FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 9 No. 10, October, 2025, pp 217 – 220
DOI: https://doi.org/10.33003/fjs-2025-0910-3904

PARASITOLOGICAL SURVEY OF *CLARIAS GARIEPINUS* IN KITIRI RESERVOIR, JIGAWA STATE: PREVALENCE, INTENSITY, AND ASSOCIATED RISK FACTORS

[1]Idris, S., [2]Bichi, A. H., [2]Umaru Joel, [1]Sambo, F., [1]Sambo M. U., [1]Adam, A. A., [1]Abubakar, A. and [1]Chiroma, Y.

[1]Department of Fisheries Technology, Binyaminu Usman Polytechnic, Hadejia Jigawa State, Nigeria.
[2]Department of Fisheries and Aquaculture, Faculty of Renewable Natural Resources, Federal University Dutsin-Ma, Katsina, Nigeria.

*Corresponding authors' email: safiyanuidris003@gmail.com Phone Number: +2348065460052

ABSTRACT

This study investigated the prevalence, intensity, and risk factors of parasites in *Clarias gariepinus* from Kitiri, Dakori Malam Buba, and Rafa in Jigawa State, Nigeria, between January 2022 and December 2023. A total of 120 specimens were collected with different fishing nets and transported to the Biology Laboratory of Binyaminu Usman Polytechnic, Hadejia. Fish were morphologically identified, sexed using urogenital papilla examination, and measured for total length and weight. External examinations were conducted for ectoparasites, while the gastrointestinal tract was dissected to identify endoparasites. Results revealed sex-related differences in infestations. Male *C. gariepinus* had the highest infection with *Rhabdochona* spp. (40%), while females showed greater prevalence of *Trichodina* spp. (52.38%). Endoparasites were more frequent in male intestines (55%), whereas *Trichodina* spp. occurred predominantly on the skin (54.54%) and gills (45.45%) of females. Parasite burden was influenced by size and weight, with smaller fish (10.0–15.0 cm; 31.0–50.0 g) showing higher infestations. Spatial variation indicated the highest prevalence in Dakori Malam Buba (57.5%) and Rafa (55%), while temporal analysis showed infestations peaked in the rainy season (43.89%). These findings corroborate earlier reports of high parasite prevalence in *C. gariepinus* across Nigerian waters, emphasizing the role of host biology and environmental conditions in infection patterns. Continuous monitoring and effective management are therefore critical to reducing parasitic infestations in aquaculture and wild fish stocks.

Keywords: *Clarias Gariepinus*, Parasitic Infestation, Prevalence, Risk Factors, Kitiri Reservoir

INTRODUCTION

Parasitic infestations in fish represent a major concern in aquaculture and environmental health, as they can lead to reduced fish vitality, impaired growth, and diminished reproductive capacity. These infestations also have significant economic consequences, particularly in the aquaculture sector, where parasitic diseases can lower production rates and decrease the marketability of fish (Mowang *et al.,* 2025). Environmental factors such as water quality, temperature, and the presence of other species, along with host-related factors like size, age, and sex, play a critical role in determining the prevalence and intensity of parasitic infections in fish. For instance, previous studies have demonstrated varying parasitic loads in different fish species, including *Oreochromis niloticus* and *Clarias gariepinus,* due to these factors (Mowang *et al.,* 2025). The need for effective management and monitoring of parasitic diseases is crucial to ensure the health of fish populations, particularly in areas where aquaculture is a significant economic activity.

The African Catfish, *Clarias gariepinus* is a choice fish for culture as it commands good market, consumers like its taste and farmers find it easy to culture due to its hardiness. It has been a principal cultured species across most parts of Africa. It is mostly used to generate income and provide food for subsistence farmers (Gabriel *et al.,* 2007a)

Various parasites are associated with *C. gariepinus* in the wild and cultured environment where they cause morbidity, mortality and economic losses in aquaculture practice in various parts of the world (Subashinghe, 1995; Biu *et al.,* 2013).

Omeji *et al.* (2022) observed a slightly higher prevalence of parasitic infection in the rainy season (53.00%) compared to the dry season (52.50%), the percentage parasite load was higher in the dry season (54.05%) than in the rainy season (45.95%).

Kitiri Reservoir, located in Jigawa State, Nigeria, is a key source of livelihood for local communities, supporting both subsistence fishing and small-scale aquaculture. Despite its importance, there is a significant gap in research on the parasitic fauna of fish in this reservoir. Given the central role of *C. gariepinus* in the region's fisheries, understanding the types and prevalence of parasitic infestations in this species is essential for ensuring the health of the fish population and the sustainability of local aquaculture activities.

The objective of this study is to determine the prevalence and intensity of parasitic infestations in *Clarias gariepinus* from Kitiri Reservoir, Jigawa State, Nigeria. It further aims to identify the ectoparasites and endoparasites present and to examine the influence of sex, size, location, and seasonal variation on infection patterns. The findings will provide essential data for understanding fish parasitology in the region and for supporting the sustainable management of the reservoir's fisheries resources.

MATERIALS AND METHODS

Study Area and Duration

The study was conducted in three distinct sampling sites—Kitiri, Dakori Malam Buba, and Rafa—located within the Kitiri Reservoir in Jigawa State, Nigeria. These sites were selected based on their ecological relevance and fishing activities. The sampling spanned a two-year period, from January 2022 to December 2023, to capture seasonal variations in parasitic infestations.

Sample Collection

A total of 120 specimens of *Clarias gariepinus* were randomly collected from the aforementioned sites. Fish were captured using various fishing nets, including gill nets and cast nets, commonly employed by local fishermen. Upon capture, specimens were either transported alive in aerated containers or preserved fresh on ice to the Biology Laboratory of Binyaminu Usman Polytechnic, Hadejia, for immediate examination. This approach aligns with standard protocols for fish parasitological studies, ensuring minimal post-mortem changes that could affect parasite detection (Hashem *et al.,* 2020).

Morphometric and Biological Data

In the laboratory, each fish specimen was identified to the species level based on morphological characteristics, following the taxonomic keys provided by (Olaosebikan & Raji 1998). Sex determination was performed through physical examination of the urogenital papilla. Morphometric measurements, including total length (cm) and body weight (g), were recorded using a measuring board and electronic balance, respectively. (Sadauki *et al.*,2022).

Parasitological Examination

Ectoparasite Assessment

External surfaces, including skin, fins, and gills, were examined for ectoparasites. Skin and fin surfaces were scraped using sterile scalpels, and gill arches were carefully excised. Samples were placed on glass slides with a drop of physiological saline and examined under a stereomicroscope at 40x magnification. This method is consistent with procedures outlined by Omeji, *et al* (2010) and Bichi & Ibrahim, (2009)

Endoparasite Assessment

Fish were dissected along the ventral midline to expose internal organs. The gastrointestinal tract was removed and separated into stomach and intestine sections. Each section was opened longitudinally, and contents were washed into Petri dishes containing physiological saline. The washings were examined under a compound microscope at 100x magnification for the presence of endoparasites. Parasites were isolated, counted, and preserved in 70% ethanol for further identification. (Paperna,1991).

Parasite Identification

Isolated parasites were identified to the genus or species level using morphological keys and descriptions provided by (Paperna,1996). Identification was based on morphological features such as body shape, size, presence of hooks or suckers, and internal organ arrangement. For protozoan parasites, staining techniques such as Giemsa and silver nitrate impregnation were employed to enhance visualization of diagnostic features.

Data Analysis

Prevalence, mean intensity, and abundance of parasitic infestations were calculated following the guidelines of (Bush *et al.,* 1997). Statistical analyses were performed using SPSS version 25.0. Chi-square tests were used to assess associations between parasite prevalence and host factors such as sex, size, and weight. Seasonal variations in infestation rates were evaluated using t-tests, with significance set at $p < 0.05$.

RESULTS AND DISCUSSION

Prevalence of Parasitic Infestation

Out of the 120 *Clarias gariepinus* specimens examined from three locations (Kitiri, Dakori Malam Buba, and Rafa) in Jigawa State, Nigeria, an overall parasitic prevalence of 52.38% was recorded. (Table 1). This prevalence aligns with the findings of (Omeji *et al.* 2013), who reported a 45% infestation rate in Benue State, highlighting the widespread nature of parasitic burden in wild African catfish populations across Nigeria. The relatively high prevalence observed in the present study emphasizes the continuous challenge of parasite management in both capture fisheries and aquaculture systems. Differences in infection rates among the studied sites could be linked to water quality, environmental stressors, host immunity, and anthropogenic impacts such as agricultural runoff and domestic waste disposal (Idris *et al.,* 2025b).

Table 1: Prevalence of parasites of *Clarias gariepinus* from Kitiri Reservoir

Sex	Parasite	No. of parasite recovered	% of infection
Male	*Rhabdochona spp*	18	40
	Astiotrema sp	14	31.12
	Pleurocercoid	13	28.88
	Total	45	100
Female	*Trichodina spp*	11	52.38
	Rhabdochona spp	10	47.62
	Total	21	100

Ectoparasites

Parasites infest fish, leading to damage of the skin and gill tissues, and can harm internal organs while burrowing or feeding. (Banyigyi *et al.* 2023)" In female *Clarias gariepinus*, *Trichodina* spp. recorded the highest ectoparasitic load, infesting both skin (54.54%) and gills (45.45%). (Table 2). This trend contrasts with (Sadauki *et al.* 2022), who reported no ectoparasites in *Clarias gariepinus*. The absence of ectoparasites in males in this study further aligns with (Sadauki *et al.,* 2022), suggesting possible sex-related susceptibility. The higher prevalence in females may be attributed to the parasite's simple direct life cycle and its adaptability to mucous-rich environments such as the gills and skin. This agrees with (Idris *et al.,*2025a), who also reported *Trichodina* spp. dominance in female *Clarias gariepinus* from Kalgwai Reservoir.

Endoparasites

Endoparasitic infestations were more diverse, including *Rhabdochona* spp., *Pleurocercoid* larvae, and *Astiotrema* spp. Among males, *Rhabdochona* spp. recorded the highest prevalence (55% in intestines), while *Astiotrema* and *Pleurocercoid* were comparatively lower (30% and 15% respectively). In females, *Rhabdochona* spp. occurred in both stomach and intestine, while *Trichodina* spp. dominated ecto-regions but showed no endoparasitic presence. (Table 2).

The present findings varied from the report of (Idris *et el.,* .2025a), who observed haemoparasites with a 100% prevalence (19) in *Clarias gariepinus* at Kalgwai Reservoir. However, the predominance of *Rhabdochona* spp. in this study is consistent with (Idris *et al.,* 2025a), who also reported this parasite as the most dominant endoparasite in male *Clarias gariepinus* (33.33%). In contrast, the reduced occurrence of *Astiotrema* and *Pleurocercoid* may be attributed to their more complex life cycles, which involve intermediate hosts that are likely to be scarce during certain periods of the year.

Table 2: Prevalence of Parasites of *Clarias Gariepinus* from Kitiri Reservoir in Relation to Site of Infestation

Sex/Parasite	Skin	Gills	Intestine	Stomach	Blood
Male					
Rhabdochona	0	0	11 (55)	7 (28)	0
Astiotrema	0	0	6 (30)	8 (32)	0
Pleurocercoid	0	0	3 (15)	10 (40)	0
Total	0(0)	0(0)	20 (44.44)	25 (55.55)	0(0)
Female					
Trichodina	6	5	0	0	0
Rhabdochona	0	0	5 (50)	5 (50)	0
Total	6(54.54)	5(45.45)	5(50)	5(50)	0

Size and Weight-Based Variation

Parasitic infestation varied with host size and weight. Fish within the 10.0–15.0 cm length class exhibited the highest infection rate (42.85%), whereas the lowest (1.66%) was observed in the 31.0–45.0 cm group (Table 3). However, the Chi-square test showed no significant association between parasite prevalence and fish length ($X^2 = 6.767$, $p = 0.149$).

Similarly, fish weighing 31.0–50.0 g recorded the highest infection rate (40.74%), while those in the 91.0–110.0 g class had the lowest prevalence (18.18%) (Table 4). The Chi-square analysis for weight classes also indicated no significant difference in infestation rates ($X^2 = 2.199$, $p = 0.699$).

This finding agrees with (Idris *et al.,* 2025a), who also reported that smaller length classes (10–15 cm) of *Clarias gariepinus* in Kalgwai Reservoir were more heavily infested than larger individuals.

Comparable observations have been documented in other Nigerian inland waters. For instance, Oniye *et al.,* (2004) reported higher parasite prevalence in smaller *Clarias gariepinus* from Zaria Dam, suggesting that body size influences host vulnerability.

The present study therefore reinforces the pattern that smaller fish tend to be more parasitized, even though the statistical analysis here showed no significant difference across size and weight classes. This suggests that while biological susceptibility exists, parasite transmission dynamics in Kitiri Reservoir may be influenced more strongly by environmental conditions and host–parasite interactions.

Table 3: Prevalence of Parasites in *Clarias Gariepinus* from Kitiri Reservoir Based on Length

Fish length (cm)	No. examined	No. infected	Prevalence (%)	X² value	P-value
10.0–15.0	28	12	42.85	6.767	0.149
15.1–20.0	31	9	29.03		
20.1–25.0	28	11	39.28		
25.0–30.0	18	7	38.88		
31.0–45.0	15	1	1.66		
Total	**120**	**40**	**33.33**		

Table 4: Prevalence of Parasites in *Clarias Gariepinus* from Kitiri Reservoir Based on Weight

Fish weight (g)	No. examined	No. infected	Prevalence (%)	X² value	P-value
10.1–30.0	34	12	38.70	2.199	0.699
31.0–50.0	27	11	40.74		
51.0–70.0	29	8	27.58		
71.0–90.0	19	7	36.84		
91.0–110.0	11	2	18.18		
Total	**120**	**40**	**33.33**		

Location-Based Variation

Significant site differences were observed, with Dakori Malam Buba recording the highest prevalence (57.5%), followed by Rafa (40%) and Kitiri (30%) ($p < 0.05$). (Table 5).

Table 5: Prevalence of Parasites in Relation to Location

Location	No. examined	No. infected	Prevalence (%)
Kitiri	40	12	30
Dakori Malam Buba	40	23	57.5*
Rafa	40	16	40

These location-specific variations may be linked to differences in water quality, anthropogenic pressures, and ecological factors. (Idris *et al.,* 2025b) noted that environmental conditions of Kalgwai Reservoir favored fish growth and productivity, which may also moderate parasite distribution compared to Kitiri.

Seasonal Variation

Parasite load was significantly higher during the rainy season (43.89%) compared to the dry season (25.55%) ($p < 0.05$). (Table 6).

Table 6: Seasonal Variation in Parasite Infestation

Season	Fish Examined	Fish Infected	% Infection
Dry	15.00 ± 0.00	3.83 ± 1.34[b]	25.55 ± 8.91[b]
Rainy	15.00 ± 0.00	6.58 ± 1.62[a]	43.89 ± 10.81[a]

The rainy season enhances nutrient influx and turbidity, which supports intermediate hosts and free-living stages of parasites. This pattern mirrors the findings of (Idris *et al.,*2025a), who observed seasonal fluctuations in parasite infestation in *Clarias gariepinus* at Kalgwai, with rainy season prevalence (7.75) higher than dry (4.75).

The findings from Kitiri Reservoir show parallels with those from Kalgwai Reservoir, as reported by (Idris *et al.,* 2024; 2025a; 2025b). Both studies demonstrate that parasitic infestations are influenced by host size, sex, and seasonal dynamics. The predominance of protozoan ectoparasites (*Trichodina* spp.) in females and nematodes (*Rhabdochona* spp.) in males, observed in both reservoirs, suggests a common ecological trend in semi-arid Nigerian waters. Furthermore, the higher rainy season prevalence confirms the role of hydrological cycles in sustaining parasite populations, which has significant implications for fisheries productivity and management in Jigawa State.

CONCLUSION

The current study reveals a moderately high prevalence of parasitic infestation in *Clarias gariepinus* from Kitiri Reservoir and its surrounding areas. The prevalence patterns varied with sex, size, location, and season, emphasizing the multifactorial nature of parasite-host dynamics. These findings are consistent with previous and recent studies from Nigeria and other tropical regions, highlighting persistent risks of parasitism in freshwater ecosystems.

Future studies should incorporate molecular diagnostics and histopathological analyses to further understand host-parasite interactions and assess the long-term health implications for both wild and cultured *C. gariepinus* populations.

REFERENCES

Banyigyi, A. H., Ameh, S. M., & Isah, M. H. (2023). Incidence of gastrointestinal parasites of catfish (*Clarias gariepinus*) from River Nasarawa, Nigeria. *FUDMA Journal of Sciences, 7*(4), 90–94. https://doi.org/10.33003/fjs-2023-0704-1893

Bichi, A. H., & Ibrahim, A. A. (2009). A survey of ecto and intestinal parasites of *Tilapia zillii* (Gervias) in Tiga Lake, Kano, Northern Nigeria. *Bayero Journal of Pure and Applied Sciences, 2*(1), 79–82.

Biu, A. A., Diyaware, M. Y., Yakaka, W., & Rita, D. J. (2014). Incidence of parasites of *Clarias gariepinus* (Burchell, 1822) caught from Lake Alau, Maiduguri, Borno State, Nigeria. *Nigerian Journal of Fisheries and Aquaculture, 2*(1), 74–80.

Bush, A. O., Lafferty, K. D., Lotz, J. M., & Shostak, A. W. (1997). Parasitology meets ecology on its own terms: Margolis et al. revisited. *Journal of Parasitology, 83*(4), 575–583.

Gabriel, U., Akinrotimi, O., Bekibele, D., Onunkwo, D., & Anyanwu, P. (2007a). Locally produced fish feed: Potentials for aquaculture development in Sub-Saharan Africa. *African Journal of Agricultural Research, 2*(7), 287–295.

Hashem, O., et al. (2020). Incidence and molecular characterization of fungi and yeast isolated from freshwater fishes in Lake Manzala. *Mansoura Veterinary Medical Journal, 21*(3), 61–66.

Idris, S., Bichi, A. H., Umaru, J., & Sambo, F. (2025b). Length-weight relationship and condition factor of *Clarias gariepinus* (Burchell, 1822) in Kalgwai Reservoir, Nigeria. *Dutse Journal of Pure and Applied Science (DUJOPAS), 11*(2d), 266–275.

Idris, S., Bichi, A. H., Umaru, J., & Sambo, M. U. (2025a). Parasite dynamics of *Clarias gariepinus* (Burchell, 1822) in semi-arid zone of Nigeria: A two-year survey. *Dutse Journal of Pure and Applied Science (DUJOPAS), 11*(2d), 276–285.

Idris, S., Adam, A. A., Sambo, M. U., Sambo, F., & Ukeyima, J. (2024). Haematological indices of tilapia (*Oreochromis niloticus*) from Kalgwai Dam, Hadejia, Jigawa State, Nigeria. In *Proceedings of the 39th Annual National Conference of Fisheries Society of Nigeria (FISON)*, Abuja (pp. 194–198).

Sadauki, M. A., Dauda, A. B., & Yusuf, M. A. (2022). Prevalence of gastrointestinal helminths of African catfish (*Clarias gariepinus* Burchell, 1822) in Zobe Reservoir, Katsina State, Nigeria. *FUDMA Journal of Agriculture and Agricultural Technology, 8*(1), 123–131.

Mowang, D. A., Andem, B. A., Imalele, E. E., Eleng, I. E., Ambo, A. A., Sam-Uket, N. O., & Ayim, E. M. (2025). Analysis of parasitic infections in *Oreochromis niloticus* and *Clarias gariepinus* obtained from selected fish farms in Calabar, Nigeria. *Nigerian Journal of Parasitology, 46*(1), 50–58.

Olaosebikan, B. D., & Raji, A. (2013). *Field guide to Nigerian freshwater fishes* (2nd ed.). New Bussa, Nigeria: Federal College of Freshwater Fisheries Technology.

Omeji, S., Solomon, S. G., & Obande, R. A. (2010). A comparative study of the common protozoan parasites of *Heterobranchus longifilis* from the wild and pond environments in Benue State. *Pakistan Journal of Nutrition, 9*(9), 865–872.

Omeji, S., Ogaba, E. N., & Solomon, S. G. (2022). Seasonal variation in parasitic prevalence of *Oreochromis niloticus* from Upper River Benue, Nigeria. *Asian Journal of Basic Science & Research, 4*(3), 31–45.

Omeji, S., Solomon, S. G., & Uloko, C. (2013). Comparative study on the endo-parasitic infestation in *Clarias gariepinus* collected from earthen and concrete ponds in Makurdi, Benue State, Nigeria. *Journal of Agriculture and Veterinary Science, 2*(1), 45–49.

Oniye, S. J., Adebote, D. A., & Ayanda, O. I. (2004). Helminth parasites of *Clarias gariepinus* in Zaria, Nigeria. *Journal of Aquatic Sciences, 19*(2), 71–76.

Paperna, I. (1996). *Parasites, infections and diseases of fish in Africa – An update*. CIFA Technical Paper No. 31. Rome: FAO.

Paperna, I. (1991). Diseases caused by parasites in the aquaculture of warm water fish. *Annual Review of Fish Diseases, 1*, 155–194.

Subasinghe, R. (1995). Disease control and health management in aquaculture. *FAO Aquaculture Newsletter, 9*, 8–11.