

# NASOFACIAL MORPHOMETRY OF EKPEYE TRIBE IN RIVERS STATE, NIGERIA

## Abstract

**Background:** Nasofacial Anthropometry is concerned with the measurements of the proportions, size and shape of the human nose and face <sup>[2]</sup>. This study was aimed at investigating the nasofacial dimensions in Ekpeye tribe in Rivers state.

**Methods:** Nasofacial parameters of 362 adult were measured using vernier calliper. The nasal length was measured as the distance between the nasion and the nasopinale; nasal width was measured as the distance between ala to ala. The morphological facial length was measured as the distance from the nasion to gnathion and morphological facial width was measured as the distance between right and left zygomatic arches.

**Results:** Data obtained was analyzed using SPSS version 26.0 and Microsoft Excel 2013. The mean nasal index for the males was  $95.03 \pm 17.31$  while females presented with  $91.04 \pm 10.39$ , this is statistically significant. The mean facial index for the males was  $101.72 \pm 59.52$  while females presented with  $93.18 \pm 12.65$ .

**Conclusion:** In this study, it was observed that the Ekpeye people have platyrrhine type of nose and Hyperleptoprosopic category of face. Hence the data in this study has provided anthropometric data for the Ekpeye people, which will be beneficial in forensic science and nasofacial reconstructive surgeries.

**Keywords:** Nasofacial, parameters, Ekpeye, platyrrhine, Hyperleptoprosopic.

## Introduction

“The face is the anterior aspect of the head from the forehead to the chin and from one ear to the other, the bones of the face contribute to the anterior portion of the skull. This region is also referred to as the facial skeleton or viscerocranium. The facial nerve (CN VII) provides innervation for the face. The facial artery provides the major arterial supply to the face. It arises from the external carotid artery. Bones of the skull (frontal) contribute to the skeletal framework of the human nose, however most of its external shape is formed by soft tissue structures rather than these underlying bones. Externally, the nasal profile consists of the root, dorsum, tip and columella, with the other sections of the nose consisting of the ala, alar sulcus and nostrils. The nasal skeleton consists of the nasal bones and the frontal processes of the maxillae. The anterior

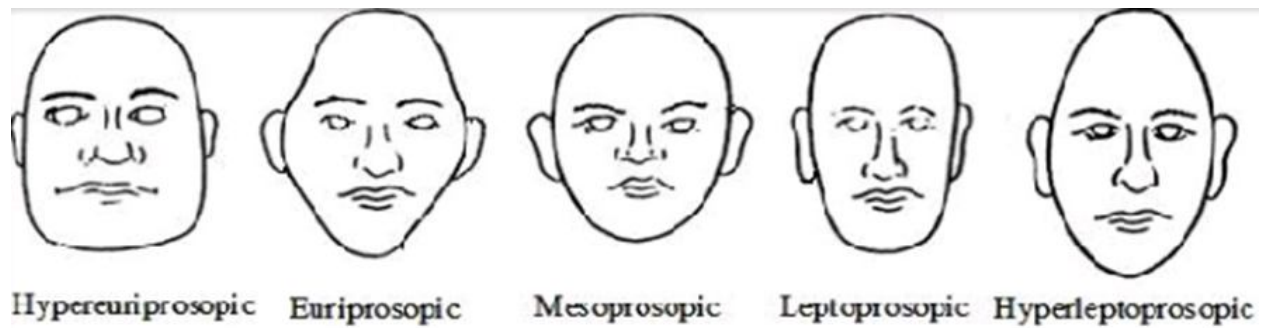
part of the nasal septum is the site of an anastomotic arterial plexus involving all five arteries supplying the septum (Kiesselbach area). The arterial supply of the medial and lateral walls of the nasal cavity is from anterior ethmoidal artery, posterior ethmoidal artery, sphenopalatine artery, greater palatine artery, septal branch of the superior labial artery. The Ekpeye tribe are a group of indigenous people found in the Orashi region of Rivers State, South-South geopolitical zone of Nigeria. The physical dimensions of the human body are influenced by ecological, geographical, racial, age and gender factors<sup>[1]</sup>. “Nasofacial Anthropometry is concerned with the measurements of the proportions, size and shape of the human nose and face”<sup>[2]</sup>. There are various soft tissue parameters and landmarks for facial analysis<sup>[3]</sup>. Facial characteristics have ethnicity and gender expressions, hence the need to study them and establish baseline data for various races and population have been emphasized<sup>[4][5]</sup>.

Based on facial anthropometry, there are five categories of face, namely:

- (i) Hypereuryprosopic (very broad, short face) (facial index 78.9 and below)
- (ii) Euryprosopic (broad, short face) (facial index 79.0-83.9)
- (iii) Mesoprosopic (Average face) (facial index 84.0-87.9)
- (iv) Leptoprosopic (Tall, narrow face) (facial index 88.0-92.9)
- (v) Hyperleptoprosopic (Very tall, narrow face) (facial index 93.0 and above)<sup>[6]</sup>.

Based on the nasal anthropometry, there are 5 categories of nose which include:

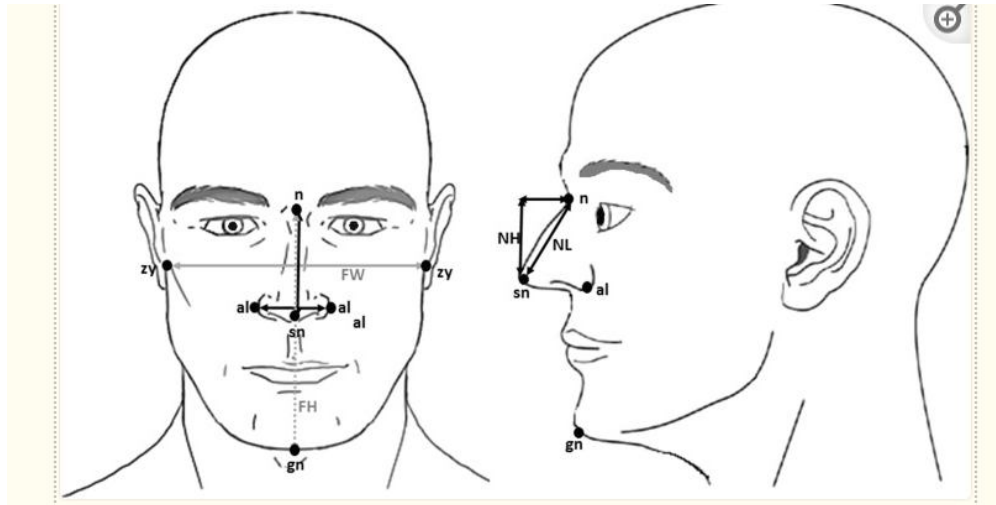
- (i) Hyperleptorrhine (nasal index  $\leq 54.9$ )
- (ii) Leptorrhine (nasal index 55.0-69.9)
- (iii) Mesorrhine (nasal index 70.0 - 84.9)
- (iv) Platyrrhine (nasal index 85.0-99.9)
- (v) Hyperplatyrrhine (nasal index  $\geq 100$ )<sup>[6]</sup>.



**fig 1 : categories of nose based on the nasal anthropometry**

## **MATERIALS AND METHODS**

This study was a descriptive cross sectional study. Convenient sampling method was used to recruit 362 adult Ekpeye indigenes (247 males and 115 females), with no history of nasofacial abnormality or previous nasofacial surgery. Non-indigens of Epkeye tribe, indigens with previous nasal or facial surgeries, cleft palate or other nasal or facial anomalies were excluded from the study. After explaining the procedure and purpose of the research, and consent given, the subjects were asked to sit comfortably on a chair with the head held out straight in the anatomical position and measurement was done using venier caliper. The nasal length was measured as the distance between the nasion and the nasopinale; nasal width was measured as the distance between ala to ala. **The morphological facial length was measured as the distance from the nasion to gnathion** and morphological facial width was measured as the distance between right and left zygomatic arches. Data obtained was analyzed using SPSS version 26.0 and Microsoft Excel 2013.



Anthropometric measurements of nasofacial parameters. *n* Nasion, *gn* Gnathion, *Zy* Zygions, *sn* subnasale, *al* ala of nose, *NL* nasal length, *NH* nasal height, *NW* nasal width, *FH* facial height, *FW* facial width. <sup>[13]</sup>

fig 2 : Anthropometric measurements of nasofacial parameters

## RESULTS

**Table 1: Age distribution of study participants**

	<i>Males</i>	<i>Females</i>	<i>Total</i>
	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>
<b>≤ 20 years</b>	151 (61.2)	66 (57.3)	217 (59.9)
<b>21-30 years</b>	42 (17.0)	30 (26.1)	72 (19.9)
<b>31-40 years</b>	30 (12.1)	11 (9.6)	41 (11.3)
<b>41-50 years</b>	18 (7.3)	7 (6.1)	25 (6.9)
<b>≥ 51 years</b>	6 (2.4)	1 (0.9)	7 (1.9)
<b>TOTAL</b>	247	115	362
<b>Mean ± SD</b>	23.91±10.58	22.72±8.59	23.53±10.00

$\chi^2 = 5.050$ ; p-value = 0.282 | t-test = 1.050; p-value = 0.294 The table shows the age-sex distribution of study participants. A total of 362 participants were recruited into the study comprising of 247 (68.2%) males and 115 (31.8%). The mean age of the study population was 23.53±10.00 years with males having 23.91±10.58 years and females having 22.72±8.59 years.

**Table 2: Nasofacial parameters**

	<i>Males</i> ( <i>Mean ±SD</i> )	<i>Females</i> ( <i>Mean ±SD</i> )	<i>Total</i> ( <i>Mean ±SD</i> )	<i>p-value</i>
<b>NASAL PARAMETERS (mm)</b>				
<b>Nasal length</b>	45.88±7.53	45.73±4.01	45.83±6.62	0.848
<b>Nasal Width</b>	42.92±4.43	41.40±4.03	42.43±4.36	<b>*0.002</b>
<b>Nasal Index</b>	95.03±17.31	91.04±10.39	93.76±15.55	<b>*0.023</b>
<b>FACIAL PARAMETERS (mm)</b>				
<b>Facial length</b>	121.77±19.34	113.00±11.76	118.98±17.76	<b>*0.000</b>
<b>Facial Width</b>	124.27±11.97	122.06±8.03	123.56±10.91	0.073
<b>Facial Index</b>	101.72±59.52	93.18±12.65	99.02±49.87	0.131

An Independent t-test was done to compare the means between males and females;

\* = p-value of statistical significance

The table shows the nasofacial parameters of Ekpeye tribe.

The mean nasal height for the males was 45.88±7.53mm while females presented with 45.73±4.01mm. No statistically significant difference was observed.

The mean nasal width for males was 42.92±4.43mm while females presented with 41.40±4.03. There was a statistically significant difference observed in the mean values between males and females.

The mean nasal index for the males 95.03±17.31 while females presented with 91.04±10.39. There was a statistically significant difference observed in the mean values between male and females.

The mean facial length for the males was  $121.77 \pm 19.34$  mm while females presented with  $113.00 \pm 11.76$  mm. There was a statistically significant difference observed in the mean values between males and females.

The mean facial width for the males was  $124.27 \pm 11.97$  mm while females presented with  $122.06 \pm 8.03$  mm.

The mean facial index for the males was  $101.72 \pm 59.52$  while females presented with  $93.18 \pm 12.65$ .

**Table 3: Nasofacial indices for different ages**

	<i>Males</i> (Mean $\pm$ SD)	<i>Females</i> (Mean $\pm$ SD)	<i>Total</i> (Mean $\pm$ SD)	<i>p-value</i>
<b><math>\leq 20</math> years</b>				
<b>Nasal Index</b>	94.87 $\pm$ 20.44	89.00 $\pm$ 10.14	93.08 $\pm$ 18.12	<b>*0.028</b>
<b>Facial Index</b>	101.82 $\pm$ 74.67	95.06 $\pm$ 13.05	99.76 $\pm$ 62.72	0.467
<b>21 – 30 years</b>				
<b>Nasal Index</b>	94.97 $\pm$ 9.14	94.43 $\pm$ 10.10	94.74 $\pm$ 9.49	0.815
<b>Facial Index</b>	100.55 $\pm$ 17.09	89.79 $\pm$ 13.25	96.07 $\pm$ 16.40	<b>*0.005</b>
<b>31 – 40 years</b>				
<b>Nasal Index</b>	94.87 $\pm$ 7.76	90.86 $\pm$ 11.16	93.79 $\pm$ 8.83	0.201
<b>Facial Index</b>	101.75 $\pm$ 21.89	89.98 $\pm$ 9.59	98.80 $\pm$ 20.11	0.110
<b>41 – 50 years</b>				

<b>Nasal Index</b>	93.08±11.55	96.27±10.08	93.97±11.05	0.528
<b>Facial Index</b>	104.98±19.72	94.00±8.09	101.90±17.81	0.171
<b>≥ 51 years</b>				
<b>Nasal Index</b>	96.40±23.34	89.25	95.22±18.79	0.527
<b>Facial Index</b>	97.30±20.58	96.74	97.22±18.80	0.981

An Independent t-test was done to compare the means between males and females;

\* = p-value of statistical significance

The result from table 3 shows sexual dimorphism in the facial index of the age group 21-30years,  $p < 0.05$ .

## DISCUSSION

**NASAL INDEX:** The result of this study showed that the the mean nasal index for the Ekpeye males  $95.03 \pm 17.31$  while females presented with  $91.04 \pm 10.39$ , hence they have platyrrhine nose type. Similar study carried out amongst Ekpeye tribe and Ikwerre by Oladipo et al., 2009<sup>[7]</sup> showed that Ekpeye people had mean nasal index for males ( $95.03 \pm 17.31$ ) while females presented with  $91.04 \pm 10.39$  as mean nasal index, Ikwerre males and females had mean nasal indices of  $84.81 \pm 0.57$  and  $93.17 \pm 0.51$  respectively. Hence Ekpeye people have platyrrhine nose type, this is in agreement with this present study. Jimoh et al., 2011<sup>[8]</sup> showed that the white race have Leptorrhine nose, the blacks have platyrrhine nose and orientals have mesorrhine nose. This is in agreement with this present study which shows similar categories of nose for the Ekpeye people, who are of the black race. Previous research by Oladipo et al., 2009<sup>[7]</sup> showed that the Okrikans fall within the platyrrhine nose type while the Andonis fall within the Mesorrhine nose type. The result obtained for the Okrika tribe is in agreement with this present study, perhaps they may have same ancestry. However, the result for the Andonis does not agree with that which states that the black race fall within the platyrrhine nose type.

The study by Tanko et al., 2019<sup>[9]</sup> showed that the people of the Nupe ethnic group had platyrrhine nose type. The study, in agreement with this present study and several other studies suggests that nasal index is important in determination of racial differences. The result of this present study also showed sexual dimorphism in nasal index of the Ekpeye people. The sexual dimorphism might be due to variations in the nose growth process between the sexes. The study by Oladipo et al., 2009<sup>[7]</sup> also showed sexual dimorphism. The mean nasal indices of Ekpeye males and females, as well as Ikwere males and females were significantly different between the two groups ( $p < 0.05$ ); the males having higher values in Ekpeye and the females having higher values in Ikwere. However, the study by Tanko et al., 2019<sup>[9]</sup> did not show sexual dimorphism in nasal indices, as  $p$  values were  $> 0.05$  and this is not in agreement with this present study.

**FACIAL INDEX:** The result of this study showed that the Ekpeye people have hyperleptoprosopic face type. The study by Tanko et al., 2019<sup>[9]</sup> showed that the people of Nupe ethnic group of Nigeria had a dominance of hypereuryprosopic face type. The study by Omotoso et al., 2011<sup>[4]</sup> showed that the people of Bini tribe have under face type, which is neither in agreement with the study by Tanko et al., 2019<sup>[9]</sup> nor this present study concerning the prevalence of racial variations in the face type of humans.

In this present study, There was sexual dimorphism in facial indices of the age group 21-30 across gender. The sexual dimorphism seen could be as a result of genetic make-up and inheritance<sup>[5][7][11]</sup>. “It has been postulated that sexual dimorphism in face structure is related to differences in prenatal testosterone exposure”<sup>[10]</sup>. The study by Oladipo et al., 2009<sup>[7]</sup> showed that “the mean facial height of adult Igbo males in Nigeria were significantly higher ( $P < 0.05$ ) than the values for adult Igbo females. The study in agreement with this present study showed the relevance of facial dimensions in the description of gender based variation among different groups and races of human population”. The study by Oghenemavwe et al., 2018<sup>[12]</sup> showed sexual dimorphism in facial indices of Igbos of Imo state. The study is also in agreement with this present study. In the study by Tanko et al., 2019<sup>[9]</sup>, there was no statistically significant difference in facial indices of the Nupe ethnic group,  $p > 0.05$ , the mean value of Facial index for the male and female Nupe subjects showed  $70.2 \pm 0.61$  and  $69.1 \pm 0.53$  respectively. The mean Nasal index was  $90.87 \pm 0.42$  and  $90.3 \pm 0.584$  respectively, indicating the dominance of hypereuryprosopic face type and platyrrhine nose type. In this present study, the mean facial

index for the males was  $101.72 \pm 59.52$  while females presented with  $93.18 \pm 12.65$ , suggesting Hyperleptoprosopic type of face.

## CONCLUSION

The Ekpeye people have platyrrhine type of nose and Hyperleptoprosopic category of face. Hence the data in this study has provided anthropometric data for the Ekpeye people, which will be beneficial in forensic science and nasofacial reconstructive surgeries.

## RECOMMENDATION

Further comparative studies with other ethnic groups will be useful.

## LIMITATIONS OF THE STUDY

Some subjects were reluctant in giving consent due to their superstitious beliefs.

## STRENGTH OF THE STUDY

This research will be useful in forensic science and nasofacial reconstructive surgeries.

## Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## REFERENCES

1. Golalipour M. J, Haidari, K., Jahanshahi, M., Farahani, R. M. (2003). The shapes of Head and Face in normal male newborns in South – East of Caspian Sea (Iran - Gogan).

*J.Anat. Soc. India* 52(1): 28 – 31.

2. Farkas L.G, Kolar, J.C and Munro, I.R, 1986. Abstract on the geography of the nose, a morphometric study. *Aesthetic Plastic Surg.*, 10(4): 191-223.
3. Holdaway RA (1983). A soft tissue cephalometric analysis and its use in orthodontic treatment planning. Part 1. *American Journal of Orthodontics*. Vol. 84, pp 1-28.
4. Omotoso, D.R, Oludiran, O.O, 'Sakpa, C.L.(2011). NasofacialAnthopometry of Adult Bini Tribe in Nigeria. *Afr. J. Biomed. Res.*14 11; 211-221.
5. Oladipo, G.S., I.U. Gwunireama and O.D Asawo, (2006). Anthropometric comparison of nasal indices between Igbos and Yorubas in Nigeria. *Global J. Med. Sci.*, 5(1):37-40.
6. Williams P, Dyson, M, Dussak J.E, Bannister LH, Berry MM, Collins P, Ferguson MWJ (1995). Skeletal system. *Gray's Anatomy* 38<sup>th</sup> Ed; Churchll Livingstone Edinburgh. pp. 609-612.
7. Oladipo G.S, Oyakhire M.O, Ugboma Henry A.A.(2009) Anthropometric studies of the nasal indices of the Ekpeye and Ikwere Ethnic groups in Nigeria. *Asian Journal of Medical Sciences* Vol 2(4) pp. 167-169.
8. Jimoh R.O, Alabi S.B, Kayode A.S, (2011). Rhinometry: Spectrum of nasal profile among Nigerian Africans. *Brazillian Journal of Otorrhinolaryngology*; Vol.77, issue 5: pp 589-593.
9. Tanko M, Mohammed S, Akpulu S.P, Sadeeq A.A, Timbuak J.A, Mustapha M. and Bauchi Z.M. (2019). Nasofacial Anthropometric Study Among Nupe Ethnic Group, Nigeria. *International Journal of Scientific and Research Publications*, 9(8), pp 883-886.

10. Neave N, Laing S, Fink B, Manning JT, 2003. The Second to Fourth digit ratio, testosterone, and perceived male dominance. *Proc. R. Soc. Lond. B* 270, pp. 2167-2172.
11. Daniel R.K, Landon B, (1997). Endoscopic forehead lift: anatomic basis. *Aesthetic Surg J* 17: 97–104.
12. Oghenemavwe L.E, Orupabo C.D, Popnen A, 2018. Gender characterization of Nasofacial Relationship of Ibos of Imo State using discriminant function analysis. *Journal of Dental and Medical Sciences*. Volume 17, Issue 6 Ver. 3, PP 71-74.
13. Rahimi Jaber, K., Kavakebian, F., Mojaverrostami, S., Najibi, A., Safari, M., Hassanzadeh, G., & Mokhtari, T. (2019). Nasofacial Anthropometric Study Among Students of Shiraz University of Medical Sciences, Iran: A Population Based Study. *Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India*, 71(2), 206–211. <https://doi.org/10.1007/s12070-018-01578-7>