

## **Comparative Study of the Nasal Indices of Children from Yoruba and Igbo Ethnic Groups in Kano, Nigeria; Using 2D images**

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### **Abstract**

Nasal index is a very useful parameter in anthropology in distinguishing ethnic or sexual differences. This study aimed at comparing nasal indices of the two major ethnic groups in Nigeria residing in the same location. The research question is: will there be significant differences in the nasal index of the two ethnic groups living in the same environment? The study sample was four hundred (400) Yoruba and Igbo children between the ages of 5 - 16 year residing in Kano metropolis in Kano state of Nigeria. Nasal height and nasal width were measured in mm, using Facial landmark detection software from BUK, version 1.0.0.0 program for Windows operating system. Nasal index was calculated using nasal height divided by the nasal width. The data obtained were subjected to Independent Sample T-test, cross-tab, and Pearson's Chi-square test.  $P < 0.05$  was considered statistically significant. The mean Nasal indices obtained from this study in Yoruba and Igbo males were  $78.23 \pm 7.94\%$  and  $77.02 \pm 7.54\%$ , while females presented with  $75.45 \pm 8.43\%$  and  $74.99 \pm 6.57\%$  respectively. Comparison of the Nasal index showed sexual dimorphism among the ethnic groups but no statistical difference exists between the ethnic groups. Significant association was observed between sex and nasal type in Yoruba ethnic group, but insignificant in Igbo ethnic group. There was also no significant association in the type of the nose between Yoruba males and Igbo males and between Yoruba females and Igbo females. The study concludes that individuals of different ethnicity may have similar nasal indices and types in as much as they were born and bred in the same environment, which means that environment or sexual difference, plays a key role in the nasal index or type than ethnicity or race.

**Keywords:** *Nasal Index; Nose Type; Igbo; Yoruba; Kano*

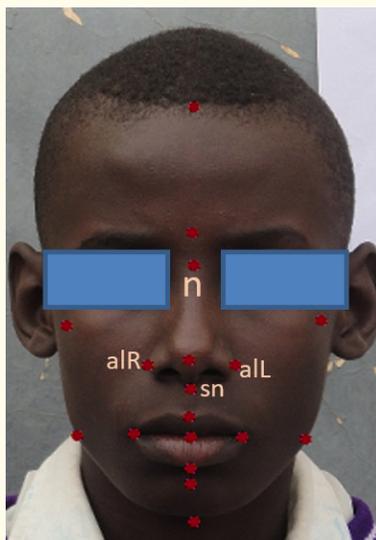
### **Introduction**

Nasal index is very useful in anthropology in distinguishing ethnic [1] and sexual differences [2]. Various categories of nose on the basis of nasal index were described by Martin and Saller, 1957. Their five categories of nasal index were internationally accepted which include; Hyperleptorrhin (very narrow nose with nasal index of  $< \text{or} = 54.9$ ), Leptorrhin (very narrow nose with nasal index of 55 - 69.9), Mesorrhin (medium nose with nasal index of 70 - 84.9), Chamaerrhin (wide nose with nasal index of 85 - 99.9), and Hyperchamaerrhin (very wide nose with nasal index of  $> \text{or} = 100$ ). Location, ethnicity and race are some of the factors shown to determine the shape of the nose of an individual [3] and individuals with narrower noses are mostly found in the cold and dry climates and broader noses in warmer, moister ones as a consequence of natural selection in human evolution [4]. Nasal index is indeed a useful tool in Forensic Science [5] and a number of studies have investigated facial profiles including noses by measuring the angles and separation of the soft tissues using cephalography [6], two-dimensional photogrammetry [7] or direct measurements [8]. The importance of nasal morphometric parameters is recognized in nasal surgical and medical management [9-11]. This study aims at comparing nasal indices of the two major ethnic group in Nigeria

residing in the same location using 2D photographs. The research question is: will there be significant differences in the nasal index of the two ethnic groups living in the same environment and also sexual dimorphism between the two ethnic groups?

**Materials and Methods**

The study population in this study were Yoruba and Igbo children between the ages of 5 - 16 years residing in Kano metropolis in Kano state of Nigeria. The study was carried out at Ruler’s Academy Nursery, Primary and Secondary schools, Golden Crown International schools, Topkids Academy, Baptist Academy and Floral International schools, Kano State. A total of four hundred (400) children comprising of two hundred (200) Igbo (97 males and 103 females) and two hundred (200) Yoruba (106 males and 94 females) were used. Consent was obtained from guardians or participants after the procedure has been explained to them. Ethical approval was obtained from Kano State Ministry of health. The photographic set up consisted of a tripod stand (Manfrototripod, model FB 10) that held a 24 mm wide-angle lens camera (Sony, model DSC-W380 made in India) and a primary flash light. The tripod stand controlled the stability and adjusted the height of the camera according to the subject’s height, with a zooming power of 3.6 [12]. The camera was used always at a distance of 120 cm from the subject and each of the subjects was asked to sit at rest on a chair facing the camera with the head in the anatomical position and the lips in repose [12]. An identification number tag was placed lateral to the head of the subject so as to merge each subject with his questionnaire. The subject’s forehead, neck, and ears were clearly visible during the recording. Photographs were analyzed using Facial landmark detection software designed by our Department of Anatomy, Bayero University Kano (BUK), version 1.0.0.0 program for Windows operating system. The program was customized with the landmarks used in this study. The required landmarks on the face were adjusted manually, after which the software automatically measured all the desired dimensions. Measured dimensions by the software were scaled to life size using a correcting factor. Intra and inter-investigator reliabilities’ correlation coefficient was considered good at 0.7 and above [13]. Children aged between 5 - 16 yrs with facial surgery, facial trauma, parents or grandparents from different ethnic group or place of birth not Kano were excluded. Independent Sample T-test was used in assessing sexual dimorphism and comparative analysis between ethnic groups. The prevalence of nasal type was analyzed using cross-tab Pearson’s Chi-square test. The P-value of less than 0.05 was considered significant. All statistical analyses were done using SPSS for windows (Version 20.0).



**Figure 1:** Landmarks used.  
Nasion = n, Subnasale = sn, Alar [14] = alR, Alar (left) = alL.

**Nasal Index:** Nasal Index was calculated using the formula =  $x \times 100$

**Results**

The means of Nasal indices obtained from this study in Yoruba and Igbo males were  $78.23 \pm 7.94\%$  and  $77.02 \pm 7.54\%$ , while females presented with  $75.45 \pm 8.43\%$  and  $74.99 \pm 6.57\%$  respectively (Table 1). Comparison of the Nasal indices showed sexual dimorphism among the ethnic groups at  $P < 0.05$  (Table 1), but no statistically significant difference exist between the ethnic groups (Table 2). Significant association was observed between sex and nasal type in Yoruba ethnic group; however, insignificant association was observed in Igbo ethnic group (Table 2). Regarding the nose types, the current study found significant sexual dimorphism between Yoruba males and females but not between Igbo males and females (Table 3). Similarly, no significant association found between Yoruba females and Igbo females or between Yoruba males and Igbo males in relation to the nasal type (shape) also (Table 4).

Ethnicity	Sex	N	Mean	Std	t	p-value
Yoruba	M	106	78.23	7.94	2.38	0.0180
	F	94	75.49	8.43		
Igbo	M	97	77.02	7.54	2.03	0.0440
	F	103	74.99	6.57		

**Table 1:** Independent Sample T-test for sexual dimorphism in Nasal indices among Yoruba and Igbo ethnic groups.

Sex	Ethnicity	N	Mean	Std	t	p-value
Males	Y	106	78.23	7.94	1.12	0.2640
	I	97	77.02	7.54		
Females	Y	94	75.49	8.43	0.47	0.6400
	I	103	74.99	6.57		

**Table 2:** Independent Sample T-test for ethnic differences in Nasal indices between Yoruba and Igbo Ethnic groups.

Ethnicity	Nasal Index	Males	Females	Total	$\chi^2$	p-value
		Frequency (%)	Frequency (%)	Frequency (%)		
Yoruba	Hyperleptorrhin	0 (0)	1 (1.06)	1 (0.50)	9.823	0.044
	Leptorrhin	12 (11.11)	25 (26.60)	37 (18.30)		
	Mesorrhin	79 (73.15)	58 (61.71)	137 (67.80)		
	Chamarrhin	16 (14.81)	9 (9.57)	25 (12.40)		
	Hyperchamarrhin	1 (0.93)	1 (1.06)	2 (1.00)		
		Total = 106 (100)	Total = 94 (100)	Total = 200 (100)		
Igbo	Hyperleptorrhin	0 (0)	0 (0)	0 (0)	1.518	0.468
	Leptorrhin	18 (18.60)	20 (19.40)	38 (19.00)		
	Mesorrhin	64 (66.00)	73 (70.90)	137 (68.50)		
	Chamarrhin	15 (15.50)	10 (9.70)	25 (12.50)		
	Hyperchamarrhin	0 (0)	0 (0)	0 (0)		
		Total = 97 (100)	Total = 103 (100)	Total = 200 (100)		

**Table 3:** Sexual dimorphism in nasal type among Yoruba and Igbo ethnic groups.

		Yoruba	Igbo	Total		
	Nasal Index	Frequency (%)	Frequency (%)	Frequency (%)	X <sup>2</sup>	p-value
Sex	Hyperleptorrhin	0 (0.00)	0 (0.00)	0 (0.00)	3.225	0.358
	Leptorrhin	12 (11.10)	18 (18.50)	30 (14.6)		
Males	Mesorrhin	79 (73.10)	64 (66.00)	143 (69.80)		
	Chamarrhin	16 (14.80)	15 (15.50)	31 (15.10)		
	Hyperchamarrhin	1 (0.90)	0 (0.00)	1 (0.50)		
		Total = 106 (100)	Total = 97 (100)	Total = 203 (100)		
Females	Hyperleptorrhin	1 (1.10)	0 (0.00)	1 (0.50)	3.923	0.417
	Leptorrhin	25 (26.60)	20 (19.40)	45 (22.80)		
	Mesorrhin	58 (61.70)	73 (70.90)	131 (66.50)		
	Chamarrhin	9 (9.60)	10 (9.7)	19 (9.60)		
	Hyperchamarrhin	1 (1.10)	0 (0.00)	1 (0.50)		
		Total = 94 (100)	Total = 103 (100)	Total = 197 (100)		

**Table 4:** Comparison in Nasal type among Yoruba and Igbo ethnic groups.

## Discussion

A number of studies have indicated racial and ethnic differences in nasal index amongst different populations most of which focused on adult. Most Western Europeans are leptorrhin, which means long and narrow nose; the Bantus and Bushmen of Africa as well as indigenous Australians are platyrrhin (broad nose) [10]. The sexual dimorphism observed in this study is in line with other studies on Itsekiris and Urhobos [15], Bekwara [16], Igbos, yorubas and Ijaws [17]. The result showed that there was no significant difference between Yoruba and Igbo ethnic groups in nasal index but this is not in line with the findings of Oladipo., *et al.* [17], who observed significant difference between major ethnic groups (igbos, Yorubas, and Hausas) living in southern Nigeria. The observed difference between the results of Oladipo., *et al.* [17] and this study, may be attributed to the age difference between their study and the present study, or because of variation in the environment right from birth. Anas and Saleh [18] reported adult mean nasal index of male Hausa ethnic group to be  $70.7 \pm 11.3\%$  and that of their female counterpart to be  $67.2 \pm 8.3\%$ , which is lower when compared to the present study and also observed differences in mean nasal index of male and female Yoruba to be  $100 \pm 8.9\%$  and  $94.1 \pm 8\%$  respectively, which were higher than the values found in the present study groups. However, Anas and Saleh's study was on adult and the current study was on children. This variation on nasal index of Hausa and Yoruba male and female in Anas and Saleh's study and the current study, indicates age as possible factor causing the variation. Study carried out by Franciscus and Long [19] in Onges, reported that the mean nasal index for males fell between the ranges of 77.3 - 97.7, while those of females fell between the ranges of 70.5 - 97.4 [20]. The result also showed that nasal type does not have significant association with ethnic group. However, there was significant association between sex and nasal type in Yoruba ethnic group but not among the Hausa and the Igbo ethnic groups. Moreover, this study showed no significant association in nose type between Yoruba males and Igbo males or between Yoruba females and Igbo females. Mesorrhin nose type was found to be dominant in males and females of the ethnic groups followed by Leptorrhin in female Yoruba, female Igbo and male Igbo. Chamarrhin was found to be the third dominant nose type in female Yoruba, female Igbo and male Igbo but was the second most dominant in Yoruba males. Hyperchamarrhin was observed in Yoruba males and females but absent in Igbo ethnic group. Hyperleptorrhin was found only in Yoruba females. Mesorrhin nasal type observed in this study is in line with the study of Fawehinmi HB and Ligha AE [21], who observed mesorrhin in healthy females in port-Harcourt Nigeria, and this may be attributed to the fact they considered adolescence. However, the finding in this study is not in line with the findings in Igbos, Ijaws and Yoruba [17], the Okrikas [15] and Bini ethnic group [22], which all reported chamarrhin (wide nose). The findings of those authors may most likely be because they considered adults in their studies [23].

## Conclusion

This study concludes that there is sexual dimorphism in the nose type with no significant differences between ethnic groups of the study age group which may be attributed to same environment the study population shares. The relevance of this study in forensic medicine, physical anthropology and rhino plastic surgery cannot be overemphasized.

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## Conflict of Interest

The authors declare that there is no conflict of interest with regards to this study.

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