



## Morphometric Study of Nasal Parameters in Igbos, South East Nigeria.

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### ABSTRACT

This study determined the normal mean values of nasal length, nasal breadth, pronasal distances and nasal index of adult Igbo Nigerians. This will serve as baseline for plastic/ reconstructive, E.N.T, Oral-Maxillo-facial surgeons and others who work on Igbo nose and face anywhere in the world, for anthropometric/ forensic purposes and serve makers of facial prosthetics as guide to making materials that will fit the Igbo nose. It will also add to the body of literature on nasal indices. A total of 1000 subjects comprising of 500 males and 500 females with ages ranging from 15-25 years were studied. The subjects were randomly selected from eleven schools a University and ten (10) secondary schools in Ihiala LGA of Anambra State. They were confirmed to be of Igbo parentage and no previous surgery, injury or infection to the nose. A sliding scale Vernier calipers which gives an accuracy of 0.01cm was used for the measurement and the results were statistically analysed. The mean length of the nose was 5.56± 0.14cm for females and 4.78±0.21cm for males, significant difference was observed between the nasal length of males and females ( $t=3.24, P<0.001$ ). The mean breadth of the nose was 4.74±0.28cm for female and 4.78±0.28cm for males, significant difference was observed between the nasal breadth of male and female ( $t=0.01, P>1.00$ ). The mean nasal Index of the nose was 88.8±4.56 females and 91.0±3.54males significant difference was observed between the nasal index of males and females ( $t=8.52, P<0.001$ ). The Igbos are platyrrhine, both females and males. The parameters evaluated in this study provide important data for forensic medicine, physical anthropology, data base and guide to surgeons in rhinoplasty and nasal reconstruction on Igbos, as well as makers of facial (nasal) prosthetics and artists.

**Key Note:** Nasal Parameters, Igbos

Morphometric measurements of the various parts of the body vary among races and can be used to identify one's race. When evaluating the face, one of the things that often call for attention is the set of three facial prominences that characterize the profile, the nose, lips and chin. A great extent of beauty and attractiveness of the face depends on the reciprocal proportion and aesthetic harmony. Knowledge of facial proportion values are employed in facial aesthetics (Didia & Dapper 2005). The nose is the most prominent and characteristic feature of the human face and is readily injured, congenitally malformed and subject to benign and malignant tumours 2-4 making reconstructive rhinoplasty one of the most frequently performed operations in plastic surgery. It is the most prominent 3-dimensional structure located on the central area of the face and the first part of the air channel to the lungs. Its shape including the nasal bridge, slope of the tip, the septum and nares differ from race to race, tribe to tribe and from one environmental region of the world to the other (Last 1981).

The nose can be divided into two parts, the internal and external part, with the external

as the most studied part. The external nose is pyramidal in structure and its skeletal framework is made up of bone and cartilages which maintain its shape. The external nose serves the cosmetic function by enhancing the personality and beauty of the individual, the nasal cavities act as a gateway to the respiratory tract where it filters and conditions the inspired air as well as serving as an organ for perception of smell.

The nose may be evaluated by direct clinical measurement Morphometry (Tucker & Hartford 1970) by photography Photogrammetric (Farkas et al 1983, Neger 1959) or more recently by three Dimensional (3D) scans and digitizer (Wisth & Boe 1975) Direct measurement techniques (Morphometry) performed manually with instruments as calipers and measuring tapes were reliable but 3D-scan was found to be more reliable, but its use is limited because of cost.

There is no concensus on the ideal nose, hence surgeons look for ethnicity-specific ideals that will satisfy the three main goals in rhinoplasty- creating a nose that pleases the patient, the surgeon and the public (Wisth & Boe 1975).

The Igbo people are found in the South-Eastern geopolitical zone of Nigeria and the adjoining states. They however travel a lot and are found virtually in every part of the world. Data on the standard dimensions of nasal indices of Igbos are few (Mahajam et al 2009, Akpa 2003, Franciscus 1991) and need to be standardized like in advanced countries where these indices are well documented.

Anthropometrical index is the ratio between one measurement and another expressed in percentage. Anthropometric index of the nose can be defined as the ratio between the width and the height of the nose multiplied by 100 (Oladipo et al 2006). There are three types of nose based on nasal index measurements, Table 1.

NASAL INDEX	TYPES OF NOSE	DESCRIPTION
85 and above	Platyrrhine	Broad noses
70 to 84.9	Mesorrhine	Medium
69.9 and below	Leptorrhine	Long and narrow nose

Some researchers clearly classified nasal index into two which are platyrrhine and Leptorrhine. These have nasal index value as in the table above but the nasal index values of the mesorrhine close to that the leptorrhine is described as sub-leptorrhine and those values close to platyrrhine are described as sub-platyrrhine<sup>15</sup>.

The white race has a narrow, long high nose (leptorrhine), the blacks have wide flat noses (Platyrrhine) and the Orientals have nose with intermediate measurements (mesorrhine)<sup>16</sup>.

## MATERIALS AND METHODS

The study population consisted of 1000 subjects, 500 females and 500 males. They were drawn from eleven schools in Anambra State-Nigeria, ten secondary schools and a university. The subjects were selected at random with ages between 15-25 years and none of the subjects had previous plastic surgery or trauma to the face. The subjects selected were healthy and purely of Igbo ethnic origin by both parents. They gave their consent to the study.

### Measurement Methods.

The subjects were asked to be in a sitting position with the head in the Anatomic position. The facial muscles were relaxed in order not to alter the size of the nose. The measurement of nasal length, breadth and pronasal distance were taken with the Vernier callipers.

#### Nasal Length

This was measured from the Nasion to the Nasopinale in centimeters.

#### Nasal Breadth

This was measured at right angles to the nasal height from alar to alar in centimeters.

#### Pronasal Distance

This is the distance from the point of union of both alar curvature points to the pronasal point.

**Nasal Index** was calculated as

$$\text{Nasal index} = \frac{\text{NASAL BREADTH} \times 100}{\text{NASAL HEIGHT}}$$

**STATISTICAL ANALYSIS:** The data obtained was analyzed using statistical tools like: mean (X), Standard Deviation (SD), Standard error (SE), t-test and Z-test.

## RESULTS

**Table 2:** Shows the nasal type and their proportion.

S/N	Nasal Type	Proportion Of Female	Proportion Of Male	Z	P	Significance
1.	Leptorrhine	13(2.6%)	10(2%)	0.00	1.00	NS
2	Mesorrhine	85(17%)	172(34.4%)	2.75	0.006	S
3.	Platyrrhine	402(80.2%)	318(63.6%)	4.96	0.0001	S

The mean nasal length for Igbo males was 5.39cm. The mean Nasal length for Igbo females was 5.56cm. Therefore the nasal length of the females is higher than that of the males. The result of the test comparing the Igbo females to the males shows a significant difference ( $P<0.001$ ). The mean value of nasal breadth of Igbo males was 4.78cm. The mean nasal breadth of the Igbo females was 4.74cm. Therefore the nasal breadth of Igbo males is higher than that of the females. The result of the test comparing the Igbo females to the

males shows a significant difference ( $P<0.01$ ). The mean pronasal distance of Igbo males was 2.35cm. The mean pronasal distance of Igbo females was 2.35cm. The result of the t-test comparing the pronasal distance of Igbo males to females shows no statistical significant difference ( $P>0.5$ ). The mean nasal index of Igbo males was 91.0, the standard deviation was 3.54 and standard error was 0.16. The mean nasal index of Igbo females was 88.8. The result of the t-test comparing the nasal index of Igbo males to females shows a significant difference ( $P<0.001$ ).

**Table 3: Nasal Length, Nasal breadth, pronasal distance and nasal index of Igbo males.**

S/N	Age group	Number of outcome	Nasal length	Nasal breadth	Pronasal distance	Nasal index
1.	15-16	80	5.33	4.68	2.27	87.40
2.	17-18	120	5.27	5.12	2.31	95.91
3.	19-20	90	5.16	4.63	2.26	88.18
4.	21-22	110	5.44	4.60	2.48	93.29
5.	23-24	75	5.39	4.85	2.40	88.48
6.	25 and above 25		55.28	4.52	2.34	86.11
7.	TOTAL	500	31.87	28.4	14.06	539.37

**Table 4.: Nasal Length, Nasal breadth, pronasal distance and nasal index of Igbo females.**

S/N	Age group	Number of outcome	Nasal length	Nasal breadth	Pronasal distance	Nasal index
1.	15-16	70	5.38	4.59	2.31	88.04
2.	17-18	147	5.54	4.45	2.22	84.54
3.	19-20	88	5.87	4.72	2.46	85.54
4.	21-22	87	5.55	5.28	2.62	95.00
5.	23-24	72	5.54	4.84	2.26	95.52
6.	25 and above	36	5.35	4.69	2.27	88.02
7.	TOTAL	500	33.23	28.57	14.14	536.46

The mean, standard deviation and standard error of nasal length, breadth, pronasal

distance and nasal index was calculated and represented in table 4 above.

**Table 5 shows the t-test result for the comparison of nasal length, breadth, pronasal distance and nasal index between Igbo males and females.**

S/N	Parameter	Nasal length		Nasal breadth		Pronasal distance		Nasal index	
		Male	Female	Male	Female	Male	Female	Male	Female
1.	MEAN	5.56	5.32	4.74	4.78	2.35	2.35	88.8	91.0
2.	SD	0.14	0.09	0.28	0.21	0.15	0.09	4.56	3.54
3.	SE	0.01	0.004	0.01	0.01	0.01	0.004	0.20	0.16
4.	SAMPLE	500	500	500	500	500	500	500	500

### DISCUSSION

In this study, a direct morphometry measurement on 1000 Igbos, 500 males and 500 females was carried out. The direct manual measurement technique was used because of the reliability and cost effectiveness in our environment. The study population- higher secondary school and university students, and age range of 15 to 25 is standard as minimal changes in the facial and nasal indices are noted in age 15 to 42 years 1.

The mean nasal length in this study was 5.56cm for females and 5.32cm for males which is similar to studies of (Wisth & Boe 1975), on African American women, in USA ,5.6cm but significantly shorter in length than the findings of (Akpa et al 2003) who found the mean length of the nose of Nigeria Igbos to be 6.22cm. Our figures are significantly higher in length than that of (Olutu et al 2005) 4.74cm in females and 4.78cm in males, but is similar to the study at Maiduguri and Ibadan (Garandawa et al, 2009), who found the mean width of the nose to be 4.22cm. It is lower than the work done by Akpa et al 2003(7.26).

The mean pronasal distance in this study was 2.35cm both male and female which is lower than the study done on 180 Chilean adult population who showed a mean of 3.923cm female and 4.351cm males. Our study showed no significant difference ( $P>0.5$ ) but the Chilean showed a significant difference between the two genders. The result of the present study conforms to the African

population of nasal index between 90 and 100 (Risley 1915<sup>20</sup>).

The result showed that there were significant differences ( $P<0.001$ ) between the nasal length of the Igbo males and the females, also significant difference ( $P<0.01$ ) was observed in the nasal breadth between Igbo males and females, again a significant difference ( $P<0.001$ ) was observed in the nasal index of the Igbo, with males having higher nasal index in comparison to that of the females, which is similar to the study done by (Oladipo et al 2006<sup>21</sup>) who observed that the Igbo males have significant higher nasal index than the females. But there was no significant difference between the Mean pronasal distance of the Igbo males and the female ( $P>0.5$ ).

With result of this study, it can be said that the Igbo males and females have the same nose type called platyrrhine (Broad nose). And the differences between their nasal index indicates sexual dimorphism with respect to nasal morphology.

The factors responsible for the variation in size, shape and length of the nose could include genetic factors (Farkas, 1983) race, tribe and environment climatic conditions (Last RJ1981) with narrower noses being favoured in cold and dry climates and broader noses in warm and moist environments as a consequence of natural selection in human evolution (Hall RL, 1995<sup>22</sup>).



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