

Research Article

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Aquaculture Status and Women's Participation in Katsina State, Nigeria

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Abstract This study provides empirical information on fish farming under different production systems and scales in Katsina State, Nigeria. The objectives were to assess the status and practices of fish farming and determine the level of women's participation in aquaculture enterprises. Primary data were collected from 149 active fish farmers through structured questionnaires and analyzed using frequencies and percentages. The results showed that fish farming was male-dominated, with men accounting for 87.2% of respondents. A total of 56.4% of respondents had 1~5 years of farming experience, indicating that most were relatively new to the enterprise. Most respondents operated small-scale farms using concrete tank systems, and *Clarias* species were the dominant fish cultured. Greater women's participation should be promoted through empowerment workshops, improved access to credit, extension support, and incentive-based programmes. The findings provide baseline information for promoting gender-inclusive aquaculture development and improving fish-farming practices in Katsina State.

Keywords Aquaculture; Women's participation; Fish-farming system; Production scale; Katsina State

1 Introduction

Fish is an important component of the human diet in many parts of the world (Amin, 2015). The need for fish farming and production intensification has increased as overfishing and improved fishing technology have contributed to declines in wild fish stocks worldwide. These pressures have increased interest in shifting from capture fisheries to aquaculture (Aliyu and Ahmad, 2018). Global aquaculture production has expanded rapidly and has become an economically important food-production industry (Kaleem and Bio Singou Sabi, 2020). In Africa, this development has been associated with increasing demand for fish, a more favourable investment environment, and lower production risks.

The aim of this study was to evaluate aquaculture status and women's participation in fish farming in Katsina State, Nigeria. The specific objectives were to:

- 1) assess the status of aquaculture in the study area;
- 2) determine the level of women's involvement in aquaculture enterprises in the study area.

2 Methodology

2.1 Study area

This study was conducted in Katsina State, northwestern Nigeria. According to the 2006 National Population Census, the state had a population of 5,792,578. It covers 24,192 km² and contains 40 man-made reservoirs (Dauda et al., 2015). Katsina State lies between latitudes 11°30'N and 13°15'N and longitudes 06°52'E and 09°20'E. It is bordered by Kano and Jigawa States to the east, Zamfara State to the west, Kaduna State to the south, and the Republic of Niger to the north. The state has three agro-ecological zones: the Sahel savanna in the northeast, the Sudan savanna in the central region, and the Northern Guinea savanna in the south (Adekunle et al., 2005). It is also divided into three agricultural zones: Ajiwa Zone, comprising 15 local government areas; Dutsin-Ma Zone, comprising 10 local government areas; and Funtua Zone, comprising the remaining nine local government areas.

2.2 Data collection and sampling procedure

Data were collected through structured questionnaires administered to fish farmers during farm visits. A purposive sampling technique was used to select respondents from the three agricultural zones of Katsina State, namely Ajiwa Zone (Zone 1), Dutsin-Ma Zone (Zone 2), and Funtua Zone (Zone 3). Lists, addresses, and farm locations of fish farmers were obtained from relevant government agencies, fish farmer groups, and individuals familiar with fish farm locations in the state.

Only active fish farmers who had completed at least one production cycle at the time of data collection were included in the study. Based on these criteria, a total of 149 fish farmers were selected across the three agricultural zones.

2.3 Data analysis

The study was descriptive in nature and focused on the observation and identification of key characteristics and practices of fish farmers. Data collected from the structured questionnaires were analyzed using descriptive statistics, including frequency counts and percentages. These statistics were used to describe the socio-economic characteristics of respondents, their farming experience, sources of finance, cultured fish species, farming systems, and production scales. No inferential statistical analysis was conducted.

3 Results

3.1 Socio-economic characteristics

The results presented in Table 1 show that fish farming in the study area was dominated by male respondents (87.2%), while female respondents accounted for 12.8%. With respect to knowledge and training background, only 8.1% of the respondents had received formal education specifically related to fish farming. When respondents who held degrees or qualifications in related fields, such as Agricultural Science and Forestry (8.7%), were included, the proportion with formal or related technical knowledge increased to 16.8%.

Most respondents acquired fish-farming knowledge through training rather than formal education. Specifically, 66.4% received local or on-the-job training from experienced fish farmers or graduates with relevant knowledge, while 15.5% attended organized fish-farming training programmes. Together, these two groups accounted for 81.9% of respondents; a further 1.3% reported other sources of knowledge.

The results on farming experience show that 56.4% of respondents had been involved in fish farming for 1-5 years, indicating that most farmers were relatively new to the enterprise. The proportion declined with increasing experience, and only 15.4% had 11~25 years of fish-farming experience. Personal savings were the main source of finance (81.9%), while no respondent reported obtaining a cooperative loan. Access to bank loans was also low (6.7%).

Clarias species were the most commonly cultured fish (91.9%), while tilapia accounted for 8.1%. Concrete tank systems were dominant (81.9%), followed by earthen ponds (16.1%) and movable tanks (2.0%). Most respondents operated at a small-scale production level (95.3%), whereas medium- and large-scale production accounted for 3.4% and 1.3%, respectively. More than half of the respondents (57.7%) had no contact with extension services. Among those who had extension contact, 39.7% received it seasonally, 38.1% monthly, and 22.2% weekly (Table 2).

4 Discussion

4.1 Gender of the fish farmers

The low participation of women in fish farming may be associated with the labour requirements of aquaculture activities, household responsibilities, cultural norms, limited access to resources, and perceived production risks in the study area. This pattern reflects gender disparities in access to and participation in farming-related occupations. The finding is consistent with Ele et al. (2013), who reported that 81% of fish farmers in Cross River State were male and 19% were female. Olasunkanmi (2012) similarly found that women accounted for only 8.3% of fish farmers in Osun State and recommended stronger extension support to encourage women's participation.

Table 1 Socio-economic characteristics of the fish farmers

Characteristics	Frequency	Percentage
Occupation (Fish farming)		
Primary	68	45.6
Secondary	81	54.4
Total	149	100
Gender		
Male	130	87.2
Female	19	12.8
Other	0	0.0
Total	149	100
Farming knowledge		
Fisheries graduate	12	8.1
Graduate of related course	13	8.7
Attended training program	23	15.5
Trained on the job	99	66.4
Others	2	1.3
Total	149	100
Farming experience (years)		
1~5	84	56.4
6~10	42	28.2
11~15	16	10.7
16~20	5	3.4
21~25	2	1.3
Total	149	100
Sources of finance		
Personal savings	122	81.9
Friends and relatives	10	6.7
Bank loan	10	6.7
Cooperative loan	0	0.0
Inheritance	7	4.7
Total	149	100

Source: Field survey (2023)

4.2 Training and knowledge of fish farmers

The findings on farmers' knowledge and training indicate that successful fish farming requires technical and practical skills. The high proportion of respondents who received on-the-job training shows that informal and practical learning plays an important role in aquaculture development in the study area. This finding is consistent with Amin (2015), who reported that 68.7% of fish farmers in Kaduna State had no formal education in fish production, and with Dauda et al. (2023), who found that 59.4% of farmers were trained on the job (Table 2).

4.3 Farming experience and enterprise development

The results suggest that fish farming remains a relatively new enterprise in the study area compared with crop production and livestock rearing. Financial constraints and limited access to credit may contribute to the closure or discontinuation of some fish farms. This finding is consistent with Amin (2015), who reported that 74.8% of fish farmers in Kaduna State had 1~5 years of experience. Oluwemimo and Damilola (2013) also found that 83% of respondents had entered fish farming within the previous five years. In contrast, Olaoye et al. (2013) reported a larger proportion of experienced farmers in Oyo State: 40.5% had 11~15 years of experience, 35.6% had 5~10 years, 15.8% had less than 5 years, and 8.1% had more than 15 years. Greater experience may improve production skills, management decisions, and farmers' ability to respond to market conditions and production risks.

Table 2 Socio-economic characteristics (Cont'd) and practices of the fish farmers

Characteristics	Frequency	Percentage
Species grown		
Catfish	137	91.9
<i>Tilapia</i>	12	8.1
Ornamental fishes	0	0.0
Others	0	0.0
Total	149	100
Extension contact		
Yes	63	42.3
No	86	57.7
Total	149	100
<i>If yes, how frequent</i>		
Weekly	14	22.2
Monthly	24	38.1
Seasonality	25	39.7
Total	63	100
Farming system		
Earthen pond	24	16.1
Concrete tank	122	81.9
Movable tank	3	2.0
Total	149	100
Production scale		
Small scale farming	142	95.3
Medium scale farming	5	3.4
Large scale farming	2	1.3
Total	149	100

Source: Field survey (2023)

4.4 Sources of finance and access to credit

The results indicate that limited access to credit may weaken farmers' ability to expand production or adopt new technologies. Most respondents relied on personal savings, possibly because of high interest rates and collateral requirements associated with formal loans. This finding is consistent with Aliyu and Ahmad (2018), who reported that 80.0% of respondents in Katsina financed their farms through personal savings. Ebukiba and Anthony (2019) similarly found that personal savings provided 80% of the capital used by fish farmers in Karu Local Government Area, Nasarawa State, while loans accounted for only 5%. Abbas (2015) reported that 82.9% of fish farmers in Ondo State used personal savings, whereas smaller proportions obtained capital from cooperative societies, banks, family members, and friends.

4.5 Cultured fish species

African catfish was widely cultured because of its high market value, acceptance of artificial feed, tolerance of pond conditions, and regular availability of fingerlings. This finding is consistent with Dauda et al. (2017), who found that 80% of farmers cultured African catfish alone, while the remaining 20% cultured African catfish together with tilapia. Abbas (2015) reported that 88% of fish farmers in Ondo State raised catfish. Ebukiba and Anthony (2019) found that catfish monoculture and the polyculture of *Clarias* with tilapia accounted for 45% and 50% of farms, respectively, in Nasarawa State. Amin (2015) also reported that catfish was the dominant cultured fish in Kaduna State, accounting for 89.6% of respondents.

4.6 Production scale of fish farmers

The predominance of small-scale farms may reflect limited access to credit and the relatively limited experience of many respondents. These constraints may hinder expansion to medium- or large-scale production and may also restrict access to extension services and farmer associations. This result is consistent with Amin (2015), who

reported that small-scale farms accounted for 79.13% of fish farmers in Kaduna State, compared with 13.04% for medium-scale farms and 7.83% for large-scale farms.

4.7 Fish-farming systems

The choice of fish farming system may be influenced by factors such as availability of space, mode of operation, financial capacity, water availability, and management convenience, but the dominance of concrete system over earthen and movable systems could be attributed to ease of maintenance for beginners. However, some studies have reported that earthen ponds may support faster fish growth because natural food organisms can supplement artificial feed.

This result supports the work of Etuk et al. (2021) in southern Calabar of Cross River state who recorded 61.43% of the respondents used concrete pond system, 24.29% adopted earthen pond system, and 14.29% practiced fish farming on movable tank system. Amin (2015) is not against the findings where he found out that 54.8% of fish farmers in Kaduna made use of concrete system, while only few of the farmers in the study area adopted other rearing systems. He added that the dominant use of concrete tank system might be due to its convenience, easy to clean and manage, and ease of harvesting and draining. A similar trend was reported by Dauda et al. (2017) in the study area where 37.1% of the respondents made use of only concrete tank, 37.2% used concrete tank with other culture facilities, making the total users of concrete either alone or with other facilities to be 74.3%. Ebukiba and Anthony (2019) also they found out that majority (45%) of the respondents in Nasarawa State used concrete pond only, 30% of the respondents used both concrete and earthen ponds, 25% percent of the respondents used earthen pond only, while none of the fish farmers were reported using a movable structure.

In contrast, Abbas (2015) reported that earthen ponds were used by 78% of fish farmers in Ondo State, whereas concrete tanks were used by 15%. The dominance of concrete tank systems in the present study may therefore reflect the preferences of small-scale and relatively new farmers for systems that are easier to clean, manage, drain, and harvest.

5 Conclusion

Women's participation in aquaculture in Katsina State was low, and fish farming was largely dominated by men. Most respondents were relatively new to fish farming and operated at a small-scale production level. *Clarias* species and concrete tank systems were dominant in the study area. Limited access to credit, limited extension contact, and low participation by women may constrain aquaculture development. Greater women's participation should therefore be encouraged through empowerment workshops, improved access to credit, extension support, and incentive-based programmes. The findings provide baseline information for promoting gender-inclusive aquaculture development and improving fish-farming practices in Katsina State, Nigeria.

Author Contributions

Husaini Shuaibu Saulawa as a corresponding author carried out the research wrote the report under the supervision of Associate Prof. Joel Umaru (a senior Lecturer by then) and Dr. Solomon Segun Adeola examine the work with key contribution on demographic profile of the fish farmers in the study area.

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