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Research Article

Assessing the Perception of Awareness on Prevention and Treatment of Fish Diseases for Sustainable Aquaculture in Zuru Local Government Area of Kebbi State, Nigeria

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Abstract

In Nigeria, aquaculture is essential for improving food security, revenue production, and sustainable livelihoods. Fish illnesses, however, continue to be a substantial productivity barrier and frequently cause large financial losses. This study evaluated fish farmers in Kebbi State, Nigeria's Zuru Local Government Area's perceptions on their knowledge regarding the prevention and treatment of fish diseases. One hundred respondents chosen by purposive sampling were given a structured questionnaire. Descriptive statistics were used to analyse the data in order to assess the respondents' attitudes, habits, and level of knowledge about managing fish diseases. The results showed that although most farmers had a moderate understanding of common fish diseases and how to prevent them, there were still gaps in the adoption of appropriate treatment methods because of financial limitations, poor training, and restricted access to veterinary care. In order to improve illness management techniques, the study emphasises the need for focused extension services, capacity-building initiatives, and increased access to reasonably priced treatment choices. Promoting sustainable aquaculture and guaranteeing long-term output in the area requires raising fish farmers' understanding and developing their practical abilities.

Keywords: *Aquaculture, Fish diseases, Awareness, Prevention, Treatment, Zuru.*

INTRODUCTION

Aquaculture has grown to be a vital industry that supports rural development, employment, and food security. Fish disease outbreaks continue to pose a serious danger to sustainability and productivity notwithstanding their potential (Agbugui *et al*., 2025; FAO, 2016). Sustainable aquaculture depends on the effective prevention and treatment of fish infections, but many small-scale farmers encounter obstacles such poor biosecurity procedures, insufficient training, and restricted access to veterinary care (Omitoyin & Osakuade, 2021; Austin, 2015). According to earlier research conducted in Lagos and Ekiti States, farmers had a reasonable level of awareness, but their adoption of treatment procedures was limited because of infrastructure and financial difficulties (Aladetohun *et al*., 2025). This study aims to fill the knowledge gap created by the lack of empirical data on farmers' perspectives of fish disease control in Kebbi State.

In Nigeria, aquaculture has grown in importance as a sector that generates cash, jobs, and food security. Fish disease outbreaks continue to be a significant problem despite their expansion, endangering sustainability and productivity (Agbugui *et al*., 2025). Sustainable aquaculture depends on the effective prevention and treatment of fish infections, but many small-scale farmers encounter obstacles such poor biosecurity procedures, insufficient training, and restricted access to veterinary care (Omitoyin & Osakuade, 2021). Studies conducted in different parts of Nigeria have revealed

that although farmers frequently exhibit a moderate level of awareness regarding illness prevention, there are still gaps in the adoption of treatment procedures because of infrastructure and financial constraints (Aladetohun *et al*., 2025).

There is little empirical data on farmers' attitudes and knowledge of managing fish diseases in Kebbi State, where aquaculture is growing as a means of subsistence. In order to create efficient extension services and policy interventions that can improve disease control procedures and advance sustainable aquaculture in Zuru Local Government Area, it is imperative that this knowledge gap be filled.

METHODOLOGY

The study was carried out in Zuru Local Government Area (LGA) Kebbi State, Nigeria. Aquaculture is becoming more and more popular as a livelihood strategy in Zuru LGA, one of the state's main agricultural zones, because of its potential to generate revenue and ensure food security (Agbugui *et al*., 2025; Kebbi State Government [KBSG] 2003). A descriptive survey approach was used to gauge aquaculture farmers' perceptions of their level of knowledge regarding fish illness prevention and treatment. Data on attitudes, behaviours, and limitations within a certain group may be gathered using this strategy, which is why it was, selected (Omitoyin & Osakuade, 2021).

Fish farmers working in Zuru LGA made up the target population. To ensure that farmers actively involved in aquaculture production were included, 100 respondents were chosen using a purposive selection technique. This sample size is consistent with other research on aquaculture awareness in Nigeria and was deemed sufficient for descriptive analysis (Aladetohun *et al*., 2025). A systematic questionnaire with questions on socio-demographic traits, awareness of fish diseases, preventive strategies, treatment methods, and restrictions was used to gather primary data. To make sure it was reliable and clear, the questionnaire was pre-tested. Descriptive statistics, such as frequencies, percentages, and mean scores, were used to analyse the data in order to summarize the awareness levels, treatment or preventive actions, and limitations of the respondents. For clarity, the results were displayed in tables.

RESULTS AND DISCUSSION

Table 1: Socio-demographic Characteristics of Respondents (n = 100)

Variable	Frequency	Percentage (%)
Gender		
Male	78	78
Female	22	22
Age		
Below 30 years	10	10
30–50 years	65	65
Above 50 years	25	25
Education		
Primary	18	18
≥ Secondary	72	72
Informal	10	10
Farm Size		
Small	80	80
Medium	20	20

Source: Field data, 2026

Gender Distribution

The result reveals that there were 78% men and 22% women among the 100 responders. This is a reflection of Nigeria's male-dominated aquaculture industry, where female participation is frequently restricted by labour-intensive techniques and cultural conventions (Omitoyin & Osakuade, 2021). According to Aladetohun *et al*. (2025), limited access to land, loans, and extension services may also be connected to women's lower representation. The low female participation underscores the need for gender-sensitive initiatives to improve inclusivity in aquaculture, such as training programs specifically designed for women and microcredit schemes (Omitoyin & Osakuade, 2021).

Age Distribution

Sixty-five percent (65%) of the respondents were in the age range of thirty to fifty (30-50) years. This age group reflects the population that is economically engaged, indicating that middle-aged farmers who have the financial and physical means to continue fish farming are the main drivers of aquaculture in Zuru (Agbugui *et al*., 2025). There were fewer younger farmers (less than 30 years old), which could point to obstacles like high startup costs or restricted access to training. Although the majority of middle-aged farmers indicate stability in aquaculture techniques, the low participation of younger farmers raises questions regarding sustainability over the long run. Aquaculture's future may be secured by policies that promote youth involvement through training and startup assistance (Agbugui *et al*., 2025).

Educational Background

Seventy-two percent of the respondents had completed at least secondary school. Adoption of aquaculture depends heavily on education since it affects farmers' capacity to comprehend disease control strategies, decipher extension messaging, and embrace contemporary practices (Oyedotun, 2025). The possibility of successful training and adoption of better fish health management techniques is suggested by higher literacy levels among respondents. A solid basis for extension services is provided by the respondents' comparatively high literacy rate. Campaigns to raise awareness are more successful because farmers with secondary education are more likely to use contemporary disease prevention and treatment techniques (Oyedotun, 2025).

Farm Size

Twenty percent of respondents ran medium-sized businesses, while the majority (80%) ran small-scale fish farms. Small-scale domination is in line with national aquaculture trends, where expansion is hampered by infrastructure issues and a lack of funding (Aladetohun *et al*., 2025). Due to poor biosecurity and restricted access to veterinary care, small-scale farmers are frequently more susceptible to disease outbreaks. Because small-scale farms predominate, disease outbreaks may have a broad effect on livelihoods. Protecting production requires bolstering biosecurity protocols and offering reasonably priced veterinarian inputs (Aladetohun *et al*., 2025).

Table 2: Awareness Level of Fish Diseases (n = 100)

Awareness Level	Frequency	Percentage (%)
High	25	25
Moderate	60	60
Low	15	15

Source: Field data, 2026

Awareness Levels

Table 2 shows that of the 100 respondents, 60% had a moderate understanding of common fish disorders such bacterial infections and Ichthyophthirius multifiliis (white spot disease). This implies that while most farmers are aware of fish health concerns, they may not fully comprehend sophisticated preventative and therapeutic approaches. In contrast to systematic training, exposure through informal channels frequently results in moderate awareness (Omitoyin & Osakuade, 2021).

Conversely, 25% showed high awareness, suggesting that a smaller percentage of farmers are knowledgeable, perhaps as a result of more education, previous training, or increased use of extension services. On the other hand, 15% lacked awareness, indicating a vulnerable group of farmers who could find it difficult to recognise or effectively control disease outbreaks (Aladetohun *et al*., 2025).

Sources of Information

Peer farmers were the main source of information for the majority of respondents (40%). This dependence on unofficial networks implies that the majority of information transfer is community-based and experiential. Peer learning can be beneficial, but it frequently lacks scientific validity and could reinforce inefficient methods (Agbugui *et al*., 2025). 30% of information sources were extension agents, highlighting their contribution to the spread of technical knowledge. The comparatively low percentage, however, suggests that formal extension programs in Zuru LGA have a limited reach. Although these sources might not always be trustworthy, local markets (20%) also functioned as information centers where farmers shared their experiences and suggestions (Oyedotun, 2025).

The prevalence of moderate awareness indicates that farmers need organised training programs to improve their knowledge of preventing and treating fish diseases. Moderate awareness might not result in efficient management techniques without it (Omitoyin & Osakuade, 2021). There is a significant danger of disease-related losses for the 15% of people who lack awareness. In order to avert extensive epidemics and economic setbacks, this population should be given priority in tailored interventions (Aladetohun *et al*., 2025).

Gaps in the formal diffusion of knowledge are highlighted by the low dependence on extension agents (30%). The ability to manage illness could be greatly increased by increasing extension coverage and enhancing farmer-agent relations (Agbugui *et al*., 2025). Extension programs might strategically leverage farmer-to-farmer training approaches because peer farmers account for 40% of information sources. Peer networks would spread dependable methods if lead farmers were equipped with appropriate knowledge (Oyedotun, 2025).

In order to promote sustainable aquaculture, the government and non-governmental organisations should incorporate fish health awareness campaigns into aquaculture development policies, making sure that formal and informal information channels are reinforced.

Table 3: Preventive Measures Practiced (n = 100)*

Preventive Measure	Frequency	Percentage (%)
Pond cleaning & water monitoring	70	70
Lime/salt prophylaxis	55	55
Biosecurity protocols	20	20

Source; Field data, 2026

Note: *Asterisk (*) mean Multiple response*

Regular Pond Cleaning and Water Quality Monitoring

Seventy percent of the responders regularly cleaned their ponds and checked the water quality. Maintaining water quality is one of the best ways to prevent fish infections, therefore this is a good sign. Fish are frequently more vulnerable to bacterial and parasite illnesses when the water quality is poor (Omitoyin & Osakuade, 2021). Although the frequency and technical precision of these activities may vary, farmers' emphasis on cleaning and monitoring indicates understanding of the connection between environmental conditions and fish health. Although the widespread use of water monitoring and pond cleaning is positive, farmers want professional assistance to make sure these methods are supported by science. Standardised cleaning procedures and water testing kits could be taught by extension agents (Omitoyin & Osakuade, 2021).

Prophylactic Measures

Over half of those surveyed (55%) said they used preventative measures including salt treatment and lime application. These techniques are frequently used in Nigerian aquaculture as low-cost ways to stabilise pond conditions and manage diseases (Aladetohun *et al*., 2025). While salt treatments are frequently used to control ectoparasites like Ichthyophthirius multifiliis, lime aids in pH regulation and reduces dangerous microbes. Reliance on these conventional preventative techniques, however, can be a sign of restricted access to contemporary veterinary inputs (Agbugui *et al*., 2025).

Although salt and lime therapies are helpful, they might not be sufficient to treat complicated bacterial or viral diseases if they are used excessively. Improved pond design and vaccination are two integrated health management strategies that should be introduced to farmers (Aladetohun *et al*., 2025).

Biosecurity Protocols

Just 20% of those surveyed said they had implemented biosecurity measures such limiting access to farms, cleaning equipment, or managing the flow of fish. A significant gap in disease prevention is highlighted by this low adoption rate. Because it lowers the danger of disease introduction and transmission, biosecurity is seen as a fundamental component of contemporary aquaculture management (Agbugui *et al*., 2025; FAO, 2016). The low uptake raises the possibility that farmers don't have the necessary resources, knowledge, or understanding of the significance of biosecurity measures. One of the main concerns is the extremely low implementation of biosecurity policies (20%). Even farms that practise cleaning and prevention are susceptible to epidemics in the absence of biosecurity. The importance of biosecurity knowledge in sustainable aquaculture should be emphasised in policies and training initiatives (Agbugui *et al*., 2025).

Programs for the development of aquaculture should incorporate biosecurity training from the government and non-governmental organisations. Adoption rates could be increased by offering farmer-friendly recommendations and subsidising disinfectants. Additionally, peer-to-peer training models could aid in the normalisation of biosecurity procedures in nearby communities (Oyedotun, 2025).

Table 4: Treatment Practices (n = 100)

Treatment Method	Frequency	Percentage (%)
Traditional remedies	45	45
Veterinary drugs	30	30
No treatment	25	25

Source: Field data, 2026

Traditional Remedies

Traditional treatments like salt baths and herbal extracts were used by nearly half of the respondents (45%). Because these techniques are accessible and reasonably priced, small-scale aquaculture uses them extensively. For instance, herbal extracts are used to treat bacterial infections, and salt baths are frequently used to treat ectoparasites like Ichthyophthirius multifiliis (white spot disease) (Omitoyin & Osakuade, 2021). Traditional treatments, however, frequently lack standardised dosages and scientific validation, which can diminish their efficacy and produce inconsistent results, even though they may offer short-term relief (Aladetohun *et al*., 2025).

The majority of farmers are not adopting scientifically recognised methods, as evidenced by their reliance on traditional cures (45%) and lack of treatment (25%). This raises the possibility of unchecked disease outbreaks, endangering sustainability as well as productivity (Omitoyin & Osakuade, 2021).

Commercial Veterinary Drugs

When commercial veterinary medications were accessible, about 30% of respondents said they used them. This represents a smaller but more scientifically based subset of farmers using contemporary treatment techniques. Although veterinary medications are often more successful at treating bacterial and parasite illnesses, their low use indicates obstacles like high costs, restricted availability, and a dearth of veterinary services in rural regions (Agbugui *et al*., 2025; Rico et al., 2012; Romero, 2012). The very low usage of commercial veterinary medications (30%) indicates that accessibility and cost are significant obstacles. Adoption rates could be raised by creating cooperative purchasing programs or subsidising veterinary medications (Aladetohun *et al*., 2025).

No Treatment

Remarkably, 25% of respondents said they didn't treat fish infections at all, citing financial limitations or a lack of access to veterinary supplies. This group is particularly susceptible to disease outbreaks, which can cause severe stock losses and financial difficulties. The lack of treatment emphasises the necessity for action and draws attention to systemic issues in aquaculture support services (Oyedotun, 2025).

The reliance of farmers on traditional cures draws attention to deficiencies in extension services and training. According to Agbugui *et al*. (2025), improving farmer education regarding appropriate diagnosis, treatment procedures, and medication administration is crucial for efficient illness management.

The creation of regional veterinary support facilities in aquaculture villages should be a top priority for the government and non-governmental organisations. Long-term sustainability would be ensured and dependence on inefficient solutions would be decreased by policies that incorporate fish health management into larger frameworks for agricultural development (Oyedotun, 2025).

Table 5: Constraints to Disease Management*

Constraints	Frequency	Percentage (%)
Limited veterinary services	65	65
Inadequate training	55	55
Financial limitations	50	50

Source: Field data, 2026

Note: *Asterisk (*) means Multiple responses*

Limited Access to Veterinary Services

Limited access to veterinary care was mentioned as a significant barrier by the majority of responders (65%). This illustrates the larger problem in Nigeria, where farmers lack prompt expert assistance due to an inadequate aquaculture-specific veterinary infrastructure (Agbugui *et al*., 2025). Farmers frequently rely on conventional treatments or unofficial counsel in the absence of veterinary advice, which may not be sufficient to control disease outbreaks (Omitoyin & Osakuade, 2021). The necessity for the government and non-governmental organisations to set up mobile veterinary units or local fish health centers is highlighted by the 65% shortage of veterinary services. Disease outbreaks could worsen without expert assistance, endangering the sustainability of aquaculture (Agbugui *et al*., 2025).

Inadequate Training Opportunities

Inadequate training opportunities were mentioned by more than half of the respondents (55%). For farmers to be knowledgeable about biosecurity, disease diagnosis, and treatment procedures, training is essential. Farmers' ability to adopt contemporary aquaculture practices is hampered by the absence of organised training programs in rural places like Zuru (Aladetohun *et al*., 2025). This disparity prevents the adoption of scientifically proven disease control techniques and maintains dependence on inexpensive, conventional procedures. A significant gap in farmer education is highlighted by the insufficient training opportunities (55%). To increase knowledge and acceptance of contemporary techniques, extension services should place a high priority on frequent workshops and farmer-to-farmer training models (Omitoyin & Osakuade, 2021).

Financial Limitations

Financial limitations were cited by half of the respondents (50%) as a deterrent to using contemporary treatment techniques. Investing in inputs like veterinary medications, disinfectants, and water testing kits is necessary for aquaculture. Effective disease control strategies are sometimes unattainable for small-scale farmers because to high input

costs and restricted financial availability (Oyedotun, 2025). Financial obstacles can limit farmers' capacity to grow their businesses, increasing their susceptibility to losses from illness.

Half of the respondents (50%) stated that they would not use modern treatment methods due to financial constraints. Aquaculture requires the purchase of inputs such as veterinary drugs, disinfectants, and water testing kits. Due to high input costs and limited financial resources, small-scale farmers may not always be able to implement effective disease management measures (Oyedotun, 2025). Farmers may be less able to expand their companies due to financial constraints, which make them more vulnerable to illness-related losses.

CONCLUSION

This study evaluated the awareness of 100 aquaculture farmers in the Zuru Local Government Area of Kebbi State, Nigeria, on the prevention and treatment of fish diseases. The results showed that there are still large gaps in the adoption of efficient treatment methods, even though the majority of farmers showed a moderate understanding of prevalent fish diseases and preventive measures. The application of contemporary disease control techniques was hampered by limitations such restricted access to veterinary care, insufficient training, and financial difficulties. The necessity for focused interventions is further highlighted by the limited adoption of biosecurity policies and the dependence on conventional treatments. In general, promoting sustainable aquaculture in the area requires raising fish farmers' understanding and developing their practical abilities.

RECOMMENDATIONS

The following suggestions were offered in light of the study's findings:

1. Offer frequent training courses to improve farmers' understanding of disease control.
2. Create mobile veterinarian units or local fish health centers.
3. Provide small-scale farmers with subsidies for veterinary medications and biosecurity supplies.
4. Encourage biosecurity compliance awareness initiatives.
5. Include fish health management in policies for the development of aquaculture.

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COMPETING INTERESTS

There are no conflicting interests, according to the authors.

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