

# Length-weight relationships and condition factor of *Hyperopisus bebe* (Lacepède, 1803) (Actinopterygii: Osteoglossiformes) in River Galma, Zaria, Kaduna State, Nigeria

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**Abstract.** The investigation of length-weight relationship and condition factor are very relevant indices to ascertain the health of fish in the water body. Length-weight relationship and condition factor of *Hyperopisus bebe* (Lacepède, 1803) (Actinopterygii: Osteoglossiformes: Mormyridae) in River Galma, Zaria, Kaduna State, Nigeria, were assessed. The mean length and mean weight in male and female were 26.703 cm  $\pm$  0.51 cm and 25.32 cm  $\pm$  0.898 cm; 158.2 g  $\pm$  10.1 g and 95.91 g  $\pm$  9.26 g, respectively. The exponent or growth pattern 'b' values for male and female were 2.009 and 2.176. The condition factor for male and female were 0.59 and 0.83, respectively. The negative allometric growth pattern and poor condition factor might be due to the poor water quality in the fish ecosystem and should be regarded with concern.

**Keywords:** *Hyperopisus bebe*; Condition factor; Growth pattern; River Galma.

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## Introduction

The fishes of the Family Mormyridae are one of the important resources from Nigerian waters as some species are found among the ornamental fish species with high export demand such as *Gnathonemus petesii*, *Gnathonemus tamandua*, *Mormyrus rume* and other *Mormyrus* spp (Okaeme et al., 2013).

*Hyperopisus bebe* (Lacepède, 1803) (Actinopterygii: Osteoglossiformes) belonging to the mormyrids family, inhabits both still and flowing waters, breed in the

flood season and feed on mollusk and chironomids larvae (Bigorne, 1990). The fish have a commercial and nutritional importance because of the fat it contains though exploited as incidental catches in gillnet and bottom trawl.

Some studies have documented the length-weight relationship and condition factor of *H. bebe* in different water bodies in Nigeria. The studies include those of Usman (2012) and Olele (2013) in Kontagora Reservoir, Niger State and in Warri River, respectively.

Little is known about these parameters of *H. bebe* in River Galma Zaria whereas, information on the length-weight relationship (LWR) and condition factor is very important for stock assessment, age structure, maturity growth and life span. Length weight data are important in calculating the condition factor and several other indices (Diaz et al., 2000).

In another hand, condition factor can be affected by several factor such as stress, sex, season, availability of feed and water quality parameters (Kohler, 1995).

This study therefore aimed at determining the length-weight relationship and condition factor of *H. bebe* in River Galma.

## Material and methods

Fish were collected twice a week for a period of eight months from fishermen at River Galma (11° 08' N to 11° 15' N and 7° 45' E to 8° 00' E) using gill net and drag net. A total of 146 *H. bebe* were caught during the period of study and all fish were conveyed to the laboratory in an ice chest containing ice block prior to identification using the guideline of Olaosikan and Raji (2004). Standard length was measured to the nearest cm using measuring board. The fish were also weighed to the nearest gram with a spring balance.

The length-weight relationship and Fulton's condition factor were calculated according to Le Cren (1951) with equations:

- (1)  $W = a(L)^b$ , then the data were transformed into logarithms prior to calculations. The equation became  $\text{Log}W = \text{Log}a + b\text{Log}L$ , where:

W = weight of fish (g)  
L = standard length of fish (cm)  
a = constant or intercept  
b = an exponent or slope.

- (2) Fulton's condition factor:  $K$

- (3)  $K = 100W/L^3$ , where  
K= condition factor  
W= weight of fish (g)  
L= standard length of fish (cm)

## Statistical analysis

Length-weight relationship was determined according to the equation of Lecren (1951) using linear regression model on Minitab 17.

The Fulton condition factor was computed manually.

## Results and discussion

Were measured and weight 146 specimens of *H. bebe*, these including eleven males and 135 females. The standard length of fish ranged between 15.2 cm to 65 cm, while the body weight varied between 30.1 g to 650 g.

The result showed that the equation and the correlation coefficient relationship of the transformed equations were  $\text{Log}W = -0.553 \pm 2.009\text{Log}L$ ,  $\text{Log}W = -0.9863 \pm 2.176\text{Log}L$ , and  $r = 0.703$ ,  $r = 0.667$ , for male and female, respectively. The P values were significant for males ( $P < 0.05$ ) and highly significant for females (Figure 1 and 2, and Table 2).

The study also revealed that the b value for males (2.01) was almost equal to female (2.1) (Table 2). Bagenal and Tesh (1978) opined that an allometric coefficient (b) smaller than 3 indicated a negative allometric. The result in our study disagree with the finding of Usman (2012) which b value was 3.320 recorded in the same fish species from the Kontagora Reservoir a freshwater in the Niger, State Nigeria. This may be due to the age of fish collected in our study that seemed to be juvenile fish when observing their mean length (26.6) and mean weight (153.47).

According to Pauly (1984), the condition factor is concerned with the degree of fitness of fish in the environment. In this study, the condition factor which is a crucial factor is less than 1.

The result of this study showed that males specimen had a condition factor (0.59) lower than females (0.83) (Table 2) though both value were lesser than 1. This might suggest that the fish inhabit a non-conductive ecosystem for their growth. Recently, a comparative study of Udiba et

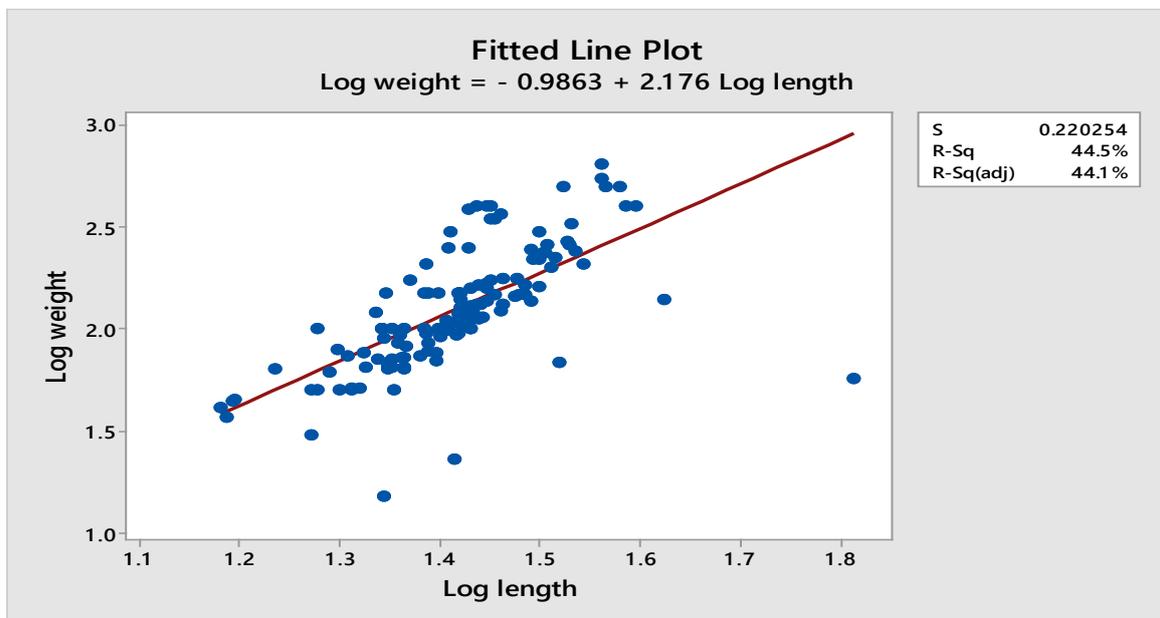
al. (2014) for contaminant in River Galma, Kubanni Dam and fish farm around Zaria reported a high level of chromium and cadmium in fish tissues in River Galma. This report might account for the poor condition factor of fish in this study.

**Table 1.** Length and weight value of *H. bebe* in male and female.

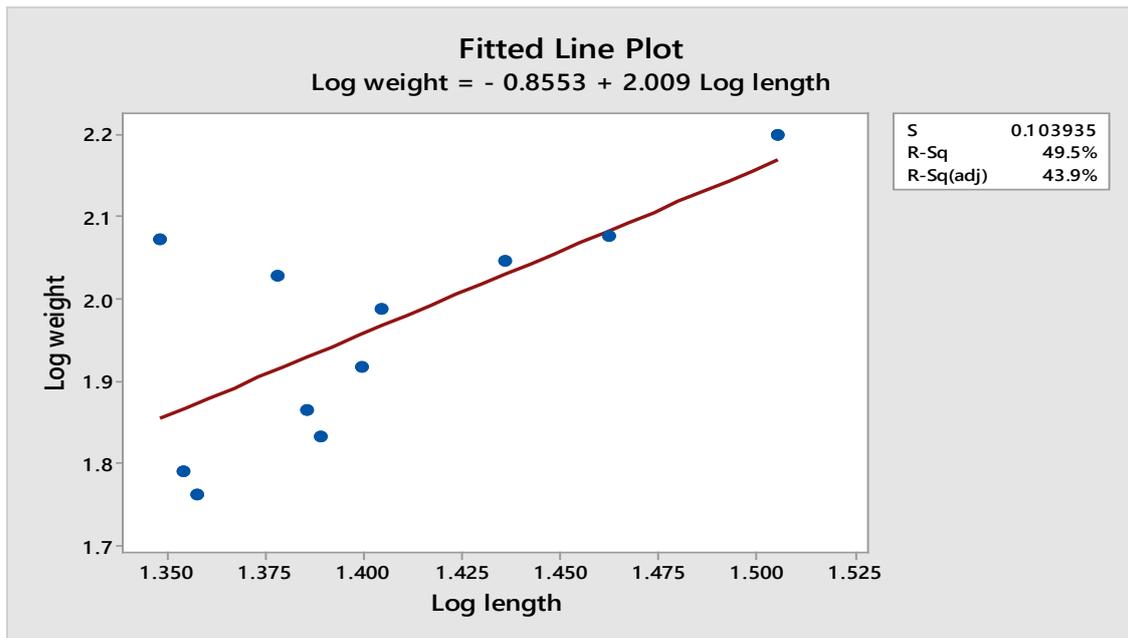
<i>H. bebe</i>	Number	Minimum length	Maximum length	Mean length $\pm$ SE	Minimum weight	Maximum weight	Mean weight $\pm$ SE
Male	135	15.2	65	26.703 $\pm$ 0.51	30.1	650	158.2 $\pm$ 10.1
Female	11	22.3	32	25.32 $\pm$ 0.898	57.8	158.50	95.91 $\pm$ 9.26
Total	146	15.2	65	26.603 $\pm$ 0.44	30.1	650	153.47 $\pm$ 9.44

**Table 2:** Length-weight relationship and condition factor parameters of *H. bebe* in male and female.

<i>H. bebe</i>	Number	a	b	Log equation	r	P value	k
Male	11	-0.8553	2.009	LogW= 0.553 $\pm$ 2.009LogL	0.667	0.016	0.59
Female	135	-0.9863	2.176	LogW=0.9863 $\pm$ 2.176LogL	0.703	0.000	0.83



**Figure 1.** Length-weight relationship of female *H. bebe* in River Galma.



**Figure 2.** Length-weight relationship of male *H. bebe* in River Galma.

## Conclusion

The negative allometric pattern and the poor condition factor provided in this study would serve as baseline information for future studies on the biology of fish inhabiting River Galma. Adequate monitoring of the River by fish biologist and environmental manager is recommended in the River and its tributaries.

## Conflicts of interest

Author declares that they have no conflict of interests.

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