# Preliminary studies of the condition factors in five tropical fish species of a coastal state, Lagos Nigeria

Ajani, Gloria Ekaete

Nigeria Institute for Oceanography and Marine Research, Bar beach, Victoria Island, Lagos
olugee232000@yahoo.co.uk

**Abstract**: This study investigated the state of wellbeing of five tropical fish species using the condition factors as the indices of measurement. Growth indices such as condition factor can be used to assess the influence of environmental factors on fish populations and also to establish the taxonomic characters of the species. The current investigation was undertaken to understand the relationship between fish length and weight using condition factor which describes the physiological state of the species. Condition factors (k) were estimated for five tropical marine fish species from fishing trawl that landed on Apapa jetty, in a coastal state Lagos Nigeria. The fish species are *Galeoides decatyles, Deprene Africana, Chlorocrumbrus chrysurus, Pomadysis jubelin and Cynoglosus senegalensis* with the following mean k values 1.59, 2.25, 0.65, 1.16 and 0.45 respectively. The condition factors from these species varied slightly with the results from other studies however the value obtained from this study showed that all species studied were in good condition from the mean condition values.
[Ajani, Gloria Ekaete. **Preliminary studies of the condition factors in five tropical fish species of a coastal state, Lagos Nigeria.** *Researcher* 2013;5(6):1-5]. (ISSN: 1553-9865). http://www.sciencepub.net/researcher. 1

**Keywords**: condition factor, wellbeing, growth, tropical fish, species

## 1. Introduction

Fish is a cheap source of highly nutritive protein, it also contain essential nutrients required by the body (Sikoki and Ololotekure, 1999). Tropical and subtropical fishes experience growth fluctuations due to factors such as changes in physical and chemical properties of the aquatic medium, environmental changes, food completion, changes in food composition (Adedeji and Araoye, 2005; Abowei and Davies, 2009). Growth indices such as condition factor can be used to assess the influence of environmental factors on fish populations. Growth in fish is in length as well as in bulk (king,1996). Adedeji and Araoye, 2005 stated that growth is a function of fish size, while Bake and Sadiku (2004) described growth as change in absolute weight (energy content) or length of fish. The relationship between lengths and body weights are essential for establishing the taxonomic characters of the species (Pervin and Mortura, 2008). Fonseca et al 2006 reported that growth estimation and condition indices were first used as measures of fish nutritional condition, growth and overall fish health, and hence for habitat quality for fish. Moreso, Vasconcelos et. al. 2009 stated that condition indices serves as a factor that integrates environmental variability and allow for assessment of fish health in a given habitat, by considering how fish respond to abiotic and biotic variables, food quality and availability and also pollution. This indices is an organism – level response, to factors such as nutritional status, pathogen effects and toxic chemical exposure, causing greater – than normal and less –than- normal weights (Azmat et. al., 2007). The condition factors are used as indicator of the well being of individual organism, because it integrates many levels of the organizational processes (Lizama et. al., 2002). Condition factor decreases in length (Bakare, 1970; Fagade , 1979) and also influences the reproductive cycle in fish (Welcome, 1979). A number of studies on condition factor of fish species include include works by Siddique (1977), Fagade (1978, 1979, 1983), Dodzie and Wangila (1980), Arawomo (1992) , Oni et al (1983),Hart (1997), Alfred-Ockiya (2000), Abowei and Hart (2007), Abowei and Davies (2009) and Abowei (2010). Since the measurement of fish condition are thought to be reliable indicators of the energetic condition or energy reserves of fish, this current investigation was undertaken to understand the relationship between fish length and weight using condition factor which describe the state of well being and energy reserves of five subtropical fish species from Lagos state, a coastal state in Nigeria. To ascertain the growth condition of fish species transported into the state through the Apapa jetty that are being caught conservation purposes of these species and also the paucity of the data on the condition and the state of well being of some fishes in tropical marine waters is scarcely documented (Samat et al., 2008). The present study is estimating the condition indices of tropical fishes in the coastal waters of Nigeria.

## 2. Materials and Methods

The fish species investigated from this study were collected from Apapa jetty, in Lagos state Nigeria. The fish samples collected for this study were transported in ice-packed plastic containers and

transported to the laboratory in the Department of Biological Oceanography, Nigerian Institute for Oceanography and marine Research, Ahmadu Bello Way, Victoria Island, Lagos, for morphometric values such as the total length, standard length and weight of the species were determined as described by Nwadiaro and Okorie (1985). The condition factor is the degree of well-being or relative robustness of the fish is expressed by coefficient of condition (also known as factor or length weight factor). The condition factor has an indicator to aquatic species (fish or shrimp) welfare in their habitat (Gomiero and Braga, 2005). It is represented by letter K; when species are measured and weighed, as in the following equation. This 'K' value can be basically and directly interpreted as the higher value, the better condition of fish.

$K = 100W/L^3$

Where

K= condition factor

W= the weight of fish in grams

L= the total length of fish in centimeters (Fulton, 1902)

Morphometric values which include Standard length (SL) and Body weight (BWT); Standard length (SL) was taken along the antero-posterior body axis, from mouth tip to the mid-point of caudal fin origin. The body weight (BWT) was measured using digital top-loading electronic weighing balance and values were in grams (g). Standard length (SL) was measured in centimeters (cm).

For each species, the mean standard length and weight as well as the standard error were calculated for each species.

Table 1: Ranges and mean values of standard lengths and body weights of five subtropical fish species

| Species | Standard Length (cm) | | Body Weight (g) | |
|---|---|---|---|---|
| | Range | Mean ±SE | Range | Mean± SE |
| *Galeoides decatyles* | 11.00-14.1 | 12.76 (0.18) | 10.42-23.86 | 17.52 (0.82) |
| *Deprene africana* | 7.00-11.50 | 8.80 (0.26) | 4.00-33.9 | 17.51 (2.01) |
| *Chlorocrumbrus chrysurus* | 9.00-16.5 | 11.49 (0.36) | 3.0-30.87 | 11.45 (1.46) |
| *Pomadysis jubelin* | 13.0-14.3 | 13.72 (0.11) | 26.5-33.18 | 30.15 (0.55) |
| *Cynoglossus senegalensis* | 12.4-20.5 | 15.68 (0.57) | 8.08-35.77 | 17.81 (2.16) |

Table 2: Ranges and mean values of the condition factors of the sampled fish species

| Species | Condition factor 'K' | |
|---|---|---|
| | Range | Mean±SE |
| *Galeoides decatyles* | 0.63-2.92 | 1.59(0.08) |
| *Deprene africana* | 1.17-3.29 | 2.25(0.54) |
| *Chlorocrumbrus chrysurus* | 0.36-0.90 | 0.65(0.15) |
| *Pomadysis jubelin* | 1.13-1.23 | 1.16(0.03) |
| *Cynoglossus senegalensis* | 0.14-0.83 | 0.45 (0.21) |

For each species, the mean standard length and weight as well as the standard error were calculated for each species. The data were subjected to 95% confidence level to determine the significance in condition factor values among the species (Ogbeibu, 2005).

**3. Results**

The results for the lengths and body weights of the five fishes examined were presented in table 1. *C. senegalensis* had the highest values with standard length range 12.4 – 20.5 cm with mean of 15.68± 0.57cm and a body weight range of 8.08 – 35.77 g with mean of 17.81± 2.16 g. *P. jubelin* was next with standard length range of 13.0 – 14.30 cm with mean of 13.72 ± 0.11 cm and a body weight range of 26.5 – 33.18 g with mean of 30.15 ± 0.55g. For *G. decatyles* standard length range 11.0-14.0cm with the mean 12.76 ± 0.18cm and a body weight range 10.42 – 23.85 g with mean 17.52 ±0.82g. *C. chrysurus* followed with a standard length values were 9.0 – 16.50cm (range) and 11.49± 0.36cm (mean), while the body weight were 3.0 – 30.87g (range ) and 11.45 ± 1.46g (mean) while *D. africana* has the least standard length values of 7.0 -11.50cm (range) and 8.80 ±0.26cm (mean), while the body weight were 4.0 - 33.9g (range) and 17.51 ± 2.01g (mean). The values for the condition factors obtained are presented in Table 2; they are 1.59, 2.25, 0.65, 1.16, 0.45 for *G. decatyles, D. africana, C. chrysurus, P.jubelin* and *C. senegalensis* respectively. For *C. chrysurus* (0.65) and *C. senegalensis* (0.45), the values were less than 1 implying that these fishes were not in good state of well-being within their habitat, but in *G. decatyles* (1.59), *D. africana* (2.25) and *P. jubelin* (1.16), the values were greater than 1 and this implied that they were in good physiological state of well-being within their habitat.

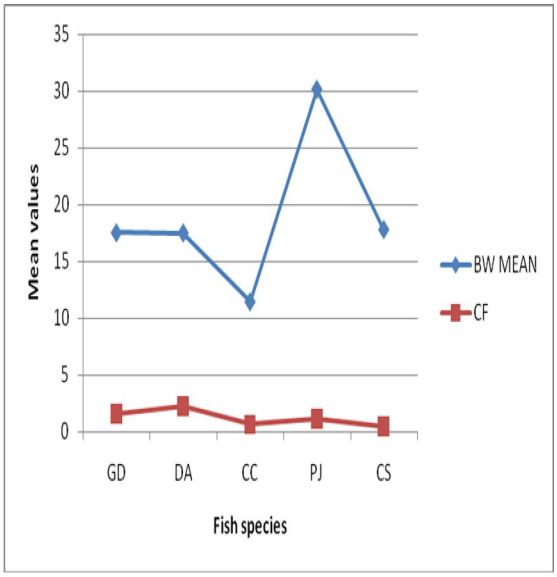


Figure 1. Relationship between Body weight and condition factor

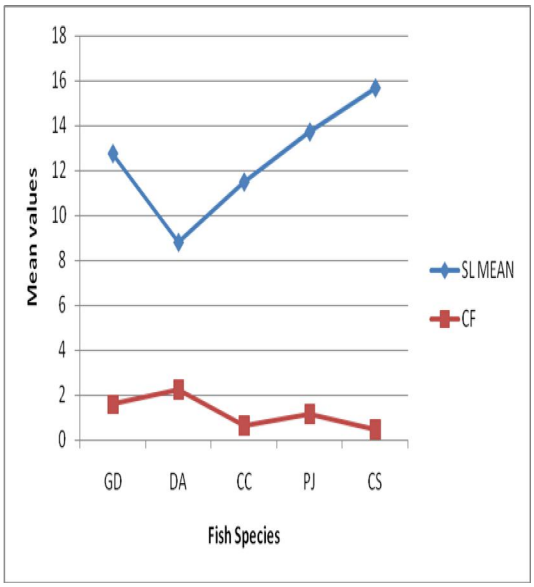


Figure 2. Relationship between standard length and condition factor

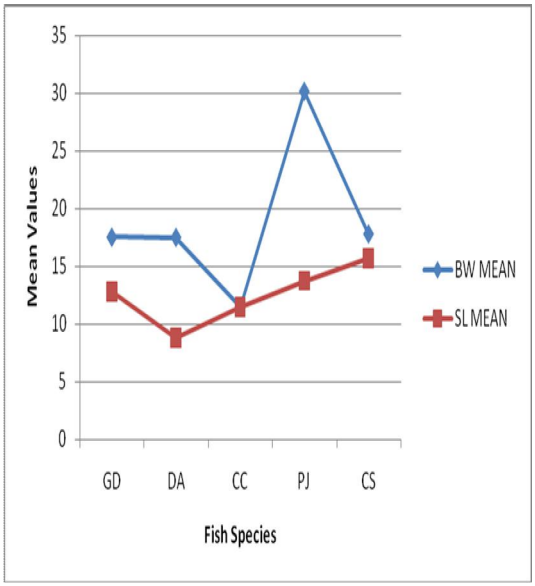


Figure 3. Relationship between mean body weight and mean standard length

BD= Body weight, SL= Standard length, CF= Condition factor, GD= *Galeoides decatyles*, DA= *Deprene Africana*, CC= *Chlorocrumbrus chrysurus*, PJ= *Pomadysis jubelin* and CS= *Cynoglosus senegalensis*

**4. Discussions**

The sizes of *C. senegalensis* and *P.jubelin* examined in this study were bigger than those of *G. decatyles, D. Africana* and *C. chrysurus* which could be observed from their higher standard length and body weight values (Table 1). Sizes of C. senegalensis obtained from this study is similar to that obtained from works done by Ndome and Eteng, 2010. The condition factors from these species varied slightly with the results from other studies Ajayi (1982), reported K= 0.77 – 0.81 for *Clarotes filamentosus* in lake Oguta; Nwadiaro and Okorie (1985) obtained K = 0.49 – 1.48 in Andoni river; while Abowei (2009), reported K = 1.00 for *Cynoglossus senegalensis* in Nkoro river Niger delta. The value obtained from this study showed that all species (Table 2) studied were in good condition and below the recommended k value range 2.9-4.8 as suitable for matured fish (Bagenal and Fesch 1978). The body weight recorded did not really have effect on the condition factor (Fig1) of the fish sampled, but relatively lower condition factors were recorded (Fig 2) for relatively higher lengths of fish while relatively higher condition factors were recorded for relatively lower lengths of fish which is similar to work done by Anene (2005) and Lizama et

al (2002) and can be attributed to the resource transferred to the gonads in the latter stages of the life history of a fish. However, the body weight increases as the standard length also increases (Fig 3).

According to Lagler (1956), it has been found that the value of K is not constant for individuals, species or populations but is subject to wide variations for fish of average natural condition. Generally, variations in the k values of these fish species could be a reflection of the state of sexual maturity, degree of nourishment, age of the fish and in some species sex of the fish (Gomiero and Braga, 2005; Ndome and Muabe, 2009). Youson et al., 1993 suggested the influenced of certain extrinsic factors such as changes in temperature and photoperiods on fish condition though tropical fishes but those caught from coastal waters in Nigeria may not experience any great difference with respect to temperature and photoperiods when compared to similar situation in the high latitude marine waters that experience long cold and warmer summers. However variables such as total suspended solids, oxygen content and macronutrients of the coastal waters could be relatively high (Ntekim and Okon 1993). Nutritionally, the condition factor reflects the physiological state of the fish in relation to welfare through accumulation of fats and gonadal development (Le Cren, 1951). Some species show highest k value during reproduction (Angelescu et al., 1958). K also gives information when two populations living in certain feeding, density, climate, and other condition; when determining the period of gonadal maturation; following up the degree of feeding activity of species to verify whether it is making good use of its feeding source (Weatherley, 1972). *C. senegalensis* has the lowest k value and a lower k value could be stages of gonadal development which require resource transfer to the gonads during the reproductive periods (Vazzoler, 1996). Condition factor greater or equal to one is good (Wade, 1992).

**Acknowledgements:**
The author is grateful to the Nigerian Institute for Oceanography and Marine Research for their support to carry out this work

**Corresponding Author:**
Ajani, E. Gloria
Department of Biological Oceanography
Nigerian Institute for Oceanography and Marine Research,
Bar Beach, Ahmadu Bello way,
Victoria Island, Lagos, Nigeria
Telephone: +2348055932207
E-mail: olugee232000@yahoo.co.uk

**References**

1. Adedeji RA, Araoye PA. Study and characterization in the growth of body parts of Synodontis schall (Pisces: Mochokidae from Asa dam, Ilorin Nigeria. Nig.J. Fisheries (2 and 3) 2005 : 219-244.
2. Abowei JFN, Davies AA. Study of the length weight relationship and condition factor of five fish species from Nkoro river, Niger Delta; Nigeria. Current Res. J. Bio Sci. 2009. 1 (3) : 94-98.
3. King RP. Length weight relationship of Nigerian freshwater fishes. Naga. The ICLARM. Quaterly 1996. 19:49-52.
4. Bake GG, Sadiku A. Relationship between the basic morphometric measurements and growth pattern of Heterotis niloticus from River Kaduna flood plain. In: Proceedings of the Fisheries Society of Nigeria, Ilorin. 2004. P.515-519.
5. Pervin MR, Mortuza MG. Notes on lenghtweight relationship and condition factor of fresh water fish, Labeo boga (Hamilton) (Cypriniformes: Cypriniformes). Univ. J. Zool. Rajshahi Univ. 2008. 27: 97-98.
6. Fonseca VF, Vinagre C, Cabral HN. Growth variability of juvenile soles Solea solea Solea senegalensis and comparison with RNA: DNA ratios in the Tagus estuary, Portugal. J. Fish Biol 2006. 68 (5) :1551-1562.
7. Vasconcelos RP, Reis-Santos P, Fonseca V, Ruano M, Tanner S, Costa MJ, Cabral HN. Juvenile fish condition in estuarine nurseries along the Portuguese Coast : Estuar Coast. Shelf Sci 2009. 82 (1): 128-138.
8. Azmat R, Talat R, Ahmed K. The length weight relationship. Condition factor and impact of fluoride concentration in Johnius belangerii of Arabian Sea. Research Journal of Environmental Toxicology 2007. 1 (3): 138 -143.
9. Lizama M, Delos A, Ambrosio P. Condition factor in nine species of fish of the characidae family in the upper Parana river flood plain Brazil, Brazil Journal of Biology 2002. 62 : 1519 – 1526.
10. Bakare O. Bottom Deposits as Food of Inland Fresh Water Fish. In: Kainji, A Nigerian Man Made Lake. Kanyi Lake Studies. 1970. S.A. Visser, (Ed.). Vol. 1. Ecology Published for the Nigerian Institute .
11. Fagade SO. Observation of the biology of two species of Tilapia from the Lagos lagoon Nigeria. Bull. Inst. Fond Afr.Nore (ser. A) 1979. 41: 627-658.
12. Welcome RL. Fisheries Ecology of Flood Plain Rivers. Longman Press, London, 1979. pp: 317.
13. Siddique AQ. Reproductive biology, lengthweight and relative condition of *Tilapia leucostica* (Trewaeva in lake aivasha, Kenya). J. Fish. Biol.1977. 10: 351-260.
14. Fagade SO. Age determination of *Tilapia melanotheron* (Ruppel) in the Lagos lagoon, Nigeria. International Symposium on Ageing of Fish in Bagenal, Teseh.1978. pp: 71-77.

15. Fagade S. The biology of *chromido Tilapia guntheri* from a small lake. Arch. Hydobiol., 1983. 97: 60-72.
16. Dodzie S. Wangila BCC.. Reproductive biology, length-weight relationship and relative condition of pond raised tilapia zilli (Gervas). J. Fish Biol., 1980. 17: 243-253.
17. Arawomo GAA. The growth of *Sarotherodon niloticus*. Proceedings of the 2nd Annual Conference of the Institute. New Bussa, Nigeria. 1982 pp: 221-227.
18. Oni SK Olayemi JY Adegboye JD. The comparative physiology of three ecologically (Rupel). *Synodonts schall.* Block and Schneider and Tilapia zilli (Gervais). J. Fish. B iol 1983. 22: 105-109.
19. Hart SA. The Biology of *Mugil cephalus* in Bonny River estuary. M.Sc. Thesis, University of port Harcourt, Nigeria, 1997 pp: 42
20. Alfred-Ockiya JF. The length-weight relationship of snake head (Chana chana) from the fresh water swamps of Niger Delta. J. Aquat. Sci., 2000. 15: 12-14.
21. Abowei JFN. The abundance, condition factor and length-weight relationship of *Cynoglossus senegalensis* (Kaup, 1858) from Nkoro river Niger Delta, Nigeria. Advance journal of food science and Technology. 2010. 17 : 57-62.
22. Samat A, Shukor MN, Mazlan AG, Arshad A, Fatimah MY. Length-weight relationship and condition factor of Pterygoplichthys paradalis (Pisces: Loricariidae ) in Malaysia Peninsula. Fisheries Research, 2008. 59: 289- 295.
23. Nwadiaro CS, Okorie PU. Biometric characteristics: length weight relationships and condition factors in Chrychthys filamentosus, spices, Bagandae from Oguta lake Nigeria. Biol. Afr., 1985. 2:48-56.
24. Gomiero LM, Braga FMS. The condition factor of fishes from two river basins in Sao Paulo state, Southeast of Brazil. Acta Scienta Maringa, 2005. 27(1): 73-78
25. Fulton TW. The rate of growth of fishes. 20th Annual Report of the Fishery Board of Scotland 1902 (3):326-446.
26. Ogbeibu AE. Biostatistics – A practical approach to research and data handling. Minder Publishing Company Ltd, Benin City, Nigeria. 2005.
27. Ndome CB, Eteng AO. Preliminary notes on the length- weight relationship and condition factor for Cynoglossus browni and Cynoglossus segelalensis (Pisces : Cynoglossidae ) off the East coast of the Niger Delta, Nigeria. World Applied Sciences Journal 2010. 10 (5) . 584 – 589.
28. Ajayi TO. The age and growth of the tongue sole, Cynolossus Canariensis (stend, 1982). Proceedings of the 2nd Annual Conference of the Fisheries Society of Nigeria (FISON) New Bush Source. 1982. 2: 19.
29. Abowei JFN, Davies AO. Some population parameters of Clarotes laticeps (Rupell, 1829) from the fresh water reaches of the lower river, Niger Delta, Nigeria. Am. J. Sci. Res., 2009 (2): 15-19.
30. Bagenal TB, Tesch FW. Age and Growth. In: Methods for Assessment of Fish Production in Fresh Water, Bagenal, T.B. (3. ed.). Blackwell Scintific Publications, 1978 . Pp 365.
31. Anene A. Dietary components of stomach of Tilapia marie Boulenger of Umuosericher Lake, Imo State, Nigeria. Journal of quariculture and Aquatic Sciences. 2005 (In press).
32. Lizama M, De Los, AP, Ambroso AM. Condition factor in nine species of fish of the characidae family in the upper Parana river floodplain, Brazil. Braz. J. Biol. J. Biol,. 2002. 62 (1): 113 – 124.
33. Lagler KF, Bardach JE, Miller RR, D.R.M. Passion DRM. Ichthydogy. 2nd Edn., John Wiley and Sons, 1977 pp: 506.
34. Ndome CB, Muabe T. The feeding behavior and condition index of Heterobranchus bidorsalis in southeastern Nigeria. J. Sustainable Tropical Agriculture Res. 2009. 29: 1-8.
35. Youson JH, Holmes JA, Guchardi JG, Beaver RE, Gersmehl, JE, Sower SA, Beaver FWH . Importance of condition factor and the influence of water temperature and photoperiod on metamorphosis of sea lamprey, Petromyzon marinus. Canadian. J. Fisheries and Aquatic Sci. 1993, 50: 2448 – 2456.
36. Ntekim EEU, Okon GAE. Trace distribution in the sediments of Bight of Bonny, South Eastern Nigerian. In: Coastlines of West Africa, Eds., Awosika LF, Chidi A, Shroader P. America Society of Civil Engineers. New York, 1993. 142 – 152.
37. LeCren ED. The length-weight relationship and seasonal cycle in gonad weight and condition in the perch Perca fluviatilis. J. Anim. Ecol., 1951. 20(2): 201-219.
38. Angelescu V, Gneri FS, Nani A. La merluza del mar argentino (biologia e taxonomia). Secr. Mar. Serv. Hidrog. Nav. Publico, 1958 H1004: 1-224.
39. Weatherley AH. Growth and Ecology of Fish Populations. Academic Press, London, 1972 pp: 293.
40. Vazzoler AE. Biologia da reprodução de peixes Teleósteos: teoria e prática. EDUEM, SBI, Maringá, 1996 pp: 169.
41. Wade JW. The relationship between temperature, food intake and growth of brown trout, *Salmo trutta* (L.); Fed. Natural and artificial pelted diet in earth pond. J. Aquat. Sci., 1992, 7: 59-71.

4/2/2013