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Effect of Demographic Factors on Entrepreneurial Culture: A Study of University Students in Metropolitan Kano

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ABSTRACT

Some aspects of biology of clarias gariepinus in tiga dam were studied, these aspects include food and feeding habits, measurement of the body sizes, weights and condition factors. The population of males was significantly higher than the females. The mean weights ranged from 369.38gm to 673.9gm. The relationships between the standard length and weight was curvilinear. The fish exhibited isometric growth, and the mean condition factor (k) significantly (P<0.05) ranged between 0.90 – 3.71. The major food ingested were insects, fish parts and algae thus the fish is considered to have mainly omnivorous feeding habits.

Keywords: Food, Feeding habits, Catfish, Measurements, Relationships, Weight, Length, Dam.

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1. INTRODUCTION

The African catfish, *Clariasgariepinus* from biological perspectives, is undoubtful one of the most idea aquaculture species in the world. They are of great economic importance as food fish and vital in sustainability of aquaculture [16]. Their aquaculture attributes include, ability to withstand handling stress, disease resistance, high growth rate, yield potential, fecundity and palatability. It is expected that the significance of African catfish culture will grow in the coming decade. *Clariasgariepinus*and *Clariasanguilaris*are the two species most readily acceptable in Nigeria, because they grow to large sizes. The African catfish is widely distributed (70% of latitude), thrives in diverse environments (temperate to tropical).

Information by several authors [5, 10] reported that *Clarias* 'is a fast growing fish and an indiscriminate feeder. It can be culture to produce large quantity of inexpensive animal protein [7]. *Clarias*can also be used to control undesirable recruitment of *tilapia* in culture systems. Therefore, *CLarias* is among important fish species in aquaculture production and management *Clarias*will fed on different kinds of foods and baits, and not every kind will take the same bait. Of course, there are some similarities to consider, including how cat find food and what types they are mostly likely to find. The feed habits of catfish is similar in terms of types of catfish in that they all look for food by smelling sensory cells in the whiskers of catfish help them to find food. In fact, foods with stronger scents will be more likely to be found by catfish because it will be easier for them to detect these food [20].

Also, catfish tend to be more active in looking for food at night. This is better time for catfishing. While this is a common habit in terms of feeding habits of *Clarias,* different based on what type of catfish it is. The channel catfish, for instance, will normally look for food at the bottom of the water bed, and they particularly feed on insects, crayfish and crustaceans are also popular among channel catfish. Younger ones will eat aquatic larvae.

The white catfish is more flexible, but the feeding habits of *Clarias* like this are different. This type of catfish does not always eat at night, and it can also eat fish eggs and aquatic insects. They will also eat plants, which make their habits different from the other feeding habits of catfish.

But head *Clarias*are more of scavengers. Yellow ones will feed on snails and some organic decay, while brown bull head catfish will take carrion, smaller fish and worms. These catfish are not necessarily picky in terms of their feeding habits, as they will take the lower level kinds of foods without argument.

The blue *Clarias* will look for food at the bottom of the water bed most of the time. When looking for fish they will move upward though. The blue catfish has a more advanced body type so can take both fish and aquatic insects regardless of size. However, an adult will take mussels and a younger one will use fish that is smaller [20]. The flat head *Clarias* has more of a predatory feeding habits of catfish. They will feed on all kinds of fish in their areas, as they are hunters. They will feed at the shallow parts of water in the right time, and they will go in groups to find food.

Feeding is a prerequisite for successful reproduction. The African catfish may be considered omnivorous fish with a high tendency to predation, slow, methodical searching negative pressure is created by increasing the volume of buccopharyngeal chamber [4].

The food is important because it affects the number and the mass of fish population. The relationships between the food and the fish are not direct by via conflicting interrelationship. Very often the amount of food eaten determines the fecundity of the year class, also determines the growth rate, maturity, longevity (how long the fish would live) [10].

The fish are voracious predator and eat almost anything includes insects, young fish, detritus, algae, rotting flesh, reptiles and fruit in the diet. It is normally an individual bottom feeder, however they are known to be extremely adaptable to conditions and feed groups at the water surface. They hunt socially, swimming information on the water surface or in a class life formation to the shore. The pack herd cichlid prey towards the shallows where they are easily caught by these African catfish who use their pectoral spines to ‘walk’ out of the water to engage prey [21].

The mouth is wide, sub-terminal, transverse and capable of opening extremely wide for engulfing prey items or sucking in large amounts of water which is flushed through the gills for filter feeding. Once the prey is in the mouth, the jaws snap closed and the broad bands of sharp teeth on both the upper and lower jaws prevent the prey from escaping. The prey is swallowed whole. The oesophagus is shore, muscular and dilatable, it opens into a distended stomach typical of creatures capable of carnivory [2].

1.2. Justification of the Study

The work is important because scanty information on the biology of *Clarias* in the dam had been done, the research will generate data that can be used to improve the fishery resources and general productivity of the dam so that the fishermen can explore resources exploitation alternatives since *Clarias* is an important commercial fish species.

1.3. Aims and Objectives of the Study

The work is aimed at making a survey of some aspects of the biology of *Clarias gariepinus*in Tiga dam with particular reference to the food and feeding habits.

2. MATERIALS AND METHODS

2.1. Study Area

The dam is in Kano State in the North of Nigeria. The Tiga Dam is located on River Kano between latitudes $11^0 20^1$ and $11^0 45^1$N of the equator and longitudes $80^0 15^1$ and $80^0 30^1$E of the Greenwich meridian, 70km South of Kano City. It is one of the largest dams in the country and was designed and built 1970 and 1974. The dam is the cornerstone of water resources development in the Kano River Valley, in Kano State and Hadejia River Valley in Jigawa State.

The dam is equipped with 3 outlets as follows

1. The main outlet is a 3.65m diameter conduit supplying a 2.2m diameter Howell Bunger relating value.
2. 2Nos 90cm diameter conduits with 60cm regulating value.

The main dam outlet, comprising of bulkhead gates, butterfly vale, etc is installed in the outlet value chamber, which is submerged 16 meters below the fully supply level.

2.2. Sampling Sites

Specimens of *C. gariepinus* for all assessment in each site were randomly collected twice monthly between May to August 2015. The Mali trap and Koma net (10-30mm mesh size) were the major gears used in the collection. Two sampling sites were selected with one sampling site randomly selected and the sites included Tower and Yaryasa.

2.3. Fish Measurement

In the aquarium, data obtained from each fish included; length, weight, sex, fecundity and stomach content. Standard length (SL) and total length (TL) were measured to the nearest 0.1cm and weight to the nearest 0.1g.

Total Weight (TL)

The total length of each fish was taken in centimeter from the tip of the snout (mouth closed) to the end of the caudal fin or the tail fin pinched together using a measuring board.

Standard Length (SL)

The standard length of the fish was taken using a measuring board as the distance from the tip of the snout to the posterior end of the last vertebra or the posterior end of mid lateral portion of the hypural plate.

Weight (g)

The weight of each fish was measured in gram, using a top loaded pan balance. The length – weight relationship of the fish was described by the equation:

Length Weight Relationship

The length – weight described by Rickter, [19] is as follows:

$W = aL^b$

W = the weight in gram

L = Total length in centimeter

a = the intercept/constant

b = the regression coefficient / an exponent

The logarithm transformed data will give the equation

$\text{Log}_{10}W = \log a + b\log L$ [12].

2.4. Condition Factor

The condition factor was determined by using the formula

$$K = \frac{100w}{L3}$$ [3]

Where K = condition factor

W = weight in g

L = length in cm

3. RESULTS

A total of 240 (136 male and 104 female) *C. gariepinus* individuals were caught during the study (Table 2).The standard lengths of male and female *Clariasgariepinus* ranged from 22.2cm to 47cm (Table 1).

As shown in table 1 the results of mean standard lengths of *C. gariepinus,* the male values ranged from 34.08cm to 38.29cm July (week 12) had the highest value of 38.29cm and May (week 4) had the lowest value of 34.08cm.

Similarly, table 1, showed the female mean length value to range between 28.00cm to 39.0cm with month of August (week 16) having the highest value and May (week 2) had the lowest value.

The mean weight for *C. gariepinus* (Table 1) ranged from 369.38g to 673.90g. the male specie had the highest value in July (week 12) with 673.90g and May (week 2) had the lowest value of 463.90g. in female the results obtained showed that the month of July (week 12) had the highest value 523.16g and May (week 2) had the lowest value of 369.38. The length – weight relationship of *C. gariepinus* in Tiga dam was curvilinear and statistically significant (P < 0.05) as shown in figure 1 and 2.

Table-1. Male and Female means standard length (cm), mean weight (g) of *Clariasgariepinus*in Tiga Dam over 16 weeks period (May – august 2015)

Parameters	**Months**	**May**		**June**		**July**		**August**	
Female mean weight (g)		369.38	399.69	433.38	455.15	523.15	423.15	427.54	409.92
Female mean standard length (cm)		28.00	30.00	32.25	34.00	35.00	36.16	38.08	39.00
Male mean weight (g)		463.90	464.90	515.40	538.70	549.80	673.90	513.90	479.20
Male mean standard length (cm)		34.08	34.26	37.02	37.25	37.45	38.29	36.47	35.098
Female weight logarithm		2.67	2.67	2.71	2.73	2.74	2.83	2.71	2.68
Male weight logarithm		2.67	2.70	2.75	2.80	2.80	2.82	2.85	2.85
Male (standard length) logarithm		1.53	1.54	1.55	1.56	1.57	1.57	1.58	1.58

Source: Measurements of standard lengths in tiga dam 2015,

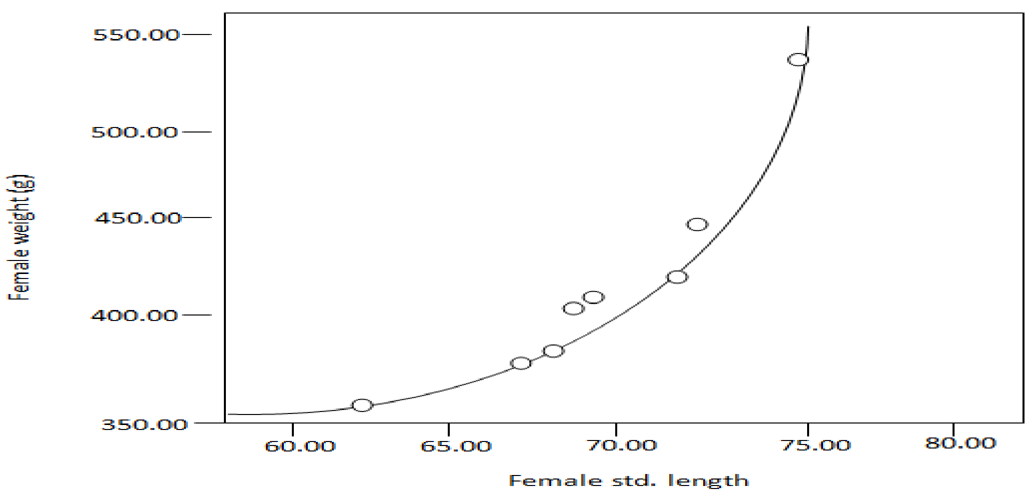

Figure-1. Graph of weight (g) against length (cm) of female *gariepinus*in Tiga Dam

As seen in figure 1, the graph showed that as weight increases the length also increase.

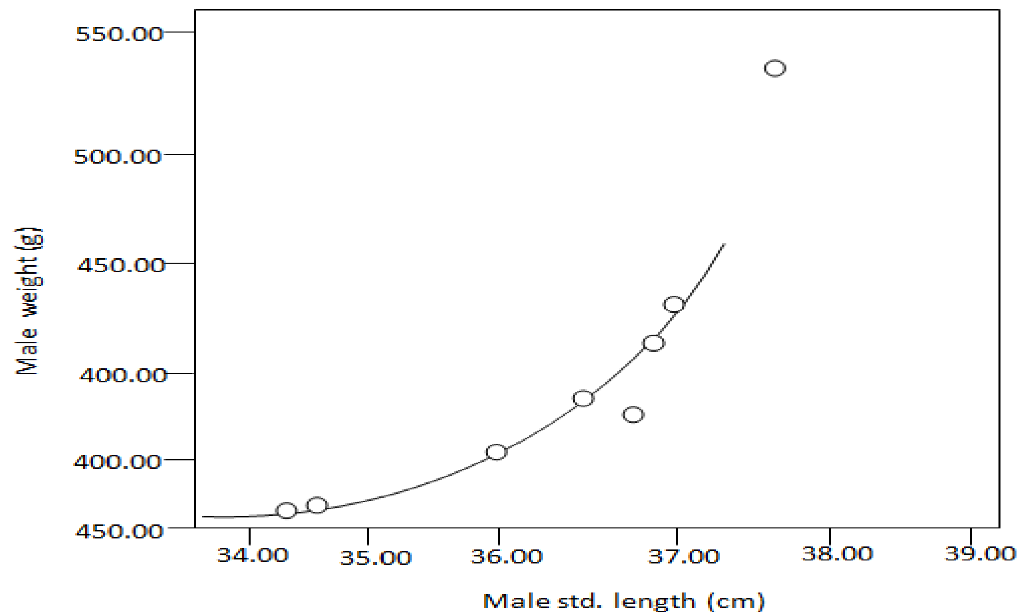

Figure-2. Graph of length – weight relationship of male *Clariasgariepinus*in Tiga Dam.

As seen in figure 2, as the length of male *C. gariepinus*increases so also the weight.

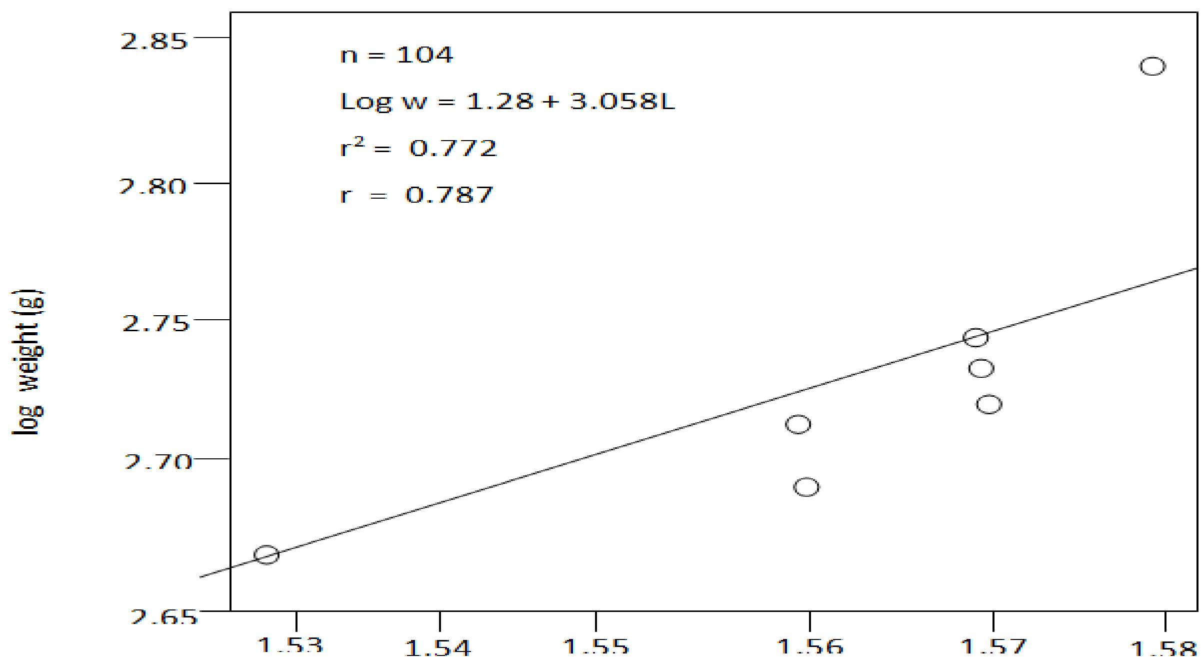

Figure-3. Graph of Relationship Log weight (g) and Log Standard Length (cm) of female *C. gariepinus*in Tiga Dam.

Figure 3 showed a graph of linear correlation between weight and standard length of female *c. gariepinus* inTiga dam

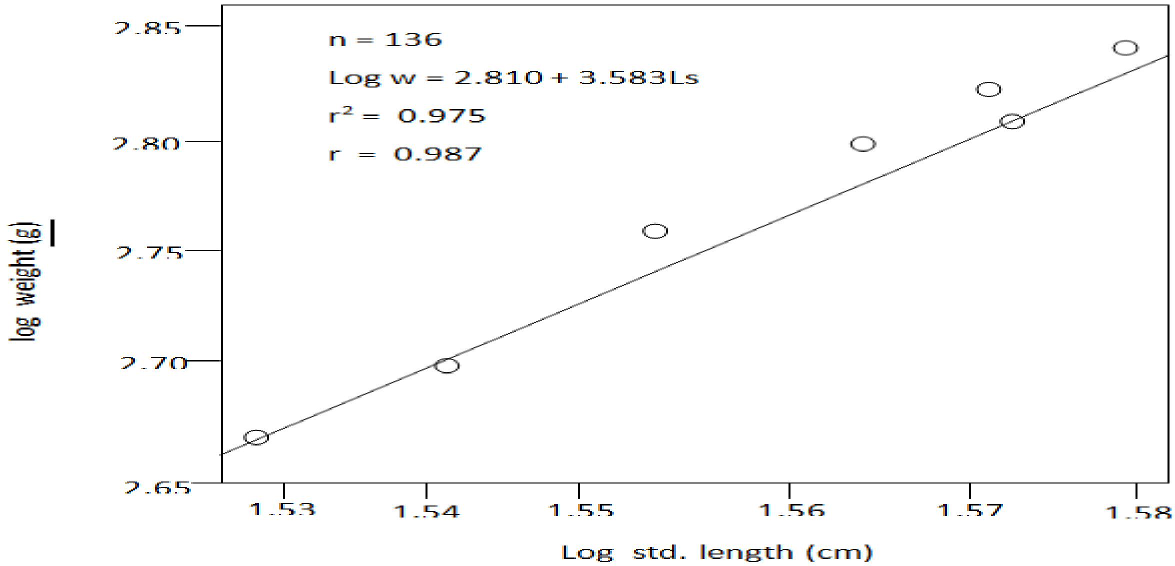

Figure-4. Graph of Relationship Log weight (g) and Log Standard Length (cm) mf male *C. gariepinus*in Tiga Dam.

As seen above, the graph showed a linear correlation between weight and standard length of male *C. gariepinus*in Tiga Dam.

From our regressed work in *C. gariepinus*of Tiga Dam, the following equation to base 10 was obtained.

For Male *C. gariepinus*

Log_{10} (w) = Loga + Logb Log L

Hence w = aLb

a = - 2.810 n = 136

b = 3.583

r^2 = 0.975

r = 0.987

Substituting in the above equation

Log_{10} w = log – 2.810 + 3.583 log L

And thus w = $2.810L^{3.583}$

For female *C. gariepinus*

Log_{10} (w) = log_a + log_blogL

Hence w = aL^b

a = 1.281 n = 104

b = 3.058

r^2 = 0.772

r = 0.878

Log_{10} w = log – 1.281 + 3.058 Log L

Thus we = $1.281L^{3.058}$

Comparison of the above two equations showed no significant difference between the sexes ($P > 0.05$). the equation was for fish ranging in length from 26.2cm to 53cm and in weight from 369.38g to 673.90g. the slope b = 3.583 and b = 3.058 for males and females *C. gariepinus*respectively had the theoretical value of 3 and above.

3.1. Stomach Contents

A total of 240 stomach samples of fish varying in length were examined for food composition study. Of these 232 (96.67%) were the number of stomachs with food. During the course of examination, it was observed that the fullness of the stomach was not in relation to the length of weight. The list of items observed in the stomach content of the fish is presented in Table 2. The stomach content was found to be composed of diverse items of both plant and animal origins, unidentified materials and mud (Table 2).

The plant food was made up of phytoplankton particularly algae. Items of animal origin were fish parts, insect parts, unidentified fragments of animal parts and organic matter (mud were also encountered frequently in the stomach of the fish) (Table 2). Zooplanktons by the fish include Cyclop.

Table-2. Stomach Contents of African Catfish (*Clairasgariepinus)* in Tiga Dam

Stomach	Occurrence	
	Number	%
No. examined	240	
No. of stomach with food	232	96.67
No. of empty stomach	08	3.45
Unidentified materials	05	2.16
Insects parts (head, throax and abdomen)	85	36.64
Fish parts	64	27.59
Cyclops	12	5.17
Algae	47	20.26
Organic matter (mud)	19	9.19

Source: Stomach contents of *clarias gariepinus* in tiga dam 2015

3.2. Relative Importance of Food Items

A summary of food items that constituted the diet of *C. gariepinus*from the TIga dam in Table 2 showed that organisms that were found relatively more frequently were insect parts with 85 (36.64%). The next important food items, which were ingested by most fish were fish parts 64 (27.59%) which were followed by algae 47 (20.26%). Among the other groups, the frequency of Cyclops was lower than that of algae. The other items frequently ingested by the fish were organic matter (mud) and unidentified materials which occurred in 19 (8.19%) and 5 (2.16%) respectively. The numbers of empty stomachs were 8 (3.45%) (Table 3).

In general, insects and fish each as a group contributed to the bulk of the diet and they were most important food of *C. gariepinus*in the lake.

Table-3. Condition factor in Relation to size, sex and standard length (cm) of *C. gariepinus* fromTiga Dam

Standard length (cm)	Males		Females		Combined sexes		Chi-square (x^2)
	Number (n)	Mean (k)	Number (n)	Mean (k)	Number (n)	Mean (k)	
20-25	2	1.77	7	1.94	9	3.71	4.34
26 – 31	15	1.22	17	1.24	32	2.46	1.31
32 – 37	58	1.14	57	1.84	115	2.98	2.04
38 – 43	52	0.84	23	0.84	75	1.68	4.91
44 – 49	9	0.90	0	0	9	0.90	
Total	136	5.87	104	5.86	240	11.63	19.4

Source: Condition factor of clarias gariepinus in tiga dam, 2015

3.4. Condition Factor

As shown in Table 3, the mean condition factor (k) values of *C. gariepinus*ranged from 1.77 to 0.90 in lengths 20cm to 49cm. For male *C. gariepinus* lengths 20cm – 25cm had the highest value of 1.77 while lengths 44cm – 49cm had the lowest value of 0.90. For females*C. gariepinus,* the mean condition factor (k) ranged from 1.94 to 0.84 in length 20cm – 25cm and 38cm – 43cm. Where 20cm – 25cm had the highest value of 1.94 and 38cm – 43cm had the lowest with 0.84. For the mean condition factor of the combined sexes, lengths 20-25cm had the highest value of 3.71 and length 44-49cm had the lowest value of 0.90 (Table 3). Mean condition factor varies significantly between length and between sexes. Generally, the females had higher values than the males. However, the total mean condition factor was insignificant (Anova, $P > 0.05$).

4. DISCUSSION

Based on frequency of occurrence insects parts and fish parts were major food items found in 85 stomach containing food in *Clariasgariepinus*in the dam (Table 2).

The result showed that *Clariasgariepinus*are bottom dwellers. This respond with Olayemi, [17] examined catfishes in Owalla Reservoir, sun State and find out that *Clariasgariapinus*fed mainly on aquatic aspects, preyed fish which were the most abundant food component and constituted the highest biomass. Similarly, insects and zooplankton are the most important food items for the fish in Lake Langeno [15] and Lake Zwai [6] in Ethiopia. Fish part is the most important food of *Clarias*in Lake Awassa [7]. The high contribution of fish to the diet of *Clariasgariepinus*in Tiga Dam may be related to the increase in the abundance of juveniles of other fishes which could have occurred due to breeding seasons and rainy season.

There was also the presence of mud this was probably ingested with other food items during feeding while searching for preys that are attached to the phytoplanktons on the sediment. Earlier reports also confirmed that the importance of organic matter (mud) to the diet of fish has been controversial. They might be ingested accidentally when the fish is feeding on detritus and benthic organisms. However, it is also believed that they may benefit through the dark coasting of organic material on heir surface [11].

The major food items insects and all group of *Clarias gariepinus* ingested fish parts for the study period (Table 2). Other food items ingested were algae and Cyclops. Hence, the fish is considered to be carnivorous in the dam. The study showed that smaller fishes ingested more of insects and Cyclops, whereas large *Clarias gariepinus* ingested more of fish parts.

This could be due to the fact that large *Clarias gariepinus* inhabits deep waters, whereas small ones live in shallow waters among phytoplankton's where densities of benthic organisms are usually high [7, 15].

Ekanem, [8] reported that insects are most important in the diet of small *Clarias gariepinus.* In addition, [17] who found sight sized based differences in food habits, reported that juvenile *Clarias gariepinus* feed more on insects than adults. The frequency of empty stomachs was 8 (3.45%) which seemed to be associated with breeding activity. Another reason that would have been responsible for the empty stomachs is the method of capture. Since the fish were left for several hours on the gears before they are collected, the stomach contents may have been lost by regurgitation or digestion Daba and Meseret, [6]. Olayemi, [17] also showed that regurgitation of stomach contents was very high in *Clariasgariepinus*caught by gill net in Owalla reservoir (Osun State).

In general, fish prey provides more energy per unit weight than other prey items. However, switching feeding habits relies on existence of at least two alternate abundant preys.

The length – weight relation of *Clariasgariepinus*reflected an increased in weight is not proportional with increase in length significantly (P > 0.05) in this study.

The largest *Clariasgariepinus*caught in the present study was 53cm (TL) which was comparable to largest size recorded from Epe Lagoon 56cm [9] but smaller than that from Lake Zwai (117cm) [6].

The values of regression coefficient b = 3.058 and b = 3.583 recorded for both female and male *Clariasgariepinus*showed that the rate of increase in body length is not proportional to the rate of increase in body weight. This shows positive allometric or approximate isometric growth [9] showed the values of b-2.790 and b = 3.00 for both male and female *Clariasgariepinus* [14]. The value of b showed approximate isometric growth.

It is also comparable to the value of be calculated for the same species in Lake Langeno 2.9 [15] and in Lake Awassa (3.04) [7].

According to Pauly and Gayanilo, [18] b values may range from 2.5 to 3.5 suggesting that result of this study is valid. This impliesthat the dynamics of fish population dynamic models [13]. Variation in the proportionality constant (a) were lower than exponent (b) because the values of (a) vary with environment factors whereas (b) tend to remain unchanged during a giving life phase. The observation is consistent with that of Ekanem, [8] where variability in (b) exceeded (a) in *Chryschthynigrodigitatus.* This was indication that the fishes were in better condition and an evidence of greater food abundance.

Condition factors, which are used to compare the wellbeing or fatness of fish. The mean condition factor in the present study was 0.90 to 3.71. the corresponding values for the Lake Langeno population were 0.63 to 3.25 [15]. The corresponding value for *Clariasgariepinus*were 0.70 to 2.91 [1].

There was general decrease in condition factor with increasing length of the species (Table 3). This means that increase in length did not bring about proportional increase in weight [13] attributed the decline in condition factor to the deposition of materials for gonad formation which lead to increase in weight and actual spawning which lead to reduction in fish weight respectively. However, the mean condition factor 0.90 – 3.71 showed that the species are in good condition.

5. CONCLUSION

In conclusion, we can consider *Clariasgariepinus*as a slow moving omnivorous predatory fish which feed on a variety of food items from minute zooplankton to fish half of its own length. The dam produced fish of positive allometric or isometric growth which was indication that fishes were in good condition on evidence of greater food abundance.

6. RECOMMENDATIONS

Large number of small sized fish were been exploited in the Dam from observations, proper management actions are required to protect the immature fish. Therefore, gear size type must be recommended for the fish in the lake.

African catfish breeds intensively during the raining season. Fishermen capture these catfish by using fishing gears in shallow water without considering the fact that they are in their spawning period. This repeated concerned should enforced regulation to prohibit fishing on spawning ground during breeding season considering the fact that the fish are caught for consumption.

Finally, since *Clariasgariepinus*can survive and grow suitably even in poor environmental condition in Tiga Dam, also consumer preference in many parts of Africa which have great economic importance, the fishery management/the government should motivate fish farmers by introducing or stocking more fingerlings of the species so as to provide excellent broodstock for aquaculture.

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