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# Comparative Studies on the Condition Factor of two *Macrobrachium* species from Three lagoon Systems, South West, Nigeria

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**ABSTRACT**

*Macrobrachium* species are decapods Crustacean found mainly in the Southern part of Nigeria and have gained a lot of attention due to their economic and aquaculture potentials. The investigation on the condition factor of *Macrobrachium macrobrachion* and *Macrobrachium vollenhovenii* were carried monthly between August 2021 and July 2023 from Badagry, Epe and Lagos Lagoons. The result showed that a total of 5634 prawns were collected from the lagoons (2035, 2567 and 1032 from Badagry, Epe and Lagos Lagoons respectively) which consisted of 3978 *M. macrobrachion* (1847 males and 2131 females) and 1656 *M. vollenhovenii* (1166 males and 490 females). The Condition factor (K) of the species from the three lagoons ranged from 0.3 to 3.1, with the male species having the highest value. The result showed that the lowest and highest K-value for *M. macrobrachion* and *M. vollenhovenii* are 0.9, 1.7 and 0.3, 3.1 respectively, with that of *M. vollenhovenii* being higher than *M. macrobrachion.* It could be said that the prawns are considered to be in good condition/well-being in their various habitats since the highest k factors of both species are 1 and greater. The findings from this research therefore, provide valuable information on the well-being of these species from the three lagoons for the sustainable management of the prawn resources.

**Keywords**:

*Lagoons, Length, Macrobrachium species, Nigeria, Weight, Well-being*

## Introduction

The genus *Macrobrachium* belong taxonomically to the Kingdom-Animalia, Phylum-Arthropoda, sub-phylum- Mandibulata, a large class of animals called the Crustacean and infraorder - Caridae. They are known to inhabit both the freshwater and the brackish environment (New 2002; Davassi 2011; Akinwunmi and Lawal-Are 2019; Akinwunmi 2020). Although some of the species complete their cycle in inland/fresh waters but most inhabit brackish water conditions at the early stages of their life cycle (Banerjee 2003).

Despite the fact that different species of these prawns can be found all through the West African regions, but only four have been found to occur in Nigeria and these are *Macrobrachium vollenhovenii* (Herklots 1857), *M. macrobrachion* (Herklots 1851), *M. felicinum* (Holthius 1949) and *M. dux* (Lenz 1910)

(Bello-Olusoji et al. 2004; Akintola and Bakare 2011). Of all these four species, the 1st two species are known to be the largest and as well command the highest economic importance (Ajuzie and Fagade 1992). Besides, the occurrence and distribution of these two species includes their ability to resist any form of disease outbreak, command good market price, grow fast, acceptability and good taste (Jimoh et al. 2005).

Marioghae and Ayinla (1995) reported that apart from the fact that the prawns can be captured in the same gear, morphologically they look slightly alike. The chelipeds in *M. vollenhovenii* are stout with one cheliped larger than the second while the chelipeds are slender in the case of *M. macrobrachion* (Akinwunmi 2020). These Macrobrachium species as well possess the quality of hardiness, hence being able to survive out of water for up to 20 minutes. Though, ecologically, they differ slightly in their habitat preference (Marioghae and Ayinla 1995). Previous works on the total length of African river prawn (*M. vollenhovenii*) had shown to reach a maximum of 182 mm and 226 mm while Brackish water prawn (*M. macrobrachion*) attained a maximum of 120 mm and 128 mm (Jimoh et al. 2005; Akinwunmi and Lawal-Are 2018). They are widely accepted as food, provide employment opportunities by supporting a large number of the artisanal and commercial fisheries as well as generate a source of income to many countries of the world (Jimoh et al. 2005; Bello-Olusoji et al. 2006).

The knowledge of the well-being and length/weight relationship is another critical aspect of the prawn species which are essential tools in fisheries biology, physiology, stock assessment, ecology and conservation (Froese 1998; Oscoz et al. 2005). This relationship enables the analysis of condition indexes and allows for the comparison of species growth progression between sexes at different time and seasons (Petrakis and Stergiou 1995; Froese 2006). Condition factor deals with the well-being or fatness of a fish and is based on the assumption that aquatic organism of a particular length with heavy weight are assumed to be in a better condition (Bagenal and Tesch 1978; Abowei and George 2009). Besides, it has been used as a measure of growth and feeding intensity of aquatic organisms (Fagade 1979; Abowei et al. 2009). It has an inverse relationship with length such that increase in length culminate to decrease in condition factor and it also determines the reproductive behavior in fish and shrimp (Fagade 1979; Abowei 2009, 2010).

It is in lieu of this, that the present study seeks to focus on the condition factor of *M. macrobrachion* and *M. vollenhovenii* from Badagry, Epe and Lagos Lagoons which will provide an addition to knowledge upon which future researches will be based on. Besides, the study is expected to provide valuable addition to knowledge on the wellbeing of these species from the three lagoons for sustainable management of the prawn resources.

## Materials and Methods

### Study Sites Description

The Badagry Lagoon (Fig. 1), which has its source from River Queme in the Republic of Benin to the west of Nigeria, is located in the Southwest (Lagos State) of Nigeria and opens into the Atlantic Ocean via the Lagos harbour. It lies between longitudes 3°54″ and 4°13″E and latitudes 6°25″ and 6°35″N (Lawal-Are and Kusemiju 2000). It forms a continuous system of lagoons and creeks lying along the coast of Nigeria from the border with the Republic of Benin to Niger Delta, with a water

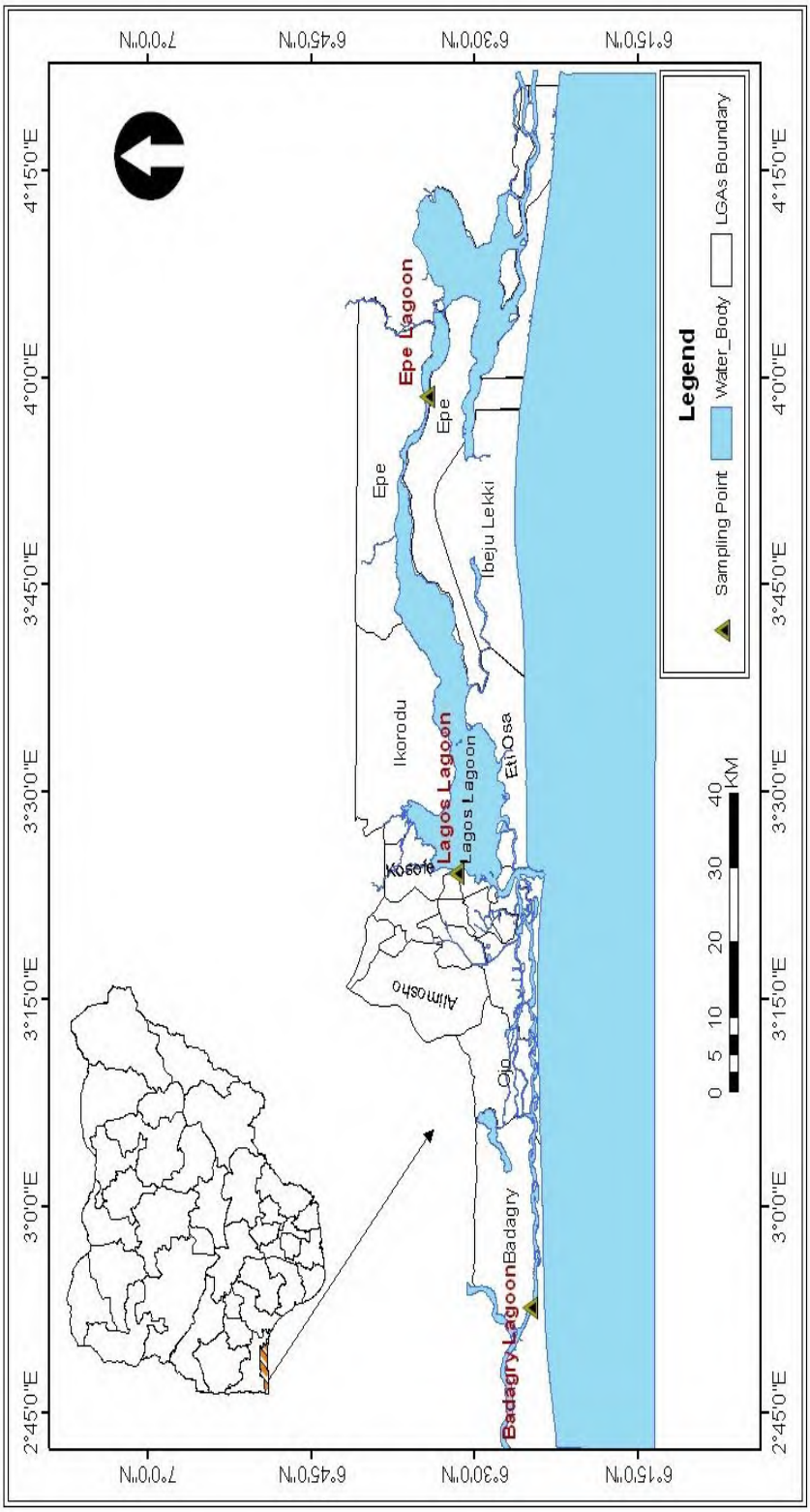


Figure 1: Map of the lagoons, indicating the sampling sites (Akinwunmi and Moruf 2021)

depth ranging from 1-3 m (Ndimele and Jimoh 2011). The area is dominated by thick shrubs and small trees while the major ecological factors operating in the lagoon have been documented by Ezenwa and Kusemiju (1985); Solarin (1998); Akinwunmi and Lawal-Are (2019). The temperature ranged from 26-30 °C (Ezenwa and Kusemiju 1985). The authors also documented an increase in salinity in the lagoon between July and September (rainy season) due to the incursion of salt water from the Cotonou Lagoon in the Republic of Benin.

Epe Lagoon (Fig. 1) lies between latitudes 6º29″N and 6º38″N; and longitudes 3º30″E and 4º05″E (Agboola and Anetekhai 2008) and is fed by River Oshun. It has a surface area of about 225 $km^2$ with a maximum depth of 6 m and it is sandwiched between the Lagos and Lekki Lagoons. The lagoon empties into the Gulf of Guinea through the Lagos harbour and it is one of the four major lagoons in Lagos State, Nigeria (Kumolu-Johnson et al. 2010).

Lagos Lagoon (Fig. 1) is located between longitudes 3°23″ and 3°53″E and latitudes 6°26″ and 6°37″N. It is a brackish water environment situated within the low-lying coastal area of Nigeria. The terrain is dominated by a maze of estuaries, lagoons, creeks and rivers. Of all the total land area covered by Lagos State, one-quarter of it constitute the water surface: lagoons, creeks and coastal river estuaries (Ndimele 2003). These water bodies act as sinks for the discharge of wastes from about 2000 medium and large-scale industries located in the Lagos metropolis (Anetekhai et al. 2007). The lagoon is fed in the north by Ogun River and it opens into the Atlantic Ocean via the Lagos Harbour. One of its major sources of water (River Ogun) discharges a large volume of water into the lagoon making the salinity very low during the rainy season (Solarin 1998; Lawson 2001; Akinwunmi and Lawal-Are 2019). Ecologically, the lagoon has a salinity fluctuation of high brackish water during the dry season (December - May), while freshwater condition exists in the rainy season (June - November) (Ugwumba and Kusemiju 1992; Solarin 1998; Lawal-Are 2006).

**Collection of the prawn species**

The collection of *M. macrobrachion* and *M. vollenhovenii* were done every month from the jetties of Badagry Lagoon, Epe Lagoon and Lagos Lagoon between August 2021 – July 2023 (24 months) in traps set within the lagoons. The prawns, as shown in Plates 1 and 2 were randomly sampled in relation to size. They were immediately preserved in an ice-chest and transported into a freezer (-20 ºC) in the laboratory of the Department of Marine Sciences prior to further biological analysis.

**Laboratory Studies**

The prawns were allowed to thaw after the removal from the freezer. A pile of filter papers was used to remove excess water from the prawns. The total length of the prawns was measured from the rostrum tip to the end of the telson with a graduated rule to the nearest 0.1 cm while the total body weight was measured on an electronic weighing balance (Model: DT 1051A) to the nearest 0.01 gram (Akinwunmi 2020).

**Size composition and ranges of *Macrobrachium* species**

The size composition and ranges of the length and weight of *M. macrobrachion* and *M. vollenhovenii* collected from Badagry, Epe and Lagos Lagoons were grouped and recorded (Akinwunmi and Lawal-Are 2018).

**Condition factor (K) in *Macrobrachium* species**

The condition factor (K) or the general well-being of the prawn was determined using the formula in Eq. 1 as described by Gayanilo et al. (1989) and Enin (1995).

$$K = 100W/L^3 \ldots\ldots\ldots\ldots \quad (Eq.1)$$

where W = weight of the prawn in grams

L = total length of the prawn in cm

Condition factor (K) was determined for the specimens on a monthly and size group basis.

Plate 1: The dorsal view of *Macrobrachium macrobrachion* (Mag. x 0.6)

Plate 2: The dorsal view of *Macrobrachium vollenhovenii* (Mag. x 0.6)

**Statistical Analysis**

Statistical analysis of the data collected was done using Microsoft Excel for windows (2008), Descriptive statistics, PAleontological STatistics (PAST) version 2 and Predictive Analytics SoftWare (PASW) Statistics version 18.

**Results**

The result from this study showed that a total of 5634 specimens of *M. macrobrachion* and *M. vollenhovenii* were collected from the three lagoons which consisted of 3978 *M. macrobrachion* and 1656 *M. vollenhovenii*. 2035 from Badagry Lagoon (1912 and 123 of *M. macrobrachion* and *M. vollenhovenii* respectively), 2567 from Epe Lagoon (1140 and 1427 of *M. macrobrachion* and *M. vollenhovenii* respectively) and 1032 from Lagos Lagoon (926 and 106 of *M. macrobrachion* and *M. vollenhovenii* respectively) as presented in Table 1.

The size of *M. macrobrachion* and *M. vollenhovenii* from Badagry Lagoon ranged from 5.0 - 12.0 cm and 5.6 - 16.1 cm (total length) and from 1.3 - 22.8 g and 3.1 - 73.7 g (body weight) respectively. The size of *M. macrobrachion* and *M. vollenhovenii* from Epe Lagoon ranged from 5.3 - 13.2 cm and 4.5 - 22.8 cm (total length) and from 1.6 - 40.3 g and 1.5 - 76.6 g (body weight) respectively while the size of *M. macrobrachion* and *M. vollenhovenii* from Lagos Lagoon ranged from 5.1 - 12.1 cm and 4.7 - 16.8 cm (total length) and from 1.3 - 22.2 g and 1.3 - 140.8 g (body weight) respectively as presented in Table 2.

Table 1: Size composition of *Macrobrachium* species from Badagry, Epe and Lagos Lagoons (August 2021 – July 2023)

| **SPECIES** | **BADAGRY LAGOON** | **EPE LAGOON** | **LAGOS LAGOON** | **TOTAL** |
|---|---|---|---|---|
| *M. macrobrachion* | 1912 | 1140 | 926 | 3978 |
| *M. vollenhovenii* | 123 | 1427 | 106 | 1656 |
| **TOTAL** | 2035 | 2567 | 1032 | 5634 |

Table 2: Size range of *Macrobrachium* species from Badagry, Epe and Lagos Lagoons (August 2021 – July 2023)

| | *M. macrobrachion* | | *M. vollenhovenii* | |
|---|---|---|---|---|
| | Total length | Total weight | Total length | Total weight |
| Badagry Lagoon | 5.0-12.0 | 1.3-22.8 | 5.6-16.1 | 3.1-73.7 |
| Epe Lagoon | 5.3-13.2 | 1.6-40.3 | 4.5-22.8 | 1.5-76.6 |
| Lagos Lagoon | 5.1-12.1 | 1.3-22.2 | 4.7-16.8 | 1.3-140.8 |

The differences in the condition factor by size and sex of *M. macrobrachion* and *M. vollenhovenii* from the three lagoons are presented in Tables 3-8. In Badagry Lagoon, the K values for *M. macrobrachion* from ranged from 1.2 – 1.4 (male), 1.1 – 1.2 (female) and 0.3 – 1.4 (combined sexes); while the K values for *M. vollenhovenii* ranged from 1.6 – 2.7 (male), 1.5 – 2.0 (females) and 0.4 – 2.7 (combined

sexes). In Epe Lagoon, the K values for *M. macrobrachion* from ranged from 1.2 – 1.9 (male), 1.1 – 1.5 (female) and 0.3 – 1.9 (combined sexes); while the K values for *M. vollenhovenii* ranged from 0.8 – 2.1 (male), 0.3 – 2.0 (females) and 0.1 – 2.1 (combined sexes). In Lagos Lagoon, the K values for *M. macrobrachion* from ranged from 0.9 – 1.4 (male), 1.1 – 1.7 (female) and 0.3 – 1.4 (combined sexes); while the K values for *M. vollenhovenii* ranged from 1.2 – 3.1 (male), 1.3 – 2.0 (females) and 0.4 – 3.1 (combined sexes).

The highest K-values were recorded for the large size groups while the lowest mean K value for *M. macrobrachion* from the three lagoons was 0.9 (male) and the highest was 1.9 (male). The lowest mean K value for *M. vollenhovenii* from the three lagoons was 0.3 (female) while the highest was 3.1 (male).

Table 3: Variation in the Condition factor (K) of *M. macrobrachion* from Badagry Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 4.5-5.4 | - | - | - | - | 34 | 5.2 | 1.6 | 1.1 | 34 | 5.2 | 1.6 | 1.1 |
| 5.5-6.4 | 12 | 6.0 | 2.9 | 1.3 | 168 | 6.0 | 2.6 | 1.2 | 180 | 12.0 | 5.5 | 0.3 |
| 6.5-7.4 | 103 | 7.0 | 4.3 | 1.2 | 426 | 7.0 | 4.0 | 1.2 | 529 | 14.0 | 8.2 | 0.3 |
| 7.5-8.4 | 224 | 8.0 | 6.2 | 1.2 | 263 | 7.9 | 5.7 | 1.2 | 487 | 15.8 | 11.9 | 0.3 |
| 8.5-9.4 | 301 | 8.9 | 8.7 | 1.2 | 187 | 8.8 | 8.3 | 1.2 | 488 | 17.7 | 17.0 | 0.3 |
| 9.5-10.4 | 145 | 9.9 | 11.5 | 1.2 | 10 | 9.7 | 10.2 | 1.1 | 155 | 19.6 | 21.7 | 0.3 |
| 10.5-11.4 | 31 | 10.8 | 15.6 | 1.2 | - | - | - | - | 31 | 10.8 | 15.6 | 1.2 |
| 11.5-12.4 | 8 | 11.7 | 21.7 | 1.4 | - | - | - | - | 8 | 11.7 | 21.7 | 1.4 |
| | 824 | | | 1.3 | 1088 | | | 1.2 | 1912 | | | 0.7 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

Table 4: Variation in the Condition factor (K) of *M. macrobrachion* from Epe Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 4.5-5.4 | - | - | - | - | 6 | 5.2 | 1.6 | 1.1 | 6 | 5.2 | 1.6 | 1.1 |
| 5.5-6.4 | 18 | 6.1 | 2.8 | 1.2 | 6 | 6.1 | 3.1 | 1.4 | 24 | 12.2 | 5.8 | 0.3 |
| 6.5-7.4 | 69 | 7.1 | 4.3 | 1.2 | 50 | 7.1 | 4.3 | 1.2 | 119 | 14.2 | 8.6 | 0.3 |
| 7.5-8.4 | 152 | 8.1 | 6.4 | 1.2 | 192 | 7.9 | 6.1 | 1.2 | 344 | 16.0 | 12.5 | 0.3 |
| 8.5-9.4 | 115 | 9.0 | 9.1 | 1.2 | 161 | 8.8 | 8.4 | 1.2 | 276 | 17.8 | 17.5 | 0.3 |
| 9.5-10.4 | 184 | 9.9 | 12.1 | 1.3 | 20 | 9.6 | 10.0 | 1.1 | 204 | 19.5 | 22.1 | 0.3 |
| 10.5-11.4 | 86 | 10.9 | 17.0 | 1.3 | 1 | 10.8 | 19.1 | 1.5 | 87 | 21.7 | 36.1 | 0.4 |
| 11.5-12.4 | 78 | 11.7 | 21.2 | 1.3 | - | - | - | - | 78 | 11.7 | 21.2 | 1.3 |
| 12.5-13.4 | 2 | 12.8 | 40.1 | 1.9 | - | - | - | - | 2 | 12.8 | 40.1 | 1.9 |
| | 704 | | | 1.3 | 436 | | | 1.3 | 1140 | | | 0.7 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

Table 5: Variation in the Condition factor (K) of *M. macrobrachion* from Lagos Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 4.5-5.4 | 2 | 5.4 | 1.4 | 0.9 | 24 | 5.1 | 2.2 | 1.7 | 26 | 10.5 | 3.6 | 0.3 |
| 5.5-6.4 | 36 | 6.0 | 2.9 | 1.3 | 132 | 6.0 | 2.6 | 1.2 | 168 | 12.1 | 5.5 | 0.3 |
| 6.5-7.4 | 139 | 7.0 | 4.1 | 1.2 | 218 | 7.0 | 4.1 | 1.2 | 357 | 14.0 | 8.2 | 0.3 |
| 7.5-8.4 | 54 | 8.0 | 6.8 | 1.3 | 169 | 7.9 | 5.8 | 1.2 | 223 | 15.8 | 12.6 | 0.3 |
| 8.5-9.4 | 47 | 8.9 | 10.0 | 1.4 | 58 | 8.7 | 8.0 | 1.2 | 105 | 17.6 | 18.0 | 0.3 |
| 9.5-10.4 | 19 | 9.8 | 13.1 | 1.4 | 6 | 9.6 | 10.0 | 1.1 | 25 | 19.4 | 23.1 | 0.3 |
| 10.5-11.4 | 15 | 10.7 | 17.4 | 1.4 | - | - | - | - | 15 | 10.7 | 17.4 | 1.4 |
| 11.5-12.4 | 7 | 11.7 | 21.0 | 1.3 | - | - | - | - | 7 | 11.7 | 21.0 | 1.3 |
| | 319 | | | 1.3 | 607 | | | 1.3 | 926 | | | 0.6 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

Table 6: Variation in the Condition factor (K) of *Macrobrachium vollenhovenii* from Badagry Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 4.5-5.4 | 2 | 5.4 | 3.0 | 1.9 | - | - | - | - | 2 | 5.4 | 3.0 | 1.9 |
| 5.5-6.4 | 8 | 6.1 | 3.8 | 1.7 | - | - | - | - | 8 | 6.1 | 3.8 | 1.7 |
| 6.5-7.4 | 11 | 7.0 | 5.6 | 1.7 | 6 | 7.1 | 5.5 | 1.5 | 17 | 14.0 | 11.1 | 0.4 |
| 7.5-8.4 | 29 | 7.8 | 8.5 | 1.8 | 3 | 8.3 | 9.1 | 1.6 | 32 | 16.1 | 17.6 | 0.4 |
| 8.5-9.4 | 20 | 8.9 | 11.9 | 1.7 | 7 | 8.5 | 12.6 | 2.0 | 27 | 17.5 | 24.5 | 0.5 |
| 9.5-10.4 | 7 | 10.0 | 17.2 | 1.7 | 6 | 10.1 | 18.7 | 1.8 | 13 | 20.0 | 35.8 | 0.4 |
| 10.5-11.4 | 6 | 10.8 | 23.2 | 1.8 | 3 | 10.6 | 20.7 | 1.7 | 9 | 21.4 | 43.9 | 0.4 |
| 11.5-12.4 | 6 | 11.9 | 29.4 | 1.7 | - | - | - | - | 6 | 11.9 | 29.4 | 1.7 |
| 12.5-13.4 | 1 | 13.1 | 35.8 | 1.6 | - | - | - | - | 1 | 13.1 | 35.8 | 1.6 |
| 13.5-14.4 | 4 | 14.0 | 44.4 | 1.6 | 1 | 14.1 | 51.5 | 1.8 | 5 | 28.1 | 95.9 | 0.4 |
| 14.5-15.4 | 1 | 13.1 | 60.9 | 2.7 | - | - | - | - | 1 | 13.1 | 60.9 | 2.7 |
| 15.5-16.4 | 2 | 15.7 | 62.4 | 1.6 | - | - | - | - | 2 | 15.7 | 62.4 | 1.6 |
| | 97 | | | 1.8 | 26 | | | 1.8 | 123 | | | 1.2 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

Table 7: Variation in the Condition factor (K) of *M. vollenhovenii* from Epe Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 3.5-4.4 | 2 | 4.3 | 1 | 1.3 | | - | - | - | 2 | 4.3 | 1.0 | 1.3 |
| 4.5-5.4 | 7 | 5.3 | 2.2 | 1.5 | 6 | 5.2 | 2.2 | 1.6 | 13 | 10.4 | 4.4 | 0.4 |
| 5.5-6.4 | 54 | 6.0 | 3.6 | 1.6 | 8 | 6.0 | 3.7 | 1.7 | 62 | 12.1 | 7.3 | 0.4 |
| 6.5-7.4 | 189 | 7.1 | 6.0 | 1.7 | 41 | 6.9 | 5.5 | 1.7 | 230 | 14.0 | 11.5 | 0.4 |
| 7.5-8.4 | 251 | 8.0 | 8.6 | 1.7 | 154 | 7.9 | 8.0 | 1.6 | 405 | 15.9 | 16.5 | 0.4 |
| 8.5-9.4 | 184 | 8.9 | 11.8 | 1.7 | 72 | 9.0 | 11.9 | 1.6 | 256 | 17.9 | 23.6 | 0.4 |
| 9.5-10.4 | 207 | 9.9 | 16.1 | 1.7 | 68 | 10.0 | 17.0 | 1.7 | 275 | 19.9 | 33.1 | 0.4 |
| 10.5-11.4 | 75 | 11.0 | 21.7 | 1.6 | 25 | 10.9 | 22.3 | 1.7 | 100 | 21.8 | 44.0 | 0.4 |
| 11.5-12.4 | 30 | 11.9 | 31.5 | 1.9 | 18 | 11.9 | 28.2 | 1.7 | 48 | 23.8 | 59.7 | 0.4 |
| 12.5-13.4 | 9 | 12.8 | 33.4 | 1.6 | 8 | 12.6 | 39.5 | 2.0 | 17 | 25.4 | 72.8 | 0.4 |
| 13.5-14.4 | 10 | 14.0 | 46.0 | 1.7 | | - | - | - | 10 | 14.0 | 46.0 | 1.7 |
| 14.5-15.4 | 3 | 15.0 | 70.6 | 2.1 | | - | - | - | 3 | 15.0 | 70.6 | 2.1 |
| 15.5-16.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 16.5-17.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 17.5-18.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 18.5-19.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 19.5-20.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 20.5-21.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 21.5-22.4 | 3 | 21.6 | 81.2 | 0.8 | | - | - | - | 3 | 21.6 | 81.2 | 0.8 |
| 22.5-23.4 | 1 | 21.1 | 92.4 | 1.0 | 2 | 22.5 | 31.5 | 0.3 | 3 | 43.6 | 123.9 | 0.1 |
| | 1025 | | | 1.6 | 402 | | | 1.6 | 1427 | | | 0.7 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

Table 8: Variation in the Condition factor (K) of *M. vollenhovenii* from Lagos Lagoon (August 2021 – July 2023)

| Size | MALE | | | | FEMALE | | | | COMBINED SEX | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| group | N | TL | WT | K | N | TL | WT | K | N | TL | WT | K |
| 4.5-5.4 | 1 | 4.5 | 1.1 | 1.2 | | - | - | - | 1 | 4.5 | 1.1 | 1.2 |
| 5.5-6.4 | 5 | 6.0 | 3.5 | 1.6 | | - | - | - | 5 | 6.0 | 3.5 | 1.6 |
| 6.5-7.4 | 6 | 6.9 | 5.1 | 1.5 | 3 | 7.0 | 5.3 | 1.5 | 9 | 13.9 | 10.3 | 0.4 |
| 7.5-8.4 | 10 | 7.9 | 7.4 | 1.5 | 8 | 8.1 | 9.0 | 1.7 | 18 | 16.1 | 16.4 | 0.4 |
| 8.5-9.4 | 1 | 8.6 | 11.6 | 1.8 | 9 | 8.9 | 12.6 | 1.8 | 10 | 17.5 | 24.2 | 0.5 |
| 9.5-10.4 | 5 | 10.2 | 21.1 | 2.0 | 8 | 10.0 | 19.0 | 1.9 | 13 | 20.2 | 40.0 | 0.5 |
| 10.5-11.4 | 6 | 11.1 | 30.5 | 2.2 | 7 | 10.8 | 22.4 | 1.8 | 13 | 22.0 | 52.9 | 0.5 |
| 11.5-12.4 | 4 | 11.9 | 35.3 | 2.1 | 13 | 11.8 | 31.5 | 1.9 | 17 | 23.7 | 66.8 | 0.5 |
| 12.5-13.4 | 2 | 13.0 | 52.4 | 2.4 | 9 | 13.0 | 42.9 | 2.0 | 11 | 25.9 | 95.3 | 0.5 |
| 13.5-14.4 | 3 | 14.0 | 71.9 | 2.6 | 4 | 13.6 | 47.7 | 1.9 | 7 | 27.6 | 119.6 | 0.6 |
| 14.5-15.4 | | - | - | - | 1 | 15.2 | 46.8 | 1.3 | 1 | 15.2 | 46.8 | 1.3 |
| 15.5-16.4 | | - | - | - | | - | - | - | 0 | - | - | - |
| 16.5-17.4 | 1 | 16.6 | 140.0 | 3.1 | | - | - | - | 1 | 16.6 | 140.0 | 3.1 |
| | 44 | | | 2.0 | 62 | | | 1.8 | 106 | | | 0.9 |

Key: N - Number, TL -Total Length (cm), WT - Total weight (g), K - Condition factor

**Discussion**

The values of the condition factor for the two species are 1 and greater which could be an indication of good feeding intensity and overall wellbeing in the spawning/reproductive behaviour. This is in support with the work documented by Braga and Gennari-Filho (1990). Consequently, an aquatic organism could be said to be in a better condition when the K value is greater or equal to 1 (Wade 1992). The result showed that males of both *M. macrobrachion* and *M. vollenhovenii* had higher K values than the females. This could be due to the fact that males of these two species are known to be larger in size than the females (Akinwunmi and Lawal-Are 2018). This finding is in agreement with the report of Lawal-Are and Kusemiju (2000) on crabs. However, this is contrary to the findings reported by Andem et al. (2013) on *M. macrobrachion* collected from great Kwa River, Obufa Esuk beach. Their report showed that the female prawns had higher condition factor than the males.

The overall condition factor of both species was considered owing to the fact that these two species were collected from the same lagoons all through the period of study while the values ranged between 0.3 and 3.1. These ranges differ from the K values (0.5914 - 0.6909 and 0.49 - 0.82) that was posited by Udoinyang et al. (2016) and Komi and Francis (2017) on the condition factor of some shrimp species from the artisanal shrimp fishery of Iko river estuary, southeastern Nigeria and *Penaeus monodon* from Andoni River System, Niger Delta respectively. However, Ajibare et al. (2020) reported that the Condition factor of *M. vollenhovenii* from Asejire Reservoir, Nigeria ranged between 2.79-3.33. The works reported by Suryanti et al. (2017) and Solanki et al. (2020) indicated that the condition factor of *Penaeus merguiensis* and *Penaeus monodon* from Indonesia and India ranged from 0.570-1.773 and 0.455-1.646 respectively. The variation in the values might be due to the differences in the species and habitats from where the species were collected.

Also, it was observed that the K-values (combined sexes) of *M. vollenhovenii* was higher than that of *M. macrobrachion* for Badagry, Epe and Lagos Lagoons. This invariably means that *M. vollenhovenii* had a better condition factor, which might be due to the fact that it is generally larger than *M. macrobrachion* and also due to their high occurrence in fresh water environment (New 2002; Akinwunmi and Lawal-Are 2018).

**Conclusion**

The present study evaluated the condition factor of *M. macrobrachion* and *M. vollenhovenii* from three (Badagry, Epe and Lagos) lagoons and based on the findings from this research, it could be suggested that the prawn species are said to be in good condition in their various habitats. The condition factor of *M. vollenhovenii* was higher than that of *M. macrobrachion* with the K factor of the males of *M. vollenhovenii* being higher than that of the females.

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**Declaration of Interest Statement**

The author declares no conflict of interest.

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