Feeding Habits and Length-Weight Relationship of the African Catfish *Clarias gariepinus* (Burchell, 1822) (Pisces: Clariidae) from Koka Reservoir, Ethiopia

Teshome Belay[1] and Tekleweyni Asayehegn[2*]

[1]Department of Animal Sciences, College of Agriculture and Natural Resources, Dilla University, P.O. BOX 419, Dilla, Ethiopia (teshimeansc@gmail.com; https://orcid.org/0000-0001-7072-0060).

[2] Department of Aquatic Sciences, Fisheries, and Aquaculture, College of Natural and Computational Sciences, Hawassa University, P.O.BOX 05, Hawassa, Ethiopia (*teklew951@gmail.com; https://orcid.org/0000-0002-4076-9434).

ABSTRACT

This study was conducted during two rainy (June and July) and two dry (April and May) months of 2024 to examine the feeding habits and length-weight relationship of the African catfish, *Clarias gariepinus*, from Koka Reservoir, Ethiopia. In total, 402 specimens were collected and analyzed for feeding habits and length-weight relationships. From the total sample considered, only 343 (85.3%) were non-empty and considered for feeding habit analysis. A multiple sampling approach, including gillnets of different sizes, beach seines, hooks, and random sampling, was applied. The diet composition was analyzed using frequency of occurrence and volumetric contribution. From the stomach contents of *C. gariepinus*, seven major food categories were identified, displaying an omnivorous category. Among the identified diet compositions, zooplankton in occurrences (90.38%) and volumetric contribution (21.42%) were the dominant food categories. The occurrences of insects (93.07%) and macrophytes (89.23%) were the major food categories in dry and rainy months, respectively. Volumetrically, it was also seen that insects were the most ingested food items, accounting for 29.53% in dry months, and macrophytes (25.29%) in rainy months, respectively. The length-weight relationship indicated a curvilinear and significant interaction ($r^2 = 0.979$). The growth exponent displayed an isometric growth pattern ($b = 2.95$). From the results, it is concluded that the diet composition of *C. gariepinus* from Koka Reservoir indicates differences based on size and season. The overall growth exponent indicates the current safe condition. Some food items, like fish and insects, show a low dietary role compared to previous studies in the same study area. Therefore, it is recommended to conduct further studies by incorporating year-round sampling to indicate their feeding pattern.

Keywords: *Clarias gariepinus,* Feeding habits, Growth, Koka reservoir, Omnivorous.

1. INTRODUCTION

The African catfish *Clarias gariepinus* is a widely distributed species in different inland water bodies across Africa (Langi et al., 2024). Due to its high adaptability and economic importance, *C. gariepinus* has become one of the preferred commercially valuable fish species in many countries worldwide, including Brazil, Mali, Kenya, Nigeria, South Africa and several Asian nations (Segaran et al., 2023). This growing importance has attracted considerable attention from both capture fisheries and aquaculture sectors. The species is particularly favored due to its desirable biological characteristics, such as rapid growth rate,

Momona Ethiopian Journal of Science (MEJS), V18(2):183-198, 2026 ©CNCS, Mekelle University, ISSN:2220-184X

Submitted: 9th April 2026 Accepted: 23rd September 2026 Published: 29th October 2026

© CNCS Mekelle University. This article is licensed under a Creative Commons Attribution 4.0 International License. This license enables re-users to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator. The license allows for commercial use. To view the details of this license, visit http:// creativecommons.org/ licenses/ by/4. 0/. CC: Creative Commons; BY: credit must be given to the creator.

high resistance to diseases, and tolerance to high stocking densities (Klimuck et al., 2024). Consequently, numerous studies have been conducted by fish biologists across different aquatic ecosystems to support effective management and informed decision-making.

In Ethiopia, *C. gariepinus* is considered as the second most commercially important fish species, contributing about 20% of the national capture fisheries production from major inland waters. (Tesfaye and Wolf, 2014). With changing consumer preferences and increased acceptance of the species, its contribution to national capture production has increased about 23.5% (FAMP, 2024). However, the overexploitation of several fish species in Ethiopian inland water bodies has prompted increased interest in aquaculture, particularly through induced breeding of *C. gariepinus* (Gadisa and Devi, 2013; Abdissa et al., 2015; Wubie et al., 2015; Tilahun and Yalew, 2024). As a result, understanding the biological aspects of the species, especially its feeding ecology and growth patterns, has become a critical research priority.

Several studies have been conducted in Ethiopian inland waters to investigate the food and feeding habits as well as the length–weight relationships of *C. gariepinus* to support fisheries management. Published studies on the feeding habits of *C. gariepinus* include: studies from Lake Hawassa (Dadebo, 2000; Desta et al., 2007; Belay et al., 2025), Lake Hawassa and Shallo Swamp (Tekle-Giorgism et al., 2016), Lake Chamo (Dadebo, 2009), Lake Langano (Teka and Admassu, 2016), Lake Ziway (Tugie and Taye, 2004), Koka Reservoir (Dadebo et al., 2014), Lake Babogaya (Admassu et al., 2015) and the Rib Reservoirs (Tesfahun and Alebachew, 2023; Dessie et al., 2024). The findings of the above-mentioned researchers indicated that, *C. gariepinus* showed a generalist feeding behavior, ingesting a wide variety of plant- and animal-based food items.

The feeding habits of *C. gariepinus* in Koka Reservoir were previously studied in detail by Dadebo et al. (2014). However, the sampling design of the above-mentioned study relied primarily on fish purchased from the landing sites. For feeding habit study, a multiple approach is expected to reduce sampling bias during data analyses. Although a study conducted by Dadebo et al. (2014) from Koka Reservoir provided valuable baseline information. However, several environmental and anthropogenic changes have occurred in Koka Reservoir which needs updated the key biological aspects of *C. gariepinus*. For instance, the occurrence of toxic cyanobacteria, particularly *Microcystis aeruginosa*, which poses serious risks to aquatic biota including fish, has been reported from the reservoir (Major et al., 2018). Additionally, the threats of water hyacinth (*Eichhornia crassipes*) has altered the physicochemical characteristics of the Reservoir and affected the distribution and

abundance of phytoplankton (Getnet et al., 2021), and zooplankton (Getnet et al., 2020), which were previously identified as important food items for *C. gariepinus* (Dadebo et al., 2014). Furthermore, dietary competition with introduced exotic carp species has also been documented (Tesfaye and Wolf, 2018). All these emerging environmental pressures are closely linked to the feeding ecology and growth patterns of *C. gariepinus*. Therefore, the aim of the present study was to provide updated baseline information on the feeding habits (such as diet composition, ontogenetic dietary shift, and seasonal dietary variations) and the length-weight relationship of *C. gariepinus* from Koka reservoir, Ethiopia. The finding will contribute for different management decision, understanding the current food resource from the reservoir and used as an input for modeling experts.

2. MATERIALS AND METHODS

2.1. Descriptions of Study Area

Koka reservoir is geographically located at 8°20'N to 8°28' N Latitude and 39°0' to 39°8' E longitude (Fig 1). The reservoir was constructed as a result of damming Awash River for the purpose of hydro-electricity in the late 1960s (Dadebo et al., 2015). It is located in the Awash Basin at an altitude of 1,590 m above sea level within the Rift Valley of Ethiopia, about 90 km southeast of the capital city, Addis Ababa. It has a surface area of about 255 km^2 with a maximum and mean depths of 14 m and 9 m, respectively (Tesfaye and Wolff, 2014). Water in- and outflow is mainly provided by the Awash River. In addition, the Mojo River may also generate inflow during the rainy season. The lake has a large floodplain area in its Western side.

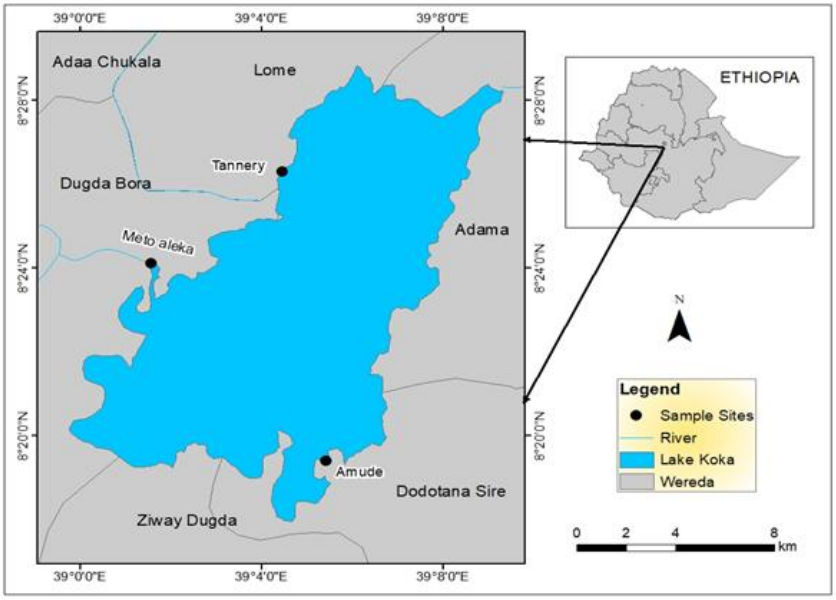


Figure 1. Map of Lake Koka with all the sampling sites (Source: Map was developed with ARC-GIS software).

2.2. Sampling and Morphometric Measurements

Sampling was conducted during two dry months (April and May) and other two rainy months (June and July) of 2024. To avoid sampling biases, multiple approaches were applied. For the first approach, a long line was set at three sampling sites, including Amude, Meto Aleka, and Tannery (Fig 1), respectively. The other approach was a random sampling from fishermen, which was captured with the aid of long lines and gillnets with different stretched sizes. Immediately after capture, morphometric measurements, including their total weight (TW) and total length (TL) of the fish, were measured to the nearest 0.1 g and 0.1 cm, respectively, at the shore area. After taking their morphometric data, dissection of the specimens with the aid of a surgical blade was conducted at the shore area. Their stomach was cut off and preserved 5% formalin solutions until further procedures were conducted. Finally, the preserved stomach samples were transported to Hawassa University's fishery laboratories for further examinations of feeding habits.

2.3. Feeding Habit Analysis

2.3.1. Diet Compositions

In the laboratory of fisheries of Hawassa University, the preserved stomach samples of *C. gariepinus* were gutted from the tip of the foregut of the stomach and gently palpated to transform the food items in the petri dish. During this process, a larger food items such as fish species and insect taxa were directly separated within their lowest taxa level. However, some groups of plankton taxa and other smaller-sized insects were identified with the aid of a dissecting microscope and a compound microscope, respectively. The food items in different categories were expressed based on frequency of occurrence (Hylsop, 1980) and volumetric contribution (Bowen, 1996).

2.3.1.1. Frequency of occurrence

The number of times a specific food item occurred in all non-empty stomachs was counted to understand how many times it occurred in the total number of samples. The occurrences of each prey were expressed as a percentage (Hylsop, 1980).

$$\%FO = \left(\frac{TNS_i}{TNSP_i}\right) X\ 100$$

Where, %FO = percent frequency of occurrences of specific food from non-empty stomach,
TNS_i = total number of fish species stomach with specific food item i, and
$TNSP_i$ = total number of non-empty species considered for feeding habit analysis.

2.3.1.2. Volumetric Contribution

For larger food items like fish and insects, their volume was directly measured with a known volume of a graduated cylinder after emptying the food from the stomach. Such food items were separated on their taxa with the assistance of a dissecting microscope (LEICA MS), and added to the known graduated cylinder; the displaced water volume was considered the volume of a specific prey (Desta et al., 2008). However, for other food items like phytoplankton additional approach was applied. After measuring the total volume of stomach samples, the samples were continuously shaken to homogenize and transferred to the Petri dish. Three drops of sub-samples were set on a slide. The food items were identified using compound microscopes (LEICA DME) with a magnification power of 100X and their percentages were calculated. Once again, a food item that has similar taxa, their average was considered and converted to volume. Finally, the volumetric contributions of each food item per total volume of the non-empty stomach sample were expressed as percentages (Bowen, 1996).

$$Vi\% = \frac{VSP_iFS}{VF_iFS}\ X\ 100$$

Where Vi% indicates the volumetric contribution of food item i in percentage, VSP_iFS indicates the volume of a specific food item found in all specimens, and VF_iFS indicates the volume of all food items found in all non-empty stomachs.

2.3.2. Ontogenetic Dietary Shifts

To determine the size-based ontogenetic dietary shift, the considered samples were grouped into three different size classes using the percentage of volumetric contribution. For the first size classes, *C. gariepineous* ranged from 29-38.9 cm were coded as I, from 39-48.9 were coded as II, and size classes ≥49 were coded as III. After grouping their size classes, the volumetric contributions of major food items were put in each size class, plotted with a stacked chart to indicate their contributions, and expressed as percentages.

2.3.3. Seasonal Variations of Diet Compositions

The occurrences and volumetric contributions of major food categories were identified after grouping the samples based on two rainy and two dry months. The mathematical expressions of each major food categories were expressed based on their frequency of occurrences and volumetric contributions.

2.4. Length Weight Relationship

For length-weight relationship analysis, the sorted data were run using the power function after removing the outliers and calculated as: $TW = aTL^b$ (Pauly, 1984), where TW= total

weight of fish (g), TL= total length of fish (cm), a = the intercept of the regression line, and b = the growth exponent of the regression line.

2.5. Data Summarization, Analysis and Interpretation

Depending the nature of data type, it was summarized, and analyzed using Microsoft excel and SPSS v20. The length-length weight relationship was also interpreted based on the r^2 value with reference from the fitted line.

3. RESULTS AND DISCUSSION

3.1. Feeding Habits

3.1.1. Diet Composition

For the present study, 402 specimens of *C. gariepinus* ranging from 29 cm to 65 cm in total length were examined for feeding habit analysis. Of the specimens analyzed, 343 (85.3%) had non-empty stomachs containing seven major food categories, including insects, fish, ostracods, macrophytes, detritus, zooplankton, and phytoplankton. The present result indicated that *C. gariepinus* from Koka Reservoir ingests both plant- origin and animal - source food categories. Similar generalist feeding habits were identified from different inland water bodies on the same species, including from Rib reservoir (Tesfahun and Alebachew, 2023; Dessie et al., 2024), Lake Hawassa (Dadebo, 2000; Tekle-Giorgis et al., 2016; Belay et al., 2025), Lake Chamo (Dadebo, 2009), Lake Babogaya (Admassu et al., 2015), and from the same study area, Koka Reservoir (Dadebo et al., 2014). Among the identified food categories, the role of zooplankton in both frequency of occurrence **(**90.38%) and volumetric contribution **(**21.42%**)** was considered the first most preferred food item compared with other major food categories (Table 1). The role of insects in both frequency of occurrence (87.46%) and volumetric contribution (18.96%) was identified the second most ingested food item of *C. gariepinus* during the present study. Other food categories, including macrophytes, ostracods, detritus, and phytoplankton, also played important roles in both occurrence and volumetric contribution (Table 1).

The present finding aligned with the same studies as other study areas on the same species, which reported that zooplankton was a dominant food category, such as studies from Rib Reservoir (Tesfahun and Alebachew, 2023; Dessie et al., 2024) and from Lake Chamo (Dadebo, 2009). Such reliance of zooplankton might be related to the abundance of food item or depending on their anatomical structure, in which *C. gariepinus* has a specialized long and closely placed filtering gill raker to filter zooplankton (Dadebo, 2009).

Table 1. Diet compositions of C.gariepinus from Koka reservoir (n = 343).

Food categories		***Frequency of occurrence***		***Volumetric contribution***	
		FO	***%FO***	***Vol (ml)***	***% Vol***
Insects		**300**	**87.46**	**143.76**	**18.98**
	Hemiptera	150	43.73	65.89	8.70
	Coleoptera	100	29.15	41.69	5.50
	Odonata	35	10.2	21.69	2.86
	Plecoptera	15	4.37	14.49	1.92
Fish		**30**	**8.74**	71.67	**9.46**
	O. niloticus	25	7.29	57.59	7.60
	L. intermedius	5	1.46	14.08	1.86
Ostracods		**130**	**37.9**	**86.27**	**11.39**
Macrophytes		**280**	**81.63**	**112.1**	**14.80**
Detritus		**230**	**67.05**	**129.8**	**17.03**
Zooplankton		**310**	**90.38**	**162.2**	**21.42**
	Copepoda	122	35.56	81.44	10.75
	Cladocera	147	42.86	73.46	10.75
	Rotifera	41	11.95	12.46	**6.81**
Phytoplankton		**141**	**41.1**	**51.57**	**6.81**
	Diatoms	41	11.95	18.99	2.51
	Blue green algae	100	29.15	32.58	4.30

On the other hand, some food categories, like fish species were reduced compared to the same study area. For instance, during the present study, from the stomach content of *C. gariepinus*, only *O. niloticus* and *L. intermedius* fish species were identified at different proportions (Table 1). The present finding indicated low compositions of fish diversity in the stomach contents of *C. gariepinus* from the same study area (Dadebo et al., 2014). This might be the difference of fish size difference (Catarina et al., 2005). For instance, during the present study, the largest size catch for feeding habit analysis was 65 cm in total length. While, during Dadebo et al. (2014), the largest non-empty species was recorded at 87 cm from the same study area. Koka Reservoir currently sees a threat of water hyacinth (Tolera et al., 2025). This situation might be restricted to the free movements of *C. gariepinus* to diversify its feeding habit from the shore area. The other probable factor might be related to the reduction of fish population from Koka reservoir as a result of overfishing (Anteneh et al., 2023).

The present study also showed a contradictory result from the findings of other studies on the same species. For instance, insects were the dominant food category in Lake Langano (Teka and Admassu, 2016), Lake Hawassa (Tekle-Giorgis et al., 2016; Belay et al., 2025), Lake Zeway (Tugie and Taye, 2004), Lake Babogaya (Admassu et al., 2015), fish and insects were from Lake Hawassa (Dadebo, 2000), phytoplankton from Egbe Reservior, Nigeria (Malami and Magawata, 2010), fish in Lake Baringo (Omondi et al., 2013). This

variation may be attributed to differences in the physicochemical characteristics of the water bodies, fish sample size, and the abundance and distribution of food items (Tesfahun, 2018; Pratiwy et al., 2023); the quality of food source that they ingest (Omondi et al., 2013) and water level fluctuations (Bianchi-Costa et al., 2023).

3.1.2. Ontogenetic Dietary Shift

The food category preferences of *C. gariepinus* from Koka Reservoir showed clear differences among size classes, indicating ontogenetic dietary variation (Fig 2). In the smaller size classes, *C. gariepinus* mainly consumed insects, which contributed 48.53% compared to other identified food categories (Fig 2). The role of insects was low in the medium sized classes, which contributed 23.63%. However, at larger size classes, insects didn't show a dietary role for *C. gariepinus* (Fig 2). The contributions of other food categories, including ostracods and phytoplankton, declined sharply when the size of *C. gariepinus* increased (Fig 2). The dietary preference of the fish shifted toward detritus and fish prey as its size increased (Fig 2). The increased reliance on fish and detritus at larger size classes may be attributed to natural developmental changes, including enlargement of the stomach and mouth gape, which enable the capture and ingestion of larger prey items (Mihalitsis and Bellwood, 2017; Whitfield et al., 2022). On the other hand, zooplankton was identified from the stomach contents of *C. gariepinus* as a food item in all size classes during the present study (Fig 2). However, the contribution of zooplankton indicated an increasing trend when the size classes of *C. gariepinus* increased (Fig 2). The persistent presence of zooplankton across all size classes may be related to the anatomical structure of the gill rakers, which facilitate efficient filtration of these food items (Dadebo, 2009).

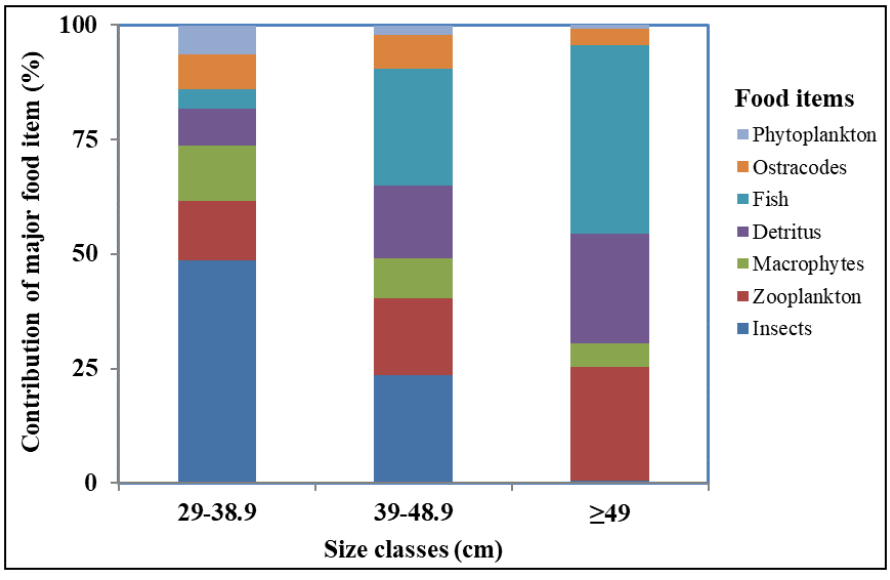


Figure 2. Ontogenetic dietary shift of C. gariepinus.

3.1.3. Seasonal Variations

The diet composition of *C. gariepinus* from Koka Reservoir showed clear seasonal variations in both the frequency of occurrence and volumetric contribution of different food categories between the dry and wet months (Table 2). During the dry season, insects (93.07%), zooplankton (83.07%), and detritus (47.69%) were the three most frequently occurring food items in the stomachs of *C. gariepinus*, compared with other identified food categories (Table 2). Macrophytes and phytoplankton also showed relatively high frequencies of occurrence, whereas fish remain were the least frequently recorded food items (Table 2).

Table 2. Seasonal variations of C. gariepinus during dry (n = 170) and wet (n = 173) months.

Food items	***Frequency of occurrence (%)***		***Volumetric contribution (%)***	
	Dry months	***Wet months***	***Dry months***	***Wet months***
Insects	**93.07**	**20**	**29.53**	**3.91**
Hemiptera	40	9.5	12.14	0.65
Coleoptera	35	4.3	14.12	1.25
Odonata	8.02	5.2	1.17	1.25
Plecoptera	10.05	2	2.11	0.76
Fish	**10**	**5.38**	**8.89**	**9.77**
O.niloticus	6	3.08	5.62	6.53
L.intermedius	4	2.3	3.28	3.23
Ostracods	**5.33**	**12.3**	**8.57**	**11.87**
Macrophytes	**33.08**	**89.23**	**8.18**	**25.29**
Detritus	**47.69**	**79.23**	**11.11**	**23.85**
Zooplankton	**83.07**	**66.15**	**26.08**	**19.31**
Copepoda	32.02	23.1	12.55	7.44
Cladocera	40.05	28.02	8.39	8.34
Rotifera	11	15.03	5.15	3.54
Phytoplankton	**23.07**	**47.69**	**7.63**	**5.99**
Diatoms	6.03	20.6	2.31	2.28
Bluegreen algea	17.04	27.09	5.32	3.7

In contrast, during the rainy season, the frequency of occurrence of major food items differed markedly from that of the dry season (Table 3). Macrophytes (89.23%), detritus (79.23%), and zooplankton (66.15%) were identified as the three most frequently occurring food categories. Phytoplankton (47.69%) and insects (20.6%) showed intermediate levels of occurrence, while insects and fish remains were rarely observed during the rainy months (Table 3). Similarly, the volumetric contribution of food items in the diet of *C. gariepinus* exhibited distinct seasonal differences (Table 3). During the dry season, insects (29.53%), zooplankton (26.08%), and detritus (11.11%) contributed the highest proportions to the total stomach volume. Other food categories, including fish remains, ostracods, and macrophytes, contributed relatively small volumes and played minor roles in the diet (Table 3). Conversely,

during the rainy season, macrophytes (25.29%), detritus (23.85%), and zooplankton (19.31%) constituted the highest volumetric contributions to the diet. Other food categories, such as ostracods, fish remains, phytoplankton, and insects, contributed only minimal volumes and were considered of minor importance during this season (Table 3). The present result showed a similar pattern, which reported a difference in food occurrences and contribution at different seasons, such as from Lake Babogaya (Admassu et al., 2015), Hawassa (Dadebo, 2000; Belay et al., 2025), Rib reservoir (Tesfahun and Alebachew, 2023; Dessie et al., 2024) and from the same study area Koka reservior (Dadebo et al., 2014).

Table 3. Comparisons of growth exponent (b) of C. gariepinus across different inland water bodies of Africa.

Water bodies	***Growth exponent (b)***	***R^2 value***	***Growth pattern***	***References***
Koka reservoir	2.95	0.979	I	Present study
Rib Reservoir	2.62	0.77	NA	Mequanent et al. (2023)
	2.83	0.85	NA	Asres et al. (2023)
Lake Chamo	3.19	0.99	A	Dadebo et al. (2011)
Asi River, Turkey	2.94	0.93	I	Sismek et al (2022)
Ajiwa reservoir, Nigeria	2.85	0.95	NA	Sadauki et al. (2024)
Naivasha, Kenya	3.23	0.88	PA	Keyombe et al. (2015)
Zobe reservoir	2.85	0.96	NA	Sadauki et al (2023)

Note: I- isometric, NA- negative allometric, A- allometric, PA- Positive allometric.

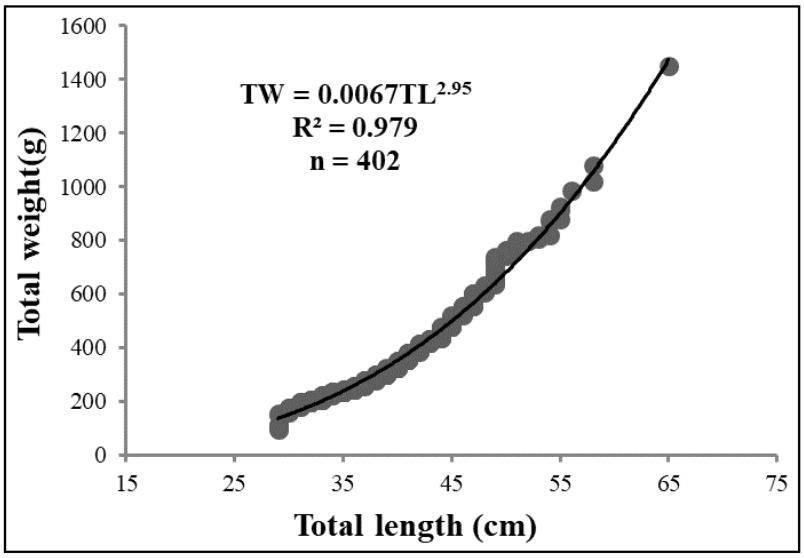


Figure 3. Length-weight relationship of C. gariepinus from Koka Reservoir.

3.2. Length Weight Relationship

The length–weight relationship of *C. gariepinus* from Koka Reservoir exhibited a clear curvilinear pattern (Fig 3) and demonstrated a strong positive relationship between length and weight (R^2 = 0.979). Similar curvilinear relationships with strong correlations have been reported for the same species in various inland water bodies, indicating consistent growth

patterns across different habitats. The growth exponent (b = 2.95) indicated near isometric growth pattern for *C. gariepinus*. A comparison of growth exponent (b) values reported from different water bodies is summarized in table 3. The isometric growth pattern observed in this study is consistent with the findings from several previous studies on the same species, although some studies have reported either positive or negative allometric growth patterns (Table 3). Variations in growth patterns among different studies may be attributed to differences in sample size, physicochemical characteristics of the water bodies, availability and quality of food resources, and reproductive or breeding conditions (Froese, 2006).

4. CONCLUSIONS AND RECOMMENDATIONS

During the present study, diverse food categories, including insects, fish, detritus, macrophytes, phytoplankton, zooplankton and ostracods, were identified from the stomach contents of *C. gariepinus.* Based on the diet composition analysis, C. *gariepinus* was categorized as an omnivorous category. Currently, the growth exponent (b) value of *C. gariepinus* from the Koka reservoir showed cubic increase in the body mass with length of fish. However, conducting further research on the reservoir is expected, in which the diversity of major food items, like fish species, was reduced compared to the former studies. *C. gariepinus* widely relied on zooplankton, which might be dietary competition with other commercially important fish species like *O. niloticus*. Therefore, year-round-based studies and dietary competition should be addressed to consider the future scenario of the reservoir production potential.

5. ACKNOWLEDGEMENTS

The authors acknowledged the Department of Aquatic Sciences, Fisheries, and Aquaculture of Hawassa University for laboratory access.

6. CONFLICT OF INTEREST

There is no conflict of interest.

7. REFERENCE

Abdissa, B., Getahun, S & Yalew, A. 2015. Artificial propagation of *Clarias gariepinus* (Burchell, 1822) in aquaria. *Ethiopian Journal of Biological Sciences*, **14 (1)**: 85-92.

Admassu, D., Abera, L & Tadesse, Z. 2015. The food and feeding habits of the African catfish, *Clarias gariepinus* (Burchell), in Lake Babogaya, Ethiopia. *Global Journal of Fisheries and Aquaculture*, **3 (4)**: 211-220.

Anteneh, Y. E., Mamo, S. W., Yisheber, A. W & Seyneh, D. T. 2023. Current fishery status in Ethiopian reservoirs: challenges and management. *Fisheries and Aquatic Sciences*, **26(5)**: 305-317, https://doi.org/10.47853/FAS.2023.e26.

Asres, A. T., Alebachew, S & Kebtieneh, N. 2023. Length-weight relationships and reproductive biology of commercially important fishes from Ribb Reservoir, Ethiopia. *Fisheries and Aquatic Sciences*, **26(5)**: 318-335, https://doi.org/10.47853/FAS.2023.e27.

Belay, T., Dadebo, E., Tilahun, G & Aemro, D. 2025. Feeding and reproductive biology of the African catfish *Clarias gariepinus* (Burchell, 1822) in Lake Hawassa, Ethiopia. *Ethiopian Journal of Science and Technology*, **18(1)**: 1-26, https://dx.doi.org/10.4314/ejst.v18i1.1.

Bianchi-Costa, I. C., Quirino, B. A., Cardozo, A. L. P., Yofukuji, K. Y., Aleixo, M. H. F & Fugi, R. 2023. Water-level fluctuations lead to changes in the diet of an omnivorous fish in a floodplain. *Neotropical Ichthyology*, **21(1)**: e220064, https://doi.org/10.1590/1982-0224-2022-0064.

Bowen, S. H. 1996. Quantitative description of the diet. pp 513 – 532. In B.R. Murphy and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Catarina, I., Margaret, A., Johan, W & Johan A. 2005. Size distribution in African catfish (*Clarias gariepinus*) affects feeding behavior but not growth. *Aquaculture*, **250(1–2)**: 300-307. https://doi.org/10.1016/j.aquaculture.2005.05.034.

Dadebo, E. 2000. Reproductive biology and feeding habits of the catfish *Clarias gariepinus* (Burchell) (Pisces: Clariidae) in Lake Awassa, Ethiopia. *SINET: Ethiopian Journal of Science*, **23(2)**: 231-246, https://doi.org/10.4314/sinet.v23i2.18168.

Dadebo, E. 2009. Filter-feeding habit of the African catfish *Clarias gariepinus* Burchell, 1822 (Pisces: Clariidae) in Lake Chamo, Ethiopia. *Ethiopian Journal of Biological Sciences*, **8(1)**: 15-30.

Dadebo, E., Aemro, D & Tekle-Giorgis, Y. 2014. Food and feeding habits of the African catfish *Clarias gariepinus* (Burchell, 1822) (Pisces: *Clariida*e) in Lake Koka, Ethiopia. *African Journal of Ecology*, **52(4)**: 471-478, https://doi.org/10.1111/aje.12146.

Dadebo, E., Eyayu, A., Sorsa, S & Tilahun, G. 2015. Food and feeding habits of the common carp (Cyprinus carpio L. 1758) (Pisces: Cyprinidae) in Lake Koka, Ethiopia. *Momona Ethiopian Journal of Science (MEJS)*, **7(1)**:16-31.

Dadebo, E., Gebre-Mariam, Z & Mengistou, S. 2011. Breeding season, maturation, fecundity and condition factor of the African catfish *Clarias gariepinus* Burchell 1822 (Pisces: Clariidae) in Lake Chamo, Ethiopia. *Ethiopian J. of Biological Science*, **10(1)**. 1-17.

Dessie, A., Mingist, M., Mequanent, D & Aemro, D. 2024. Food and feeding habits of the African catfish *Clarias gariepinus* (Burchell, 1822) (Pisces: Clariidae) in the newly built Ribb Reservoir, north-west Ethiopia. *Indian Journal of Fisheries*, **71(2)**: 37-42, https://doi.org/:10.21077/ijf.2024.71.2.134268-05.

Desta, Z., Borgstrøm, R., Rosseland, B & Dadebo, E. 2007. Lower than expected mercury concentration in piscivorous African sharptooth catfish *Clarias gariepinus* (Burchell). *Science of the Total Environment*, **376(1-3)**: 134–142, https://doi.org/10.1016/j.scitotenv.2007.01.091.

Desta, Z., Borgstrøm, R., Gebremariam, Z & Rosseland, B. O. 2008. Habitat use and trophic position determine mercury concentration in the straight fin barb Barbus *paludinosu*s, a small fish species in Lake Awassa, Ethiopia. *Journal of Fish Biology*, **73(3)**: 477-497, https://doi.org/10.1111/j.1095-8649.2008.01920.x.

FAMP (Fisheries and Aquaculture Master Plan). 2024. A report by Federal Democratic Republic of Ethiopia. Retrived from https://www.moa.gov.et/wp content/uploads/2025/09/FINAL_VERSION_FAMP.pdf.

Froese, R. 2006. Cube law, condition factor and weight–length relationships: history, meta-analysis and recommendations. *Journal of Applied Ichthyology*, **22(4)**: 241-253, https://doi.org/10.1111/j.1439-0426.2006.00805.x.

Gadissa, S & Devi, L. P. 2013. Evaluation of spawning induction of African catfish (*Clarias gariepinus*) by heteroplastic hypophysation. *International Journal of Fisheries and Aquatic Studies*, **1(1)**: 22-25.

Hyslop, E. J. 1980. Stomach contents analysis: a review of methods and their application. *Journal of Fish Biology*, **17**: 411–429, https://doi.org/10.1111/j.1095-8649.1980.tb02775.x.

Keyombe, J. L., Waithaka, E & Obegi, B. 2015. Length–weight relationship and condition factor of *Clarias gariepinus* in Lake Naivasha, Kenya. *International Journal of Fisheries and Aquatic Studies*, **2(6**): 382-385.

Klimuk, A. A., Beketov, S. V & Kalita, T. 2024. Physiological and ecological features of cultivation African catfish *Clarias gariepinus*. *Biology Bulletin Reviews*, **14(3)**: 326-335, https://doi.org/10.1134/S2079086424600747.

Langi, S., Maulu, S., Hasimuna, O. J., Kaleinasho Kapula, V & Tjipute, M. 2024. Nutritional requirements and effect of culture conditions on the performance of the African catfish (*Clarias gariepinus*): a review. *Cogent Food & Agriculture*, **10(1)**: 2302642, https://doi.org/10.1080/23311932.2024.2302642.

Major, Y., Kifle, D., Spoof, L & Meriluoto, J. 2018. Cyanobacteria and microcystins in Koka reservoir (Ethiopia). *Environmental Science and Pollution Research*, **25(27)**: 26861-26873, https://doi.org/10.1007/s11356-018-2727-2

Malami, G & Magawata, I. 2010. Analysis of food and feeding habits of Catfish (Bagrus bayad, Macropterus) in River Rima and Goronyo Dam, in Sokoto State, Nigeria. *Nigerian Journal of Basic and Applied Sciences*, **18(2)**: 277-284.

Mequanent, D., Mingist, M., Getahun, A., Anteneh, W & Hailu, B. 2023. The newly built Ribb Reservoir fisheries, Tana sub-basin, Ethiopia: New fishery establishment, diversity, production, challenges and management. *Aquaculture, Fish and Fisheries*, **3(2)**: 189-201, https://doi.org/10.1002/aff2.46.

Mihalitsis, M & Bellwood, D. R. 2017. A morphological and functional basis for maximum prey size in piscivorous fishes. *PloS one*, **12(9)**: 0184679, https://doi.org/10.1371/journal.pone.0184679.

Omondi, R., Yasindi, A. W & Magana, A. M. 2013. Food and feeding habits of three main fish species in Lake Baringo, Kenya. *Journal of Ecology and the Natural Environment*, **5(9)**: 224-230.

Pauly, D. 1984. Fish population dynamics in tropical waters: a manual for use with programmable calculators. International Center for living Aquatic Resources Management, Manila, Philippines, 325p.

Pratiwy, F.M., Haetami, K & Sinaga, J.A. 2023. Exploring fish eating habits: factors influencing feeding behavior in tropical fish. *Asian Journal of Fisheries and Aquatic Research*, **23(4)**: 1-7, https://doi.org/10.9734/AJFAR/2023/v23i4605.

Sadauki, M., Bichi, A & Geidam, M. 2023. Length-weight relationship and condition factor of *Clarias gariepinus* (Burchell, 1822) in Zobe Reservoir, *Life Sciences: an International Journal*, **1(1)**:1-10.

Sadauki, M. A., Bichi, A. H & Umar, J. 2024. Length-Weight Relationship and Condition Factor of Clarias gariepinus (Burchell, 1822) from Ajiwa Reservoir, Katsina State, Nigeria. *Life Sciences: An International Journal (LSIJ)*, **1(1)**: 143-150.

Segaran, T. C., Azra, M. N., Piah, R. M., Lananan, F., Téllez-Isaías, G., Gao, H., Torsabo, D., Kari, Z. A & Noordin, N. M. 2023. Catfishes: A global review of the literature. *Heliyon*, **9(9)**: e20081, https://doi.org/10.1016/j.heliyon.2023.e20081.

Şimşek, E., Gözler, Z. A & Samsun, O. 2022. Age and growth parameters of African catfish (Clarias gariepinus Burchell, 1822) from Asi River, Turkey. *Acta Natura et Scientia*, **3(1)**: 32-43, https://doi.org/10.29329/actanatsci.2022.351.04.

Teka, L & Admassu, D. 2016. The food and feeding habits of the African catfish, *Clarias gariepinus* (Burchell, 1822), in Lake Langeno, Ethiopian Rift Valley. *Ethiopian Journal of Biological Sciences*, **15(2)**: 141-161.

Tekle-Giorgis, Y., Wagaw, S & Dadebo, E. 2016. The food and feeding habits of the African catfish, *Clarias gariepinus* (Burchell, 1822) (Pisces: Clariidae) in Lake Hawassa and Shallo swamp, Ethiopia. *Ethiopian Journal of Biological Sciences*, **15(1)**:1-18.

Tesfahun, A. 2018. Feeding biology of the African catfish Clarias gariepinus (Burchell) in some of Ethiopian Lakes: a review. *Int. J. Fauna and Biological Studies*, **5(1)**: 19-23.

Tesfahun, A & Alebachew, S. 2023. Diet composition and feeding habits of the African sharptooth catfish *Clarias gariepinus* (Burchell, 1822) from Ribb Reservoir, South Gondar, Ethiopia. *Cogent Food & Agriculture*, **9(2)**:2284228, https://doi.org/10.1080/23311932.2023.2284228.

Tesfaye, G & Wolff, M. 2014. The state of inland fisheries in Ethiopia: a synopsis with updated estimates of potential yield. *Ecohydrology & Hydrobiology*, **14(3)**: 200-219, https://doi.org/10.1016/j.ecohyd.2014.05.001.

Tesfaye, G & Wolff, M. 2018. Modeling trophic interactions and the impact of an introduced exotic carp species in the Rift Valley Lake Koka, Ethiopia. *Ecological Modelling*, **378**: 26-36, https://doi.org/10.1016/j.ecolmodel.2018.04.003.

Tilahun, G & Yalew, A. 2024. Cryopreservation and artificial insemination in African Catfish (*Clarias gariepinus*, Burchell 1822): A review. *Journal of Agriculture and Environmental Sciences*, **9(1)**: 110-122, https://dx.doi.org/10.4314/jaes.v9i1.8.

Tolera, G., Getahun, A., Geremew, A & Mengistou, S. 2025. Assessment of water hyacinth (*Pontederia crassipes*) distribution and changes in Lake Koka and Lake Ziway through remote sensing techniques. *Scientific Reports*, **15(1)**: 16885, https://doi.org/10.1038/s41598-025-94028-8.

Tugie, D & Taye, M. 2004. Reproductive biology and feeding habits of African catfish (*Clarias gariepinus*, Burchell, 1982) in Lake Zeway, Ethiopia. *ESAP Proced.*,199p.

Whitfield, A. K., Able, K. W., Blaber, S. J. M., Elliott, M., Franco, A., Harrison, T. D & Houde, E. D. 2022. Feeding Ecology and Trophic Dynamics. In: *Fish and Fisheries in Estuaries*. A. K. Whitfield, K. W. Able, S. J. M. Blaber and M. Elliott (Eds), https://doi.org/10.1002/9781119705345.ch5.

Wubie, A., Waidbacher, H & G Tsadik, G. 2015. Comparative study of Synthetic hormone and Carp pituitary gland in induced breeding of African catfish (*Clarias gariepinus*) in hatchery. *Journal of Agricultural Development*, **5**: 2.