

Facial, Nasal, Maxillary, Mandibular and Oro-facial Heights of Adult Ibibios of Nigeria

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Abstract: The study was carried out to determine the mean values of facial, nasal, maxillary, mandibular and oro-facial heights of adult Ibibios. Eight hundred (800) subjects purely of Ibibio ethnic group comprising 400 males and 400 females, aged between 18 and 80 years were used for the study. The facial height, nasal height, maxillary height, mandibular height and oro-facial height were measured using sliding caliper and the results obtained showed that the males had mean facial height of 11.14 ± 0.77 cm, nasal height of 4.15 ± 0.34 cm, maxillary height of 2.53 ± 0.38 cm, mandibular height of 4.46 ± 0.43 cm and oro-facial height of 6.99 ± 0.59 cm while the females had mean facial height of 10.55 ± 0.74 cm, nasal height of 3.93 ± 0.35 cm, maxillary height of 2.48 ± 0.49 cm, mandibular height of 4.14 ± 0.33 cm and oro-facial height of 6.63 ± 0.60 cm. Statistical analysis using the z-test showed that the males had significantly higher values than the females in all the facial parameters measured ($p < 0.05$), hence parameters were sexually dimorphic. The data of this study is recommended to forensic scientists, craniofacial surgeons and in anthropological studies.

Key words: Facial dimensions, Ibibios, Nigerians

INTRODUCTION

The face is the part of the front of the head between the ears and from the chin to the hairline. It is the anterior part of the head that includes the forehead, eyes, nose, mouth and chin (Sinnatamby, 1999). The shape of the face is determined by underlying bone, thickness and distribution of the underlying fat as well as the facial muscles (Moore & Dalley, 1999). The human face is used for expression, appearance and identity amongst others. It is widely recognized as the feature which best distinguishes a person, often at first glance. One of the primary functions of the face is physical appearance. An attractive face, no doubt is pleasing to behold, however the definition of an attractive face is subject to factors such as personality, culture, age, ethnic background as well as personal preferences (Didia and Dapper, 2005).

It is a well known fact that facial features differ amongst different races and ethnic groups. For evaluation of deviations in craniofacial morphology, standards of anthropometrical measurements should be established for a particular population (Basciftel *et al.*, 2004).

Facial parameters such as facial, nasal, maxillary, mandibular and oro-facial heights which are measurements of these parts of the face are of utmost importance in determining standards for each population. These parameters change with age and are dependent on variations in the dimensions of the skeleton, development of muscles, sex and fat content and distribution in the body which are under the influence of climate, diet, health, etc. These factors are important determinants of growth and development (Quinn, 2004). Ethnicity is a variable that affects craniofacial dimensions (Rajakshmi *et al.*, 2001). The nose is one of the best clues to racial origin (Oladipo *et al.*, 2006). Oladipo *et al.* 2007 reported the nasal parameters of the Ogonis in Nigeria. They reported mean nasal height of Ogoni males and females as 3.99cm and 3.91cm respectively. Akpa *et al.*, 2003 reported the nasal parameters of Nigerian Igbos. Mean nasal height was reported as 6.31cm and 6.04cm for males and females respectively. The reports of these authors showed sexual dimorphism in the studied populations.

Rabanus, 2003 stated that nasal height is related to maxillary height as 1.000:0.618; the sum of the nasal height and maxillary heights are related to the mandibular height as 1.618:1.000; the mandibular height is

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related to the maxillary height as 1:0.618 and the oro-facial height is related to the nasal height as 1.618:1.000 and that each ratio differs by 1.618 in line with the rule of golden proportions.

Didia and Dapper (2005) studied the values of facial, nasal, maxillary, mandibular and oro-facial heights in Nigerians in a study carried out on 200(110 males and 90 females) adult Nigerians with normal facial morphology and established that for males facial height is 12.28 ± 3.39 cm; nasal height 4.50 ± 1.23 cm; maxillary height 2.44 ± 0.66 cm; mandibular height 4.49 ± 1.23 cm and oro-facial height 6.90 ± 1.89 cm. The figures obtained for the female subjects are facial height 11.77 ± 3.53 cm; nasal height 4.48 ± 1.37 cm; maxillary height 2.30 ± 0.69 cm; mandibular height 4.20 ± 1.26 cm and oro-facial height 6.32 ± 1.91 cm. The values obtained for males were found to be significantly higher than the corresponding female values thereby establishing sexual dimorphism amongst Nigerians.

In a similar study to establish standards for craniofacial anthropometrical parameters of Latvian population by Erika *et al.*, 2005 a total of 38 craniofacial measurements of 77 individuals (39 males and 38 females) with normal craniofacial morphology were obtained and a comparison was made between males and female and between Latvian and non-Latvians. The study reported nasal height and facial height as 5.87 ± 0.45 cm and 12.41 ± 0.41 cm respectively for males and that of females as nasal height 5.67 ± 0.57 cm and facial height 11.76 ± 0.62 cm. Measurements of the face showed that males in comparison with females had wider and higher faces, bigger minimal frontal breadth and upper face depth. Measurements taken from the jaw region showed that this region in males is more expressive than in females. However mandibular body length did not show statistically significant difference between males and females. No statistically significant difference was observed between the Latvian and non-Latvian subjects in the study group.

Knowledge of facial proportion values are employed in facial aesthetics. If the facial height for example is increased relatively to the upper two-thirds, it may be possible to restore an aesthetic proportion to the overall face by surgical alteration of the patient's alveolar height and or vertical dimensions (McLaren and Rifkin, 2002).

Similarly, decreased facial height at the vertical dimension of occlusion can often be restored at an improved vertical to improve facial aesthetics (Mohindra and Bulman, 2002).

Current concepts in diagnosis and treatment planning focus on the balance and harmony of various facial features (Reidel, 1950; Holdaway, 1983; Gonzalez-Ulloa and Steven, 1961; Merrifield, 1966; Lines *et al.*, 1978). Increased skeletal treatment and surgical intervention make it extremely important to study examples of esthetically balanced faces and the scope of acceptable compromises between different facial elements.

No report exists on the facial parameters of the Ibibios ethnic group hence the need for this study. Further more, this study will provide the data on facial, nasal, maxillary, mandibular and oro-facial heights of the Ibibios of Nigeria which could be used as anthropometric reference values, in clinical practices (plastic surgery and orthodontics) and in forensic medicine and also set the pace for further investigation.

MATERIALS AND METHODS

Eight hundred (800) subjects of Ibibio ethnic group with ages ranging from 18-80 years were used in the study. These were made up of 400 males and 400 females who were Ibibios by both parents and grand parents. The subjects were selected at random from Ibibios residing in Uyo, Akwa Ibom State and Port Harcourt, Rivers State of Nigeria. All the subjects used for this study showed no facial deformity or scar.

Measurements were taken with the aid of sliding veneer caliper as follows:

Facial height, was measured as the distance between the nasion of the nose and the menton of the mandible (A+B+C). Nasal height was measured as the distance between the nasion and the anterior nasal spine (A). Maxillary height was measured as the distance between the anterior nasal spine and the junction between the upper and lower lips (B). Mandibular height was measured as the distance between the junction of the upper and lower lip and the menton (C). Oro-facial height was gotten as the sum of the maxillary and mandibular heights (B+C). It is also measured as the distance between the nasospinale and the menton. All measurements were carried out using the method described by Didia and Dapper, 2005 (Figure 1). All measurements were made by one person to ensure uniformity of measurement. Measurements were made with the subjects sitting upright with the head unsupported, relaxed and breathing quietly. The data obtained were analyzed using discrete statistics and students' z test at significance level of 0.05.

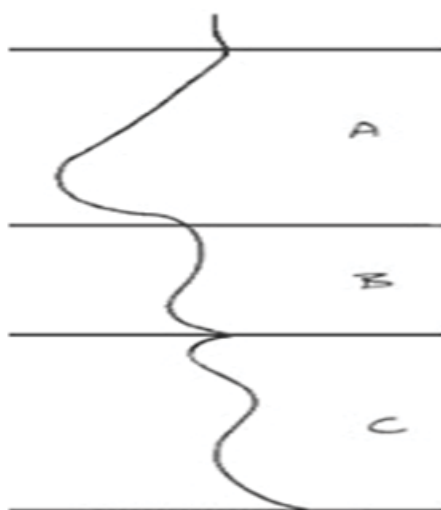


Fig. 1: Scheme to show measurement of facial parameters(Didia and Dapper,2005).

Note:

Nasal height-----A

Maxillary height ----B

Mandibular height-----C

Oro-facial height-----B + C

Facial height-----A + B + C

RESULTS AND DISCUSSION

The results of the study are shown in tables 1-4. The sample distribution of subjects is shown in table 1. More of the subjects studied were between the ages of 18 years to 22 years. The dimensions of the facial parameters obtained in this study for both male and female subjects are shown in table 2 to 4. Table 4 shows a comparison between the facial dimensions of Ibibios males and females. The values obtained for the males were found to be significantly higher than the corresponding female values ($p < 0.05$). In table 5, a comparative table of facial parameters in Ibibios and other populations, Ibibio males showed higher mean values of facial height, nasal height, mandibular height and orofacial height than male Ijaws but lower values of maxillary height than male Ijaws. In addition, facial height and nasal height of male Ibibios was lower than those of male Latvians. The mean nasal height of the male Ibibios was higher but lower than those of male Igbos. In females, Ibibios had lower facial height than Ijaws and Latvian. The value of nasal height was lower than those of Ijaws, Igbos and Latvians but higher than that of Ogonis. Orofacial height and maxillary height were significantly higher than those of Ijaws while mandibular height was lower than that of Ijaws.

Table 1: Age and sex distribution of subjects

Age Group (Yrs)	Male Subjects	Female Subjects	Total
18 – 22	108	121	229
23 – 27	42	92	134
28 – 32	14	29	43
33 – 37	73	57	130
38 – 42	12	17	29
43 – 47	88	44	132
48 – 52	7	23	30
53 – 57	32	15	47
58 and above	24	2	26
Total	400	400	800

Table 2: Mean facial dimensions of males

Age group years	Facial Height (cm)	Nasal Height (cm)	Maxillary Height (cm)	Mandibular Height (cm)	Oro-Facial Height (cm)
18 – 22	10.91	3.98	2.63	4.30	6.93
23 – 27	11.39	4.26	2.51	4.62	7.13
28 – 32	11.09	4.15	2.50	4.44	6.94
33 – 37	11.14	4.20	2.44	4.50	6.94
38 – 42	11.22	4.37	2.50	4.36	6.85
43 – 47	11.27	4.17	2.54	4.55	7.09
48 – 52	11.32	4.28	2.36	4.68	7.05
53 – 57	11.26	4.25	2.53	4.49	7.01
58 and above	11.11	4.20	2.54	4.45	6.90

Table 3: Mean facial dimensions of females

Age group years	Facial Height (cm)	Nasal Height (cm)	Maxillary Height (cm)	Mandibular Height (cm)	Oro-Facial Height (cm)
18 – 22	10.60	3.95	2.54	4.11	6.66
23 – 27	10.54	3.94	2.44	4.16	6.60
28 – 32	10.44	3.93	2.29	4.22	6.51
33 – 37	10.51	3.89	2.43	4.19	6.62
38 – 42	10.46	3.82	2.50	4.14	6.64
43 – 47	10.64	3.97	2.53	4.14	6.67
48 – 52	10.39	3.91	2.40	4.07	6.64
53 – 57	10.56	3.95	2.60	4.00	6.60
58 and above	11.19	4.07	3.01	4.11	7.12

Table 4: Comparison of mean facial dimensions between Ibibios Males and Females

Measurements	Males n=400		Female n=400	
	Mean±	S.D	Mean±	S.D
Facial height (cm)	11.14 ± 0.77		10.55±0.74	
Nasal height (cm)	4.15 ±0.34		3.93 ± 0.35	
Maxillary height (cm)	2.53 ± 0.38		2.48 ± 0.49	
Mandibular height (cm)	4.46 ±0.43		4.14 ± 0.33	
Oro-facial height (cm)	6.99 ±0.59		6.62 ±0.60	

P<0.05

Note:SD-standard deviation

Table 5: Comparative Facial Dimensions in Ethnic Groups

Parameter	Group	Male	Female	Significance	Author/Year
Facial height (cm)	Nigerians	12.28	11.77	Significant	Didia&Dapper,2005
	Latvians	12.41	11.76	Significant	Erika <i>et al.</i> ,2005
	Nigerian Ijaws	11.87	10.71	Significant	Oladipo <i>et al.</i> ,2008
	Urhobos	12.18	11.03	Significant	Oladipo <i>et al.</i> , 2009
	Ibibios	11.14	10.55	Significant	Present study
Nasal height (cm)	Nigerians	4.5	4.48	Significant	Didia&Dapper, 2005
	Latvians	5.87	5.67	Significant	Erika <i>et al.</i> , 2005
	Nigerian Igbos	6.31	6.04	Significant	Akpa <i>et al.</i> , 2003
	Ogonis	3.99	3.91	Significant	Oladipo <i>et al.</i> , 2007
	Nigerian Ijaws	4.71	4.43	Significant	Oladipo <i>et al.</i> , 2008
	Urhobos	4.85	4.4	Significant	Oladipo <i>et al.</i> , 2009
Maxillary height (cm)	Ibibios	4.15	3.93	Significant	Present study
	Nigerians	2.44	2.3	Significant	Didia&Dapper, 2005
	Nigerian Ijaws	2.49	2.39	Significant	Oladipo <i>et al.</i> ,2008
	Urhobos	2.46	2.33	Significant	Oladipo <i>et al.</i> , 2009
Mandibular height (cm)	Ibibios	2.53	2.48	Significant	Present study
	Nigerians	4.49	4.2	Significant	Didia&Dappa, 2005
	Nigerian Ijaws	4.6	4.28	Significant	Oladipo <i>et al.</i> ,2008
	Urhobos	4.89	4.39	Significant	Oladipo <i>et al.</i> , 2009
Orofacial height (cm)	Ibibios	4.46	4.14	Significant	Present study
	Nigerians	6.9	6.32	Significant	Didia&Dappa, 2005
	Nigerian Ijaws	7.12	6.5	Significant	Oladipo <i>et al.</i> ,2008
	Urhobos	7.33	6.67	Significant	Oladipo <i>et al.</i> , 2009
	Ibibios	6.99	6.63	significant	Present study

Discussion:

The study was directed mainly towards investigating the normal values of facial, nasal, maxillary, mandibular and oro-facial heights of adult Ibibios in Nigeria. The ages ranged from 18 -80 years. The choice of the study population was deliberate since facial growth changes are minimal at that age range (Didia and Dapper, 2005). Significant changes occur more in periods between 5 – 17 years (Bishara and Ortho, 2000). Observation showed that mean facial dimensions of male Ibibios were significantly higher than the

corresponding female values; this could be as a result of genetic make up and inheritance which manifest as sexual dimorphism as reported by previous authors on most anthropometric parameters (Oladipo *et al.*, 2006; Oladipo *et al.*, 2007; Oladipo *et al.*, 2008; Daniel, 2002).

Many investigators have shown significant differences in craniofacial complex among ethnic and racial groups (Hwang *et al.*, 2002; Mlyajmak *et al.*, 1996). Several other investigators (Livhitis *et al.*, 1994) suggested also that genetic factors exert a substantial influence on the individual differences in body shape and configuration. Therefore they should be considered in developing standards for various populations (Bascifitel *et al.*, 2004).

The facial dimensions established here for Ibibios are important to orthodontists and plastic surgeons and should be considered when facial aesthetics is to be improved upon.

From the study on the Latvian population by Erika *et al.*, 2005, Latvian males have a facial height of 12.41 ± 0.45 cm and a nasal height of 5.87 ± 0.45 cm; female values were, for facial height 11.76 ± 0.62 cm and 5.67 ± 0.57 cm for nasal height (Figure 5). These values are significantly higher than those obtained for Ibibios ($p < 0.05$), thus the Ibibios can be said to have a smaller facial profile than the Latvians. In similar studies on Nigerian Igbos, by Akpa *et al.*, 2003 they reported significantly higher value ($p < 0.05$) of nasal length than Ijaws as well as the Ibibios. Ogonis on the other hand, have significantly lower values of nasal length than Ijaws ($p < 0.05$) as reported by Oladipo *et al.*, 2006. Comparing it with that of Ibibios, Ogonis have significantly lower value of nasal length than Ibibios

Conclusion:

This study has been able to establish the mean facial dimensions of adult Ibibios, it also established that as in other populations facial parameters are sexually dimorphic among the Ibibios and that male facial dimensions are greater than those of females ($p < 0.05$). Knowledge of mean facial dimensions is important in evaluation of age, sex and racial differences, in clinical applications and in forensic application. Thus Plastic surgeons and orthodontists should utilize this knowledge during facial reconstructive surgery and in recommending orthodontic appliances when facial aesthetics is to be improved upon. Forensic expert should also use this knowledge in their investigations.

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