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A REVIEW OF THE COMMON PARASITES AND DISEASES OF FISH IN NIGERIA

***[1]Joy C. Atawodi, [1]Jacob S. Ngwamah, [2]Vivienne E. Ugwoke and [1]Grace O. Abovegodwin**

[1]Department of Zoology, Federal University, Lokoja PMB 1154, Lokoja, Nigeria
[2]Department of Biological Sciences, Ahmadu Bello University, Zaria, PMB 1094, Samaru, Zaria

*Corresponding authors' email: joyceciliaatawodi@gmail.com

ABSTRACT

The aquaculture sector in Nigeria has witnessed significant growth over the past few decades, contributing to food security and economic development. However, this growth has been accompanied by challenges, particularly concerning fish health. Fish parasites and diseases are significant constraints to aquaculture and wild fisheries in Nigeria, impacting food security, economic growth, and biodiversity. This review synthesizes current knowledge on the prevalence, distribution, and impact of common parasites and diseases affecting fish in Nigeria. The findings reveal the need for improved surveillance, diagnostics, and management strategies to mitigate the impact of these pathogens on Nigeria's fisheries sector. Further research is required to explore the zoonotic potential of some parasites and their implications for public health.

Keywords: Nigeria, Review, Parasites, Diseases, Fish

INTRODUCTION

Fish farming is an integral part of Nigeria's agricultural landscape, with the country ranking among the top producers of fish in Africa (Ogunji & Wuertz, 2023). The country contributes approximately 1.2 million metric tons annually to fish production (Odioko & Becer, 2022). Despite the economic benefits, the aquaculture industry faces numerous challenges, particularly from diseases caused by parasites (Ogunji & Wuertz, 2023).

As ectothermic organisms, fish are uniquely vulnerable to a wide range of pathogens, including protists, helminths, and bacteria, which can significantly impact their survival and reproduction. The prevalence of diseases caused by any of these pathogens, as well as the occurrence of common parasites in fish, can lead to serious economic losses and threaten food security and biodiversity. It is therefore essential for researchers, aquaculturists, etc, to identify and manage these health issues effectively (Prince *et al*, 2023).

Fish populations are a good sentinel for maintaining aquatic environments, however, their susceptibility to diseases, particularly those caused by parasites, can compromise not only their health but also the overall integrity of the ecosystem. For instance, the increase in fish movement due to aquaculture practices heightens the risk of disease transmission, potentially leading to declines in native species and shifts in community dynamics. Moreover, the introduction of genetically enhanced strains can endanger local biodiversity if they escape into natural waters, thereby disrupting existing ecosystems. The ecological ramifications of such dynamics reveal the critical need for a comprehensive understanding and monitoring of fish health, including the impacts of infectious pathogens, to ensure sustainable aquaculture practices and protect essential fish populations in the wild (Sanda *et al*, 2024).

In Nigeria, parasitic infections, bacterial diseases, and fungal pathogens are among the most common issues reported in wild and cultured fish populations (Omeji *et al*, 2022). Therefore, reviewing the common parasites and diseases affecting fish in Nigeria will be crucial for developing effective management strategies.

Fish parasites in Nigeria are diverse, encompassing protozoans, helminths, and crustaceans. Over the years, several researchers have documented the prevalence of these parasites, as well as their diversity, and effects on freshwater and marine fish species (Nwadike et al. 2023; Oduma et al., 2024; Banyigyi et al., 2024). The most frequently reported parasites include: Protozoan Parasites, Monogenean Parasites, Cestodes (Tapeworms), Nematodes (Roundworms), Trematodes (Flukes), etc.

Historical Background

Fish diseases and parasitic infections have posed significant challenges to both aquaculture and wild fisheries in Nigeria for many years, with documented instances dating back several decades. Studies on fish parasites and diseases in Nigeria began in the mid-20th century when pioneering researchers started to assess the health of fish in freshwater and marine environments (Ezenwaji & Inyang, 1998). Initial findings were primarily descriptive (Paperna, 1996), concentrating on the taxonomic classification of various parasites, including protozoans (such as Ichthyophthirius multifiliis and Trichodina spp.), helminths (notably Dactylogyrus spp. and Clinostomum spp.), and crustaceans (like Argulus spp. and Lernaea spp.).

The expansion of Nigeria's aquaculture sector in the 1970s, driven by government initiatives to increase fish production, inadvertently created conditions conducive to disease outbreaks due to intensified farming methods (Ogunji & Wuertz, 2023). Early instances of mass fish deaths were mainly linked to poor water quality and bacterial infections (e.g., *Aeromonas hydrophila* and Pseudomonas spp.). However, parasitic infestations eventually emerged as significant contributors to these declines (Okaeme *et al*, 1988).

The 1980s and 1990s marked a pivotal period, with Nigerian researchers forming partnerships with international organizations to systematically analyze fish pathogens. Investigations by Okpasuo *et al* (2016); Eyo & Olatunde (1998) and other researchers created some interest in understanding the prevalence of both endo- and ectoparasites in major river systems such as the Niger, Benue, and Cross River. During this time, parasitic diseases, particularly ichthyophthiriasis (commonly known as "white spot disease") and dactylogyrosis (gill fluke infections), were recognized as significant sources of economic losses in both wild and cultured fish populations (Ayanda, 2009).

In the 2000s, the focus shifted toward molecular and epidemiological studies, uncovering new parasitic threats

such as Myxobolus spp. and Henneguya spp., as well as drug-resistant strains that emerged from the indiscriminate use of antimicrobials in aquaculture practices (Agbabiaka et al, 2025). Furthermore, environmental changes, including climate change and human activities like pollution and dam construction, have altered the distribution of parasites, resulting in novel disease dynamics. Despite these advancements, significant gaps remain in national surveillance, standardized diagnostic approaches, and sustainable control strategies (Adedeji & Okocha, 2011).

Justification for the Review

Globally, fish parasitology and pathology have received heightened academic interest, yet comprehensive analyses—especially in the Nigerian context—remain scarce and disjointed. The research that does exist is often localized, species-specific, or methodologically varied, which hinders the widespread application of findings and obstructs the establishment of a unified national health management strategy. Additionally, factors such as environmental changes, anthropogenic pollution, and intensified aquaculture practices have introduced new complexities to fish disease dynamics, highlighting the need for an updated and integrated understanding of pathogen prevalence and diversity.

This review is imperative as it seeks to consolidate existing empirical evidence and assess patterns related to the occurrence, distribution, and effects of fish parasites and diseases throughout Nigeria. It aims to provide a thorough synthesis of current knowledge, emphasize emerging trends, and evaluate implications for fish health management, public health, and the sustainability of aquaculture practices as well as prospective avenues for further research.

By addressing these critical knowledge gaps, the review aspires to inform evidence-based policy decisions and serve as a valuable resource for researchers, veterinarians, and fisheries stakeholders in Nigeria and similar ecosystems.

MATERIALS AND METHODS

Methodology

This study undertook a narrative review of documented information by accessing Google, Google Scholar, Scopus, AJOL, and some data repositories using the keywords: *"fish parasites", "*fish diseases" + "Nigeria" + "aquaculture" or "wild capture". Only peer-reviewed studies were included in this study.

Findings

Major Parasites of Fish in Nigeria (Taxonomic Classification & Pathobiology)

Protozoan Parasites

Protozoans are among the most common and economically significant parasites affecting fish in Nigeria. They include such species as; *Ichthyophthirius multifiliis* (causing "white spot disease"), *Trichodina spp.*, and *Cryptobia spp.*

Ichthyophthirius multifiliis (Ich), This ciliate protozoan is a major pathogen in both wild and cultured fish. It causes *ichthyophthiriasis*, characterized by white spots on the skin, gills, and fins. Ohanu *et al* (2024) reported high prevalence rates of *I. multifiliis* in Clariid catfish (*Clarias gariepinus*) from the Lower Benue River, emphasizing its impact on fish mortality.

Trichodina spp. are also ciliates and are often found on the skin and gills of fish, causing irritation and secondary infections. Okunade *et al* (2023) documented the prevalence of *Trichodina spp.* in African Mudfish (*Clarias gariepinus*) from fish raised in in different scale of Operations in Lagos, Nigeria, linking stress to increased infestations.

Cryptobia spp. are flagellated protozoan which affects the blood and digestive system of fish. Khor *et al* (2024) reported *Cryptobia spp.* infections in cultured fish from the Niger Delta region, highlighting its role in anaemia and reduced growth rates.

Helminths

Helminths include the Monogeneans (such as Dactylogyrus spp., Gyrodactylus spp.,) Digeneans (Clinostomum spp. – "yellow grub disease") and Cestodes (Ligula intestinalis)

Monogenean Parasites

Monogeneans are flatworms that primarily infest the gills and skin of fish. They are highly host-specific and can cause severe damage to fish tissues. Dactylogyrus spp. and Gyrodactylus spp. are examples of monogenean parasites.

Dactylogyrus spp. are gill parasites which are prevalent in tilapia and catfish. A report by Idowu & Anthony (2021) documented the presence of Dactylogyrus *spp.* as a major constraint in catfish farming in southwestern Nigeria, with high infestation rates, especially during the rainy season.

Gyrodactylus spp. however, is a skin parasite known for its direct life cycle and rapid reproduction. Okpasuo *et al* (2016) identified *Gyrodactylus spp.* in wild and cultured fish from the Anambra River Basin, noting its association with skin lesions and secondary bacterial infections.

Cestodes (Tapeworms)

Cestodes are segmented flatworms that infect the digestive tract of fish. They are often transmitted through intermediate hosts, such as copepods. Some cestodes of fish include; Diphyllobothrium spp., Proteocephalus spp. etc.

Diphyllobothrium spp. is a fish tapeworm which has been reported in fish from Nigerian freshwater systems. Nwadike *et al* (2023) documented its presence in *Clarias gariepinus* from the Anambra River. The parasite impacts on fish growth and nutrient absorption.

Proteocephalus spp. is a cestode that is commonly found in the intestines of tilapia and catfish. Ifegwu *et al* (2023) provided reports of *Proteocephalus* spp. in Nigerian fish, linking their prevalence to poor sanitation in aquaculture systems.

Nematodes (Roundworms)

Nematodes such as *Camallanus* spp. and *Contracaecum* spp. are cylindrical worms that infect various organs, including the intestines, muscles, and body cavity of fish.

This intestinal nematode, *Camallanus* spp. is prevalent in catfish and tilapia. As reported by Adeleke *et al* (2024), *Camallanus* spp. was isolated from *Clarias gariepinus* from South-Western Nigeria, noting its association with weight loss and reduced feed conversion efficiency.

Contracaecum spp. is a nematode often found in the body cavity and muscles of fish. Sadauki *et al* (2022) documented *Contracaecum* spp. in fish from Jibiya, Katsina state, highlighting its zoonotic potential and public health implications,

Crustacean Parasites

Crustacean parasites, such as copepods and branchiurans, are external parasites that attach to the skin, fins, and gills of fish. Lernaea spp. also known as anchorworms, are highly pathogenic copepods which cause deep tissue damage and secondary infections. Okunade et al (2023) reported Lernaea spp. infestations in cultured fish from southwestern Nigeria, linking high infestation rates to poor pond management practices.

Argulus spp. on the other hand, is known as fish lice; they are branchiurans and are common in freshwater systems. Its occurrence has been reported by Onojafe *et al* (2021) in tilapia and catfish from the Niger Delta causing skin damage and stress-related mortality.

Trematodes (Flukes)

Trematodes are flatworms that infect various organs, including the gills, skin, and digestive tract of fish. *Clinostomum* spp. and *Diplostomum* spp. are commonly reported examples of fish trematodes.

Clinostomum spp. is a trematode parasite, commonly known as the "yellow grub," it is found in the muscles and subcutaneous tissues of fish, making the fish look unsightly. Omeji *et al* (2023) reported *Clinostomum* spp. in fish from the Benue River, noting its impact on fish marketability and consumer acceptance.

Diplostomum spp. is also a fish trematode known also as eye fluke, it affects the lenses of fish, causing blindness. Nwadike (2023) documented *Diplostomum* spp. in tilapia from Lake Kainji, linking its prevalence to the presence of snail intermediate hosts.

A summary of the distribution of Parasites and Diseases of Fish in Nigeria is presented in the table below;

Table 1: Distribution of Parasites and Diseases of Fish in Nigeria

State	Fish Species	Parasites Identified	Prevalence (%)	Key Findings	Reference
Lagos	*Clarias gariepinus*	Protozoa, Nematodes, Cestodes	45-60	High prevalence in cultured fish; poor water quality implicated.	Bakare *et al* (2023)
Oyo	*Clarias gariepinus*	Protozoa	20-32	Higher prevalence in wild-caught fish compared to cultured fish.	Ogbu *et al*, (2019)
Rivers	*C. gariepinus, O. niloticus*	Acanthocephalans, Nematodes	55-70	Higher parasite burden in fish from polluted water bodies.	Bubu-Davies *et al*, (2023); Sikoki *et al*, (2013)
Delta	*Heterobranchus bidorsalis*	Cestodes, Nematodes	40-65	Prevalence linked to seasonal changes and fishing practices.	Okoye *et al* (2014) -
Kano	*Lates niloticus*	Protozoa, Trematodes	25-40	Lower prevalence in fish from well-managed aquaculture systems.	Dabo *et al* (2024); Bichi & Dawaki (2010)
Anambra	*Clarias gariepinus*	Monogeneans, Cestodes	50-75	High prevalence due to poor handling and storage practices.	Benedict *et al* (2023); Nwadike *et al*, (2023)
Cross River	*Tilapia spp.*	Digenetic trematodes, Acanthocephalans	35-55	Wild fish showed higher parasite diversity than cultured fish.	Ekanem *et al*, (2011)
Edo/Delta	*Parachanna obscura/C. gariepinus, O. niloticus*	Nematodes, Protozoa	3-66	Prevalence correlated with water quality and fish size.	Osimen and Anagha (2020);
Enugu	*Synodontis, Clarias*	Cestodes, Trematodes	30-35	Higher prevalence during the rainy season.	Onyishi *et al* (2018); Emere and Egbe (2006)
Kaduna	*Labeo coubie; Bagrus docmak; C. gariepinus*	Cestodes, Nematodes	7-40	Higher prevalence of parasites in the wild may be due to high water contamination	Dikwa *et al*, (2024)
Imo	*Heterotis niloticus*	Acanthocephalans, Nematodes	40-65	Higher parasite burden in fish from eutrophic water bodies.	Adebambo, (2020)
Niger	*Clarias gariepinus*, *Tilapia zilli*, *O. nilocticus*	Protozoa, Monogeneans	19-85	The lower prevalence in fish from less polluted water bodies.	Manbe *et al*, (2020)
Plateau	*Tilapia and catfish*	Trematodes, Cestodes, Nematodes	25-45	Prevalence influenced by fishing methods and water quality.	Yakubu *et al*, (2002)
Sokoto	*Clarias gariepinus*	Nematodes	31-63	High prevalence in fish from riverine ecosystems.	Ibrahim *et al*, (2024)
Taraba	*Oreochromis niloticus*	Protozoa, Trematodes	30-55	Prevalence linked to anthropogenic activities and water pollution.	Omeji *et al*, (2022)
Bayelsa	*Ethmalosa fimbriata*	Monogeneans, Nematodes	40-60	Higher prevalence in fish from brackish water environments.	Ezenwaka & Living-Jamala (2024)
Benue	*Clarias gariepinus, Tilapia zilli*	Ichthyophthirius multifiliis *Clinostomum spp.*	46.9	High prevalence of protozoan parasites in Clarias gariepinus.	Omeji *et al* (2022); Onoja-Abutu *et al* (2021)
Kwara	*Oreochromis niloticus*	Trichodina spp.	32.8	Prevalence is related to the sanitary condition of the water	Junaid *et al* (2023)
Niger Delta	*Cultured fish species*	Cryptobia spp.	18.5	Low prevalence of Cryptobia spp. in cultured fish.	Ogbeibu *et al* (2014)

State	Fish Species	Parasites Identified	Prevalence (%)	Key Findings	Reference
Southwest ern Nigeria	*Clarias gariepinus*	Dactylogyrus spp.	56.3	High prevalence of monogenean parasites in Clarias gariepinus.	Adeyemo and Falaye (2007)
Anambra	*Wild and cultured fish*	Gyrodactylus spp. Diphyllobothrium spp.	27.7	Moderate prevalence of Gyrodactylus spp. in wild and cultured fish. Low prevalence of cestode parasites in Clarias gariepinus.	Mgbemena *et al* (2011) Ezenwaji and Inyang (1998)
Nationwide	*Tilapia and catfish*	Proteocephalus spp.	67.7	Moderate prevalence of cestode parasites in tilapia and catfish.	Adebambo (2020)
Oyo	*Clarias gariepinus*	Camallanus spp.	29.8	Moderate prevalence of nematode parasites in Clarias gariepinus.	Ajala and Fawole (2014)
Cross River	*Fish from Cross River*	Contracaecum spp.	15.6	Low prevalence of nematode parasites in fish from Cross River.	Ekanem *et al* (2011); Effanga & Eyo (2018)
Southwest ern Nigeria	*Cultured fish species*	Lernaea spp.	40.2	High prevalence of crustacean parasites in cultured fish.	Olurin &Somorin (2006)
Plateau	*Tilapia and catfish*	Argulus spp.	25.9	Moderate prevalence of crustacean parasites in tilapia and catfish.	Yakubu *et al* (2002); Jummai et al, (2022)
Niger (Lake Kainji)	*Oreochromis niloticus*	Diplostomum spp.	20.5	Moderate prevalence of trematode parasites in tilapia.	Ayanda (2009)

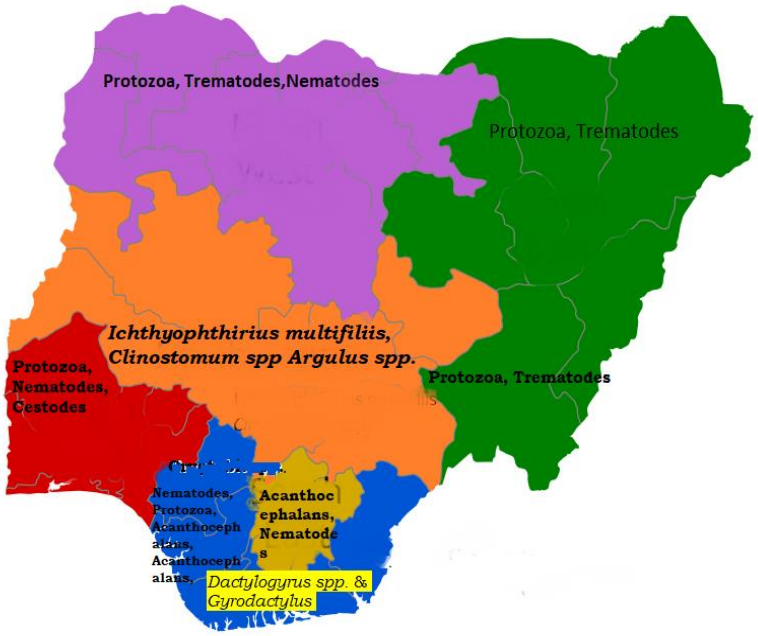

Figure 1: The distribution of the major fish parasites across the geopolitical zones of Nigeria

Impact of Parasites on Aquaculture

The occurrence of parasitic infections and disease outbreaks poses a major obstacle to the growth and sustainability of aquaculture in Nigeria. These health issues negatively impact fish health and well-being, resulting in higher mortality rates, reduced growth performance, and less efficient feed conversion. As a result, fish farmers experience significant financial losses due to lowered productivity, rising costs for veterinary care, and decreased market value of affected fish stocks. Furthermore, the ongoing prevalence of diseases threatens the dependability of aquaculture as a source of income and food security. Small- and medium-sized farmers, who make up a substantial segment of Nigeria's aquaculture industry, are particularly at risk due to their limited access to diagnostic tools, biosecurity measures, and effective disease management strategies. This situation is worsened by inadequate regulatory frameworks, weak surveillance systems, and a shortage of specialized aquatic animal health experts. Over time, the cumulative effects of these health challenges jeopardize the ecological and economic viability of the sector. If not addressed, they could obstruct the achievement of national objectives related to agricultural diversification, rural job creation, and nutritional self-sufficiency. Therefore, it is essential to implement a comprehensive strategy that incorporates improved disease diagnostics, farmer education, enhanced biosecurity practices, and coordinated research efforts to better understand the epidemiology of fish pathogens within Nigerian aquaculture systems (Prince *et al,* 2023).

Implications for Aquaculture and Fisheries Management

The high occurrence of parasitic infections and infectious diseases among fishes in Nigeria poses a significant barrier to aquaculture productivity and the sustainable management of wild fisheries. These health concerns are intensified by various systemic issues, such as poor water quality, overcrowded fish stocks, and a lack of effective biosecurity measures (FAO, 2022). The implications of these challenges are complex, affecting economic stability, nutritional health, public safety, and environmental integrity.

These challenges include;

Economic Losses

Infections caused by parasites and pathogens in farmed fish lead to decreased growth rates, increased mortality, and a decline in product quality. These adverse effects collectively lead to considerable financial losses for fish farmers, especially for smaller operators who typically have limited resources to withstand such impacts. Additionally, infected fish are often turned away by markets due to visible damage or poor health, further undermining profitability.

Food Security Issues

Since fish serves as a primary source of animal protein for numerous households in Nigeria, outbreaks of disease that severely impact fish populations can pose a significant threat to the country's food security. Rural and low-income communities, which heavily depend on affordable fish for their nutritional needs, are particularly susceptible to the variations in fish supply resulting from these disease-related production declines.

Zoonotic Risks

Some fish parasites have the potential to be zoonotic, which means they can pose direct threats to public health. Eating undercooked or raw fish that is infected with such parasites can lead to the transmission of these pathogens to humans. This risk is particularly alarming in informal markets where there is little or no regulation regarding fish health and hygiene practices.

Environmental Impacts

The use of chemotherapeutic agents including antibiotics and antiparasitic medications, to treat fish diseases can have negative impacts on the environment. When these chemicals are released into aquatic environments, they can disrupt the balance of non-target species, promote the development of antimicrobial resistance, and adversely affect the overall water quality.

Strategies for Addressing the Challenges of Fish Parasites

Addressing the intricate challenges related to fish health and the sustainability of aquaculture requires a comprehensive and proactive strategy, key aspects of this approach include:

Improved Surveillance and Diagnostic Tools

The development of strong surveillance systems is essential for the swift detection and effective management of emerging aquatic diseases. This requires the creation and deployment of highly sensitive, specific, and rapid diagnostic technologies capable of identifying pathogens even before clinical symptoms manifest. The integration of advanced molecular methods, including polymerase chain reaction (PCR) and next-generation sequencing, along with user-friendly field technologies, can significantly improve both the precision and speed of disease diagnosis. Moreover, establishing centralized databases for disease reporting and encouraging the sharing of information across different regions will facilitate a unified strategy for addressing transnational aquatic animal diseases.

Implementation of Biosecurity Protocols in Aquaculture Systems

Implementing biosecurity measures is essential for safeguarding against disease in aquaculture. Effective guidelines should encompass the maintenance of water quality, protocols for disinfection, quarantine strategies for incoming stock, and regulations governing the movement of both animals and equipment. By standardizing these practices across different farming operations and ensuring compliance through routine inspections and training, the risk of disease introduction and spread can be significantly reduced. Furthermore, fostering a strong biosecurity culture among all participants (including farmers, hatchery managers, and transport operators) is vital for establishing sustainable resilience in aquaculture systems in the long run.

Public Awareness Campaigns on best Practices for Fish Health Management

Increasing awareness and improving knowledge among all participants, from fish farmers to consumers, is essential for the sustainable development of aquaculture. Educational programs should highlight best management practices (BMPs) related to fish health, the responsible use of therapies, and the importance of promptly reporting diseases. Involving local communities through workshops, extension services, and digital platforms can bridge knowledge divides and encourage changes in behavior that align with sustainable fishing methods. Also, creating collaborative networks among government agencies, research institutions, and industry players can enhance information sharing and strengthen capacity-building initiatives.

CONCLUSION

This review highlights the diversity and distribution of common parasites and diseases affecting fish in Nigeria. The findings reveal that parasites are distributed all across the country, and addressing it, is particularly important if Nigeria must meet the world average per capita fish consumption rate of 21kg/year instead of the 11.3kg/year it currently stands at (Olaifa *et al*, 2022). Therefore, the need for targeted interventions to mitigate the impact of these pathogens on the nation's fisheries sector is urgent. Future research should focus on developing cost-effective diagnostics, vaccines, and sustainable management strategies to enhance fish health and productivity.

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