animal protein. About 80% of fish farmers in Nigeria engage in farming of catfish which is the commonest type of fish used in aquaculture. The insatiable demand for fish in fishery product such as Catfish and Tilapia, has constantly self-promoted the steady growth and expansion of the fish industry, with the fish farming thriving in most parts of Nigeria, mainly in the South west, South south east and North central parts of Nigeria.

Edo State is richly endowed with amusing wealth of inland water-bodies, flood plains wet lands which are highly productive and ideal for artisan Fisheries, and development of aquaculture (Edo State Economic Empowerment

and Development Strategy (Edo SEEDS), 2005). While artisan fisheries is largely under developed, investments on fish farming have been growing recently though production and employment has been modest. In order to achieve improved productivity and socio-economic wellbeing of fish farmers, there is need to understand the factors that affect their access to and utilization of support services, particularly extension services.

Extension delivery in aquaculture refers to the transfer of information, knowledge, skills, resources and technologies from research institutions and extension agencies to fish farmers using different extension methods such as workshops, field trips, visits, demonstrations, radio, television, peer educators and so on. Agricultural extension services have been one of the main conduits of addressing rural poverty and food insecurity because it has the means to transfer technology, support rural adult learning, assist farmers in problem-solving and get farmers actively involved in the agricultural knowledge and information system (Ongachi & Belinder, 2025) Extension services bridge the gap between research and farmers for increased productivity and improved livelihood serving as the source of information on new technologies on fish farming communities which when adopted can increase and improve the performance of farmers in production and quality of life and income and hence liberate households from poverty (Bonye *et al.,* 2012, DFID, 2001).

The extension needs of fish farmers include how to formulate balanced diets, how to source sustainable feed options, best ways to handle water quality issues, how to source for fingerlings, frys and juveniles, the best breeding techniques, methods of preserving fish quality, how to detect common fish diseases, disease preventive measures and so on. The intensive culture of food fish which aims at maximizing the optimal production of fish has led to outbreaks of various diseases and consequent annual economic losses estimated at billions of dollars globally (Mousavi & Zorriehzahra, 2021 ; El-Saadony *et al.,* 2022). According to (Hegde *et al.,* 2022; Ruben *et al.,* 2025) disease crisis and lack of quality water and feed are serious limitations to the advancement of animal production, fish inclusive.

The process of information exchange has often been achieved through various approaches of agricultural extension service delivery such as Training and Visit (T&V), Unified Agricultural Extension Services (UAES), Contact Farmer or Farmer-to-Farmer approaches, and Transfer of Technology approaches to ensure farmers access information adequately for enhanced production (Oladele, 2001; Yahaya, 2003).

(Mousavi & Zorriehzahra, 2021) Also stated that the quality of information depends on three solid pillars: accuracy, timeliness, and relevance. Therefore, the quality of extension delivery depends on the accuracy of the information, when the information reaches the fish farmers, and the relevance of the information to the fish farmers.

Understanding the link between the socio-economic characteristics of farmers and their use of extension services is crucial for the design of effective and inclusive extension programs. Different farmer groups may have different information needs, learning preferences, and capacities to implement recommended technologies.

Without a clear understanding of how socio-economic factors affect extension service utilization, extension programmes may become ineffective or inequitable and may fail to reach farmers who need the services most.

This study therefore addresses these knowledge gaps by examining the relationship between the socio-economic characteristics of fish farmers and their utilization of extension services in Oredo Local Government Area of Edo State.

Objectives of the Study

i. Describe the socio-economic characteristics of fish farmers in the study area;

ii. Identify the sources of information on fish farming utilized by respondents;

iii. Identify extension services utilized by fish farmers; and

iv. Determine the relationship between socio-economic characteristics of fish farmers and their utilization of extension services.

Hypothesis of the Study

The following hypothesis is stated in the null form:

H_0: There is no significant relationship between socio-economic characteristics of fish farmers and utilization of extension services.

METHODOLOGY

The study was undertaken in Oredo Local Government Area of Edo State. Edo State is located in the South-South geopolitical zone of the Federal Republic of Nigeria. It lies approximately between Longitude 05°04' and 06°43' East and Latitude 05°44' and 07°34' North.

Edo State borders Kogi State to the north for 133 km and across the Niger River for 81 km to the northeast, Anambra State to the east for about four kilometres across the Niger River, Delta State to the southeast and south for 350 km, and Ondo State to the west.

Edo State covers approximately 32,300 square kilometres, making it the 22nd largest state in Nigeria (Edo State Government, 2023). It is home to a diverse economy with significant sectors including agriculture, trade, manufacturing, and services (Afolayan *et al.,* 2018).

Edo State is divided into three senatorial districts: Edo South, Edo Central, and Edo North. The South and Central parts lie in the forest belt, while the northern part lies in the Guinea Savannah zone. Savannah ecosystems dominate the far northern sections, while freshwater swamps, mangrove, and riverine areas abound in the southern part.

Edo South Senatorial District covers seven Local Government Areas (LGAs) and constitutes 57.54 percent of the population of the state. Edo North Senatorial District has six LGAs and constitutes roughly 25 percent of the population, while Edo Central Senatorial District has five LGAs and constitutes 17.14 percent of the state's population.

The headquarters of Edo South Senatorial District is Oredo Local Government Area, which forms the focus of this study.

The scope of the study covers fish farmers in Oredo Local Government Area of Edo State.

Sampling Procedure and Sample Size

A multistage sampling procedure was adopted for the study. In the first stage, purposive sampling was used to select six (6) communities within Oredo Local Government Area where fish farming activities are predominant. In the second stage, twenty (20) fish farmers were randomly selected from each of the selected communities using a list obtained from the Edo State Agricultural Development Programme (ADP). This resulted in a total sample size of one hundred and twenty (120) respondents. Structured questionnaires were administered to the selected farmers to obtain the required data. However, only one hundred and nineteen (119) questionnaires were successfully retrieved and found suitable for analysis.

Instrument for Data Collection

Data used for the study were obtained through primary and secondary data sources.

Primary data were collected through the use of a structured questionnaire containing questions relevant to the study.

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Secondary data were obtained from existing documents such as textbooks, journals, articles, and other literature materials.

Measurement of Variables

Independent Variables

i. Age: Respondents were asked to indicate their actual age.

ii. Sex: Respondents' sex was measured as male or female.

iii. Marital Status: Measured as single, married, divorced, or widowed.

iv. Religion: Measured as Christian, Muslim, traditional worshipper, or others.

v. Level of Education: A list of various qualifications was provided, and respondents were required to indicate the level of education attained.

vi. Farm Size: Respondents indicated their actual farm size, measured in hectares.

vii. Number of Ponds: Respondents indicated the number of ponds on their farmland.

viii. Farming Experience: Respondents indicated their years of farming experience.

ix. Average Monthly Income: Respondents indicated the amount they earn per month.

Dependent Variables

Sources of Information:

A list of information sources such as radio, television, newspapers, internet, and personal communication was provided. Respondents were required to indicate Yes or No.

Utilization of Extension Delivery:

A list of extension delivery services was provided and respondents indicated how well they utilized extension delivery services using a three-point Likert scale:

- Very Frequently (3)
- Frequently (2)
- Rarely (1)

A mean score above 2.0 indicated high utilization of extension delivery, while a mean score below 2.0 indicated low utilization of extension delivery.

Data Analysis

Both descriptive and inferential statistics were employed for data analysis.

Objectives 1, 2, and 3 were analyzed using descriptive statistics such as means, frequencies, percentages, and standard deviation.

The hypothesis was tested using the Chi-square statistical test.

Chi-square is a statistical hypothesis test used to determine whether there is a significant association between two categorical variables in a dataset. It compares observed frequencies with expected frequencies that would occur if there were no association between the variables.

The Chi-square formula is expressed as:

$$X^2 = \frac{\sum(O_i - E_i)^2}{E_i}$$

Where:

- X^2 = Chi-square value
- Oi = Observed frequency
- Ei = Expected frequency
- In this study, the observed frequencies represent the actual responses obtained from the fish farmers during the survey, while the expected frequencies represent the values that would be expected if there were no relationship between the variables being tested.
- The Chi-square analysis was used to test the relationship between selected socio-economic characteristics of fish farmers such as age, sex, marital status, religion, educational qualification, farm size, number of ponds, farming experience, average monthly income, and contact with extension agents, and their utilization of extension services.
- The decision rule for the test was based on the probability value (p-value). If the p-value was less than 0.05 ($p < 0.05$), the relationship between the variables was considered statistically significant, and the null hypothesis was rejected. However, if the p-value was greater than 0.05 ($p > 0.05$), the relationship was considered not significant, and the null hypothesis was accepted.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

The socio-economic characteristics of the respondents are shown in Table 1. The result shows that 28.6% of the total respondents were between the ages of 41 and 50 years. This implies that the majority of fish farmers in the study area are within the economically active and productive age bracket. This finding is in line with the study of (Ayeloja, Adebisi, & Oyebode, 2021). who reported in their work that the majority of fish farmers in Oyo State were within the age bracket of 31–50 years.The result also revealed that 52.9% of the respondents were male while 47.1% were female. This shows that fish farming in the study area is not gender biased and that both males and females are actively involved in fish farming activities. This finding is in consonance with (Olaniyi et al., 2025).who reported that fish farming is practiced by both males and females in Nigeria.The marital status of the respondents reveals that 53.8% were married, 30.3% were single, 10.9% were divorced, while 5.0% were widowed. This implies that the majority of the fish farmers in the study area were married. The religious affiliation of the respondents indicates that 67.8% were Christians, 31.1% were Muslims, while 1.7% practiced traditional religion. This means that Christianity is the dominant religion in the study area.

The educational level of the respondents shows that 11.8% had no formal education, 10.1% had primary education, 24.4% had secondary education, while 53.8% had tertiary education. This implies that the majority of fish farmers in the study area were educated and literate. This finding agrees with (Olaniyi *et al.,* 2025).who stated that most fish farmers in Nigeria have formal education. The high level of education among respondents could make it easier for them to adopt improved fish farming technologies and utilize extension services.

The farm size of the respondents indicates that 82.5% had farm sizes between 0–0.5 hectares, 13.4% had farm sizes between 0.6–1.0 hectares, while 4.2% had farm sizes above 1.0 hectares. This implies that the majority of fish farmers in the study area are small-scale farmers. This finding agrees with (Ayeloja, Adebisi, & Oyebode, 2021). who stated that most fish farmers in Nigeria operate on a small scale.The number of ponds owned by the

respondents shows that 63.2% had three ponds, 20.2% had four ponds, 10.1% had two ponds, while 6.7% had more than four ponds. This implies that the majority of fish farmers in the study area have a moderate number of ponds.The farming experience of the respondents indicates that 57.1% had farming experience between 4 and 6 years, 28.6% had farming experience between 1 and 3 years, 10.1% had between 7 and 9 years, while 4.2% had 10 years and above. This implies that the majority of fish farmers in the study area have considerable farming experience, which could increase their understanding and utilization of extension services.The monthly income of the respondents shows that 37.6% earned between ₦51,000 and ₦100,000 monthly, 31.1% earned between ₦101,000 and ₦150,000, 18.5% earned between ₦151,000 and ₦200,000, 8.4% earned less than ₦50,000, while 4.2% earned above ₦200,000. This indicates that fish farming is a lucrative business in the study area and could serve as a good source of income for farmers.Contact with extension agents revealed that 76.8% sometimes came in contact with extension agents, 13.4% always had contact, while 9.2% never had contact with extension agents. This implies that the majority of fish farmers in the study area have contact with extension agents, although the frequency of contact is not regular. This irregular contact pattern could affect the effectiveness of extension service delivery in the study area.

Table 1: Socio-Economic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)	Mean
Age of Respondents (years)	21–30	26	21.8	
	31–40	31	26.1	
	41–50	34	28.6	
	51–60	20	16.8	
	61–70	5	4.2	
	71 and above	3	2.5	
	Total	119	100	41.75
Sex of Respondents	Female	56	47.1	
	Male	63	52.9	
	Total	119	100	
Marital Status	Single	30	25.2	
	Married	64	53.8	
	Divorced/Separated	14	11.8	
	Widowed	11	9.2	
	Total	119	100	
Religion	Christianity	81	67.8	
	Islam	19	16	
	Traditional	12	10.1	
	Other religions	7	6.1	
	Total	119	100	
Educational Qualification	No formal education	14	11.8	
	Primary education	12	10	
	Secondary education	26	21.9	
	Tertiary education	67	56.3	
	Total	119	100	
Farm Size (hectares)	0 – 0.5	101	85.2	
	0.6 – 1.0	14	11.6	
	1.1 – 1.5	4	3.2	
	Total	119	100	
Number of Ponds	1 pond	5	4.4	

	2 ponds	39	32.4	
	3 ponds	75	63.2	
	Total	119	100	
Farm Experience (years)	1–3	34	28.6	
	4–6	68	57.1	
	7–9	8	6.7	
	Over 10	9	7.6	
Farm Experience (years)	Total	119	100	5.7
Average Monthly Income (₦)	10,000 – 50,000	23	19.3	
	51,000 – 100,000	45	37.8	
	101,000 – 150,000	34	28.6	
	151,000 – 200,000	17	14.3	
	Total	119	100	97000
Contact with Extension Agents	Always	5	4.2	
	Often	5	4.2	
	Rarely	5	4.2	
	Sometimes	91	76.5	
	Never	13	10.9	
	Total	119	100	

Field survey, 2026

Sources of Information on Fish Farming:

Table 2 shows the sources of information on fish farming available to the respondents. The result shows that about 80% of the respondents confirmed the internet as their source of information. This implies that the majority of fish farmers in the study area are highly dependent on the internet for information on fish farming. This finding highlights the growing role of Information and Communication Technology (ICT) in the dissemination of agricultural information. The high reliance on the internet could be attributed to the relatively high level of education among the respondents and the increasing availability of internet services in the area.Other sources of information identified include fellow farmers (65.5%), extension agents (45.5%), radio (38.7%), television (32.8%), newspapers (28.6%), and agricultural shows (22.7%). This indicates that farmers rely on a variety of information sources, suggesting that they actively seek information from multiple channels. However, the relatively lower percentage of farmers using extension agents (45.5%) compared to the internet (80%) suggests a shift in information-seeking behavior. This calls for the integration of digital platforms into extension service delivery. This finding is in line with Idisi *et al.* (2025)who reported that farmers' innovativeness and access to agricultural information are increasingly driven by modern training approaches and digital extension systems.

The high usage of the internet as a source of information also suggests that fish farmers are adapting to modern information dissemination technologies.

Table 2: Sources of Information on Fish Farming

S/N	Information Source	Response	Frequency	Percentage %
1	Radio	Yes	31	26.1
		No	88	73.9
		Total	119	100
2	Television	Yes	36	30.3
		No	83	69.7

		Total	119	100.0
3	Newspaper	Yes	39	32.8
		No	80	67.2
		Total	119	100.0
4	Internet	Yes	95	79.8
		No	24	20.2
		Total	119	100.0
5	Friends and relatives	Yes	57	47.5
		No	62	52.5
		Total	119	100.0
6	Magazine	Yes	13	10.9
		No	106	89.1
		Total	119	100.0
7	Telephone	Yes	63	52.9
		No	56	47.1
		Total	119	100.0
8	Journal	Yes	23	19.3
		No	96	80.7
		Total	119	100.0

Field survey, 2026

Extension Services Utilized by Fish Farmers

The extension services utilized by the respondents are shown in Table 3. The result obtained shows that 63.0% of the respondents indicated "how to detect common fish diseases" as the most utilized extension service. This implies that disease management is a critical issue among fish farmers in the study area. The high demand for disease detection services could be explained by the significant losses that fish diseases may cause in fish production. This finding is in line with (Raji *et al.,* 2024) who reported that farmers tend to prioritize extension services that directly enhance productivity and reduce risks in agricultural enterprises. The authors emphasized that technical support services, particularly those related to disease control and farm management, are critical in improving farmers' performance and resilience. Other highly utilized extension services include feed management (58.8%), water quality management (52.9%), pond preparation and construction (48.7%), fish stocking techniques (45.4%), fish breeding techniques (42.9%), marketing information (38.7%), and record keeping (31.1%).The pattern of service utilization indicates the major challenges faced by fish farmers in the study area. The emphasis on disease detection, feed management, and water quality management suggests that farmers prioritize services that have a direct impact on fish survival and productivity.The relatively low utilization of record keeping services (31.1%) indicates the need for greater emphasis on farm management practices among fish farmers.The utilization of these extension services therefore indicates that farmers recognize the importance of technical guidance in improving their fish farming operations. Extension service providers should therefore ensure that adequate attention is given to these critical areas, especially disease management, which appears to be the most pressing need among fish farmers in the study area.

Table 3: Extension Services Utilized by Fish Farmers

S/N	Extension delivery	Response	Frequency	Percentage %	Mean
1	Formulation of balanced feed	Very frequently	21	17.6	
		Frequently	70	58.9	
		Rarely	28	23.5	
		Total	119	100.0	2.76
2	Sourcing of sustainable feed options	Very frequently	60	50.4	
		Frequently	30	25.2	
		Rarely	29	24.4	

		Total	119	100.0	2.32
3	Sourcing for fingerlings, frys and juveniles	Very frequently	34	28.6	
		frequently	63	52.9	
		Rarely	22	18.5	
		Total	119	100.0	1.91
4	Breeding techniques	Very frequently	30	25.2	
		frequently	42	35.3	
		Rarely	47	39.5	
		Total	119	100.0	2.04
5	Detection of common fish diseases	Very frequently	75	63.0	
		frequently	23	19.3	
		Rarely	21	17.6	
		Total	119	100.0	2.56
6	Management of water quality issues	Very frequently	23	19.3	
		frequently	22	18.5	
		Rarely	74	62.2	
		Total	119	100.0	1.83
7	Preservation of fish quality	Very frequently	23	19.3	
		frequently	47	39.5	
		Rarely	49	41.2	
		Total	119	100.0	2.21
8	Prevention of diseases	Very frequently	62	52.1	
		frequently	24	20.2	
		Rarely	33	27.7	
		Total	119	100.0	3.41

Field survey, 2026

Relationship Between Socio-Economic Characteristics and Utilization of Extension Services:

The table below shows the Chi-square analysis on the relationship between the socio-economic characteristics of fish farmers and the utilization of extension services. The result shows that there was a significant relationship between socio-economic characteristics and utilization of extension services ($\chi^2 = 45.67$, $p < 0.05$). This implies the socio-economic nature of fish farmers plays a great role in how they make use of extension services. Specifically, it was found that the relationship between educational level and utilization of extension services was the strongest. Farmers with higher educational levels had more likelihood to utilize extension services than those with lower educational levels. This finding is consistent with previous studies ((Osagiede *et al.,* 2024) which have shown that education enhances farmers' ability to understand and adopt new technologies and services. This finding agrees with Akinboye (2024).

who noted that farmers with larger farm sizes tend to have greater economic capacity and stronger motivation to seek extension services in order to improve productivity. Likewise, Ashley-Dejo & Adelaja (2022) observed that farm size influences farmers' demand for agricultural information and technical support.

Farm size was also found to significantly relate to service utilization, with farmers having larger farms being more likely to use extension services. This could be explained by the fact that farmers with larger operations have more resources and greater need for technical guidance to manage their farms effectively. Farming experience was equally related to service utilization. Farmers with greater years of experience were more likely to access extension services, perhaps because they are more aware of the importance of technical instruction and are more likely to have built relationships with extension agents. The significant relationship between socio-economic characteristics and utilization of extension services has important implications for extension service planning and delivery. It suggests that extension programs should be designed to take into account the various characteristics of farmers, and special attention should be given to reaching those farmers with lower educational levels and smaller farm sizes who may be less likely to seek the services available.

Chi-square Analysis of the Relationship Between Socio-Economic Characteristics of Fish Farmers and Utilization of Extension Services (n = 119)

S/N	Socio-Economic Characteristic	χ^2 Value	df	p-value	Decision
1	Age	6.285		0.279	Not Significant
2	Sex	1.941		0.164	Not Significant
3	Marital Status	4.723		0.193	Not Significant
4	Religion	3.853		0.278	Not Significant
5	Educational Qualification	14.363		0.002	Significant
6	Farm Size	10.572		0.005	Significant
7	Number of Ponds	2.962		0.227	Not Significant
8	Farming Experience	9.483		0.023	Significant
9	Average Monthly Income	8.663		0.034	Significant
10	Contact with Extension Agents	12.814		0.012	Significant

Decision rule: Significant at $p < 0.05$

CONCLUSION

The study has determined that fish farmers in Oredo Local Government Area receive information from a wide range of sources; primarily, the influence of the internet over time has emerged as one of the sources, and this emergence is a result of the digitalization of agricultural information systems. It can be concluded from the study that the socio-economic characteristics of the fish farmers in the study area have a significant influence on how they utilize extension services. The significance of this finding for extension service planning and delivery is important. Extension programmes need to be planned in such a way that they meet the diversified characteristics of farmers, with specific interventions to enhance access and utilization among different groups of farmers with lower than average levels of education, smaller farm holdings, and limited farming experience. Though respondents utilize extension services on how to formulate balanced feed, how to source sustainable feed options, breeding techniques, how to detect common fish diseases, and disease preventive measures, the pattern of utilization reveals that the most crucial area of concern for the farmers is in the area of disease management.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Extension programs must consider the diverse socio-economic characteristics of farmers. Special attention should be focused on reaching farmers who have lower levels of education and smaller farms, as they may have greater difficulty accessing and using extension services.
2. Extension service providers should tap into digital platforms and information and communication technologies (ICTs) to complement traditional extension approaches.
3. Disease management services should be developed as a priority in extension programs, as they have high demand among fish farmers.
4. Fish farmers should be encouraged to subscribe to different farmers' groups. Farmers' groups provide platforms for collective learning, resource sharing, and mutual support, which can enhance the effectiveness of extension services.

Study Limitation

Participants reported data was collected by way of questionnaire. Thus, the information was accurate, on the understanding that the respondents honestly and willingly disclosed this information. It is possible that the

respondents may have given socially desirable responses or misinterpreted certain questions, which may affect the reliability of collected data.

The farmers' responses may have been influenced by recall bias. The respondents were asked to recall earlier contacts with extension agents, sources of agricultural information, and previous use of extension services. Because these events happened over an extended period, some of the farmers might not remember them accurately, which could cause their actual experiences to be underreported or overreported.

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