

Assessment of Smallholder Fish Farming Enterprise in Argungu Local Government Kebbi State

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ABSTRACT

This study aimed to assess the engagement and interest of rural people in fisheries activities in Argungu Local Government Area of Kebbi State. One hundred and fifty (150) questionnaires were randomly distributed in the three villages. The questionnaires consisted of socioeconomic Characteristics as well as the current engagement of the rural people in fisheries activities and their interest in fish farming. The data obtained from the questionnaires was analyzed using descriptive statistics. Results indicate that the majority (73.3%) of these fish farmers are male, compared to (26.7%) who are female. A large proportion of fish farmers have attained primary education (30.7%). Regarding marital status and income levels, (66%) of the fish farmers are married and (68%) of the fish farmers earn less than 10,000 Naira monthly. The results on engagement and interest of smallholder farmers in fish farming enterprises show that (52.7%) of the fish farmers are actively engaged in fish farming. Fish farming enterprises reveal that smoking is the most commonly used method, with (53.2%) of the respondents favoring it. The most prevalent constraints in fish farming enterprise indicate that (58%), is the poor marketing system and poor storage facilities, which affects (56.7%) of the smallholder fish farmers. Based on this, it is recommended that there is a need to assist in setting up small-scale fish farming projects in rural areas with proper monitoring and supervision and Small-scale fish farming policies and practices to significantly improve food security, rural incomes and sustainable aquaculture development.

INTRODUCTION

Fish is the major source of cheap quality proteins vital for a healthy populace in the developing world. It has the highest level of easily metabolized high-quality protein, fats, vitamins, calcium, iron and essential amino acids when compared with other sources of animal protein such as poultry and beef. Fish consumption is highly relished among people of all classes and ages in that the fish is less tough and more digestible when compared to beef, mutton chicken and bush meat. Fish as a source of rich food for the poor can play a crucial role in improving the food security and nutritional status of millions of people in Africa and other developing parts of the world Ayoola, (2010). Global consumption of fish as food reached an all-time high of nearly 17 kg per person in 2018, supplying over 3 billion people with at least 15 percent of their average animal protein intake. However, Africa has the least in consumption of fish (FAO) (2010). Most of the health-related problems in the developing world such as abnormal development, reduction in human productivity, high incidence of infant mortality, malnutrition and diseases have been attributed to low intake of good quality animal protein, hence production of fish is very imperative to the good health of the nations in the developing world.

Fish farming is exceptionally placed to reverse the declining supplies from captured fisheries and the activity has notable potential for new livelihood opportunities, providing the mechanism for lower-priced fish, enhanced nutritional security and employment for poor communities by servicing urban markets Jagger and Pender, (2011). World aquaculture production in 2020 was 60 million tonnes, with an estimated total value of US\$119 billion. Nigeria as the second largest aquaculture producer in Africa only produced 200, 535 tonnes (FAO) (2012) in 2020. There is a huge gap between demand and production of fish in Nigeria, some 1,380,000mt. In 2020 alone, for instance, Nigeria's fish demand stood at 2.66 million metric tons, and the country had to spend 100 billion naira on fish importation annually (FAO) (2012).

The study on the assessment of smallholder fish farming enterprises is crucial due to the rising importance of aquaculture in enhancing food security and livelihoods. Smallholder fish farming contributes significantly to rural economies by providing income and nutrition. However, challenges like limited access to resources, inadequate technical knowledge, and market constraints hinder their potential. Assessing these enterprises offers insights into their strengths and areas needing improvement, enabling the development of targeted interventions. This is essential for promoting sustainable growth in the sector and supporting smallholder farmers in meeting both local and global food demands (FAO, 2023).

Aquaculture provides opportunities to improve livelihood prospects, ensures resource sustainability and fosters economic growth (FAO) (2010). Poverty alleviation and improvement of the livelihoods of the poor have always been one of the major objectives of all aquaculture projects. Dexter, (2011), reported that fish farming is a viable, sustainable and profitable business that is now also being patronized by rice, corn and vegetable farmers as an alternative source of their income to help improve the living conditions of their respective

families. Argungu Local Government Area is one area that showed little or no fish farming activities. As part of community outreach, the objective of this study was to investigate the level of engagement and interest of the rural people in fish farming enterprises.

LITERATURE REVIEW

Smallholder fish farming has increasingly become a critical component of rural livelihoods, food security, and economic development, particularly in developing countries. Numerous studies have highlighted the role of smallholder aquaculture in poverty alleviation and nutritional improvement. For instance, the Food and Agriculture Organization (FAO, 2023) emphasizes that small-scale fish farming contributes to food security by providing affordable protein sources and generating income for rural households. However, smallholder fish farmers often face challenges such as limited access to quality inputs, inadequate technical knowledge, and poor market linkages, which hinder the full realization of their potential (Njaya et al., 2023). These challenges underscore the need for targeted interventions that can enhance the productivity and sustainability of smallholder fish farming enterprises.

Recent research has also explored the socio-economic impacts of smallholder fish farming. Studies by Asiedu et al. (2022) and Karisa et al. (2023) suggest that when effectively managed, smallholder fish farming can significantly contribute to the reduction of rural poverty and the improvement of livelihoods. These studies indicate that smallholder aquaculture can be a viable enterprise if farmers have access to appropriate technologies, training, and market opportunities. Additionally, the integration of fish farming with other agricultural practices, such as rice farming, has been identified as a strategy that can increase productivity and sustainability (Dey et al., 2022). Despite these potential benefits, the scalability and sustainability of smallholder fish farming remain areas requiring further investigation, particularly in the context of environmental sustainability and climate change.

Theoretical Framework

The theoretical framework for studying smallholder fish farming enterprises can be anchored in the Sustainable Livelihoods Framework (SLF), which provides a comprehensive approach to understanding how rural households build and sustain their livelihoods. The SLF posits that rural livelihoods are shaped by the interaction of five core assets: human capital, natural capital, financial capital, physical capital, and social capital (Chambers & Conway, 1992). Applying the SLF to smallholder fish farming, human capital involves the skills and knowledge of farmers; natural capital includes access to water bodies and land; financial capital pertains to the availability of funds for investment; physical capital covers infrastructure like ponds and equipment; and social capital relates to the networks and institutions that support farming activities.

Furthermore, the SLF emphasizes the importance of vulnerability contexts, such as exposure to environmental risks and market fluctuations, which can impact the sustainability of smallholder fish farming. This framework allows

for the analysis of how smallholder fish farmers utilize their assets to respond to challenges and opportunities, thereby shaping the outcomes of their enterprises. Integrating the SLF with theories of agricultural innovation, such as the Diffusion of Innovations Theory (Rogers, 2003), can further elucidate how new technologies and practices are adopted by smallholder farmers and the factors influencing these decisions. Together, these frameworks provide a robust basis for analyzing the dynamics of smallholder fish farming enterprises and formulating strategies to enhance their viability and sustainability.

METHODOLOGY

Study Area

This study was carried out among people in Alwasa, Bayawa, and Lailaba villages in Argungu Local Government Area. Argungu Local Government is located at latitude 12.75° N and longitude 4,54° E, Argungu has an area of 428km². Argungu Local Government is located within the Sudan Savannah region of Nigeria. The state experiences rainy and dry seasons. The rainy season starts in May and ends in September while the dry season begins in October and ends in early April. The total annual rainfall in the area ranges from 800mm to 1,200mm. The mean minimum temperature range of the state is 25.65°C while the mean maximum range is 39.26°C Kebbi State Today, (2020).

Data Collection and Analysis

The three villages were randomly selected due proximity to riverine areas and active engagement in fish farming activities. Data were collected using well-structured questionnaires, which were developed base on the objectives of the study and were validated by research experts and with reliability co-efficient. One hundred and fifty (150) questionnaires were randomly distributed in the three villages. The questionnaires consisted of socioeconomic Characteristics as well as the current engagement of the rural people in fisheries activities and their interest in fish farming. The data obtained from the questionnaires was analyzed using descriptive statistics.

RESEARCH RESULT AND DISCUSSION

Socio-Economic Characteristics of the Fish Farmers

The personal characteristics of smallholder fish farmers reveal significant trends that can offer insights into the demographics and socio-economic factors influencing their practices. Notably, the results indicate that the majority (73.3%) of these fish farmers are male, compared to (26.7%) who are female. This gender disparity may reflect cultural or social norms that influence the participation of men and women in fish farming activities. The age distribution of the fish farmers shows a significant concentration in the 31-50 years age range, with (30.7%) of the respondents falling between 41-50 years and (23.3%) between 31-40 years. This suggests that middle-aged individuals are predominantly involved in fish farming, possibly due to the experience, stability, and resources required in this occupation.

Education levels of fish farmers also play a crucial role in shaping their practices and adaptability to new techniques. A large proportion of fish farmers have attained primary education (30.7%) and secondary education (25.3%), indicating a basic level of literacy that could influence their ability to implement improved farming practices and access information. However, there is also a significant segment with only Koranic education (25.3%) or adult literacy (8%), which might limit their exposure to more formal agricultural training. Interestingly, 16.7% of the fish farmers have tertiary education, suggesting a potential for innovation and leadership within this subset of farmers, who may serve as catalysts for the adoption of advanced techniques and technologies in fish farming.

Regarding marital status and income levels, the results show that a substantial majority (66%) of the fish farmers are married, which could imply a level of social stability that supports sustained involvement in fish farming. The income distribution reveals that (68%) of the fish farmers earn less than 10,000 Naira monthly, highlighting the low-income nature of this occupation. This income level may affect the farmers' ability to invest in improved practices or expand their operations, thereby influencing the overall productivity and sustainability of their farming activities.

Table 1: Socio-economic Characteristics of the fish farmers

Variables	Frequency	Percentage
Sex		
Male	110	73.3
Female	40	26.7
Age (years)		
Below 25	13	8.7
25-30	34	22.7
31-40	35	23.3
41-50	46	30.7
Above 50	22	14.6
Educational Level		
Koranic Education	38	25.3
Primary Education	46	30.7
Secondary Education	38	25.3
Adult Literacy	12	8
Tertiary Education	16	16.7
Marital Status		
Single	51	34
Married	99	66
Occupation		
Farming	49	32.7
Artisan	39	26
Civil Servant	20	13.3
Trading	42	28
Monthly Income(N)		
Below 5,000.00	57	38
5,000.00 - 10, 000.00	45	30
10, 000.00 - 15, 000.00	19	12.7

16, 000.00 – 20, 000.00	14	9.3
Above 20, 000.00	15	10

Field survey 2024

Engagement and Interest in Fish Farming

The results on the engagement and interest of smallholder farmers in fish farming enterprises show that (52.7%) of the fish farmers are actively engaged in fish farming, while (47.3%) are not involved. This indicates a slight majority of smallholder farmers recognize the potential of fish farming as a viable livelihood option. The engagement rate suggests a growing interest in the sector, potentially driven by the demand for fish as a protein source and the opportunity for income generation. However, the nearly equal proportion of non-engaged farmers highlights challenges such as limited resources, lack of knowledge, or other socioeconomic factors that may hinder full participation in fish farming. Understanding these barriers is crucial for developing targeted interventions that can increase engagement and support the expansion of the fish farming sector among smallholder farmers.

Table 2: Engagement and Interest in Fish Farming

Variable	Frequency	Percentage
Engaged	79	52.7
Not Engaged	71	47.3

Field survey 2024

Fish Processing Methods

The results on fish processing methods among smallholder farmers in fish farming enterprises reveal that smoking is the most commonly used method, with (53.2%) of the respondents favoring it. This preference for smoking can be attributed to its effectiveness in preserving fish for longer periods, enhancing flavor, and its suitability in environments with limited refrigeration facilities. Frying with (26.7%) is the second most popular method, likely chosen for its quick preparation time and the taste appeal of fried fish, which could cater to local market demands. Drying with (20%) is the least preferred method but remains significant for regions with high temperatures and low humidity, where it serves as an effective preservation technique. The dominance of smoking highlights the need for support in improving smoking techniques and infrastructure to ensure product quality and marketability.

Table 3: Fish Processing Methods

Method	Frequency	Percentage
Drying	30	20
Smoking	80	53.2
Frying	40	26.7

Field survey 2024

Fishing Activities

The results in Table 3 highlight the various fishing activities undertaken by smallholder farmers in a fish farming enterprise, with "Fish marketing" holding the highest 50%. This indicates that marketing is the most prevalent activity among these fish farmers emphasizing its crucial role in the fish farming industry. The high engagement in marketing activities suggests that smallholder farmers prioritize the sale and distribution of their fish products which is vital for ensuring the profitability and sustainability of their enterprises. Effective marketing strategies are essential for fish farmers to reach a broader market, increase sales, and ultimately enhance their income levels.

This focus on marketing could be driven by the need to recover investments in fish farming and to ensure a steady income stream. According to Kareem et al. (2022), effective marketing is a critical component of the fish farming value chain, directly impacting the success and expansion of smallholder farming enterprises. Thus, by placing a strong emphasis on marketing, smallholder farmers can improve their livelihoods and contribute to the broader agricultural economy.

Table 4: Fishing Activities

Fishing activities	Frequency	Percentage
Fish farming	25	16.7
Fish processing	30	20
Fish marketing	75	50
Fish transportation	20	13.3
Total	150	100

Field survey 2024

Constraints Faced by Smallholder Farmers in the Fish Farming Enterprise

The results in Table 4 outline several constraints faced by smallholder farmers in the fish farming enterprise, which significantly hinder their productivity and sustainability. Each constraint reflects the challenges that these farmers encounter in their daily operations. These constraints include inadequate capital, inadequate water, lack of technical skills, lack of processing equipment, poor storage facilities, poor marketing system, and poor transportation system.

The most prevalent constraints in fish farming enterprise indicate that (58%), is the poor marketing system. A poor marketing system significantly impacts the ability of smallholder farmers to sell their fish at competitive prices. This could be due to a lack of organized markets, insufficient market information, or the inability to access more lucrative markets.

Moreover, the inefficiency in marketing can lead to significant post-harvest losses, as fish farmers might not have immediate buyers or proper storage facilities to keep their produce fresh. According to Oluwasola et al. (2022), improving market access and infrastructure is critical to ensuring that smallholder farmers can thrive in a competitive environment, thus enhancing their overall contribution to the agricultural economy.

Another significant constraint is the poor storage facilities, which affects (56.7%) of the smallholder farmers. Poor storage facilities are closely linked to the problem of the poor marketing system. Without proper storage, fish farmers are forced to sell their fish immediately after harvest, often at lower prices due to the perishability of the product. The lack of adequate cold storage or preservation methods results in a high rate of spoilage, leading to financial losses. According to Adebayo et al. (2023), enhancing storage facilities is vital for reducing post-harvest losses and ensuring that fish farmers can maximize their profits.

The lack of technical skills, which affects (53.3%) of the smallholder farmers, is another critical constraint. Technical skills in fish farming encompass knowledge of best practices in aquaculture, including feeding, disease management, breeding, and water quality control. The absence of these skills can lead to low productivity, high mortality rates, and inefficient use of resources. This gap in technical expertise is a significant barrier to the adoption of modern and more efficient fish farming techniques. According to Asiedu and Sarpong (2023), capacity building and the provision of extension services are essential to improving the productivity and sustainability of smallholder fish farming enterprises.

Inadequate capital is another constraint that affects (46.7%) of the smallholder farmers. Capital is crucial for the acquisition of inputs such as feed, fingerlings, and equipment, as well as for the expansion of fish farming operations. Many smallholder farmers lack access to credit facilities which limits their ability to invest in their farms. This constraint is often aggravated by the high cost of inputs and the uncertainty associated with the fish farming business, which makes financial institutions reluctant to provide loans to small-scale fish farmers. According to Olufemi and Musa (2024), improving access to credit and financial services is critical for enabling smallholder farmers to invest in their farms and increase their productivity.

Other notable constraints of fish farming are lack of processing equipment (50%), inadequate water supply (26.7%), and poor transportation systems (51.3%). The lack of processing equipment hinders the ability of fish farmers to add value to their products, which could enhance their marketability and profitability. Inadequate water supply is a significant concern, as fish farming is highly dependent on water quality and availability. Poor transportation systems worsen the marketing challenges, as they limit the fish farmers' ability to access distant markets or deliver their products on time.

Table 5: Constraints Faced by Smallholder Farmers in the Fish Farming Enterprise,

Constraints	Frequency	*Percentage
Inadequate capital	70	46.7
Inadequate water	40	26.7
Lack of technical skill	80	53.3
Lack of processing equipment	75	50
Poor storage facilitates	85	56.7
Poor marketing system	87	58

Poor transportation system	77	51.3
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*Field survey 2024, *Multiple responses recorded*

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this research has shown some personal characteristics of rural people in Argungu Local Government Area of Kebbi State, Nigeria. Most of the respondents were interested in fish farming. The major constraints facing these people are a lack of technical skills and a lack of capital. If these rural people are helped to overcome these constraints and actively participate in fish farming with proper management, the poverty level in the area will be alleviated through employment generation, additional income, food security and overall national growth in fish production.

Captured fisheries alone are not sustainable to meet Nigerians' demand for fish; hence efforts should be made to increase fish production through higher involvement in fish farming. There is a need to assist in establishing fish farm projects randomly in rural areas as a start-up for interested members who are ready to be committed to the enterprise from which they can grow, with proper monitoring and supervision. Rural people have access to credit facilities in terms of loans without interest or with feasible and affordable interest.

ADVANCED RESEARCH

Every research certainly has limitations. Limitations in the sense of research limitations that affect the researcher's ability to explore the data being studied, limitations of available data, or external factors of research such as limited time and resources. So further research is needed for the perfection of this research.

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