

## Photometric Facial Analysis of the Soft Tissue Profile of Isoko Adults

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### Original Research Article

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**Abstract:** Photometric facial analysis deals with the evaluation of angular and linear relationships of the skeletal and soft tissues of the face. This study was aimed at ascertaining the facial norms that define the linear parameters with respect to photometric analysis of the Isoko adults. This study carried out on a total number of 180 subjects (90 males and 90 females) all of which were of Isoko extraction using standard photographic records. The subjects stood in the natural head position while a digital camera was used to capture the linear parameters. Data analysis was done using IMG PRO Facial Analyser software and Z-test. The results of this study revealed that facial width for females was  $(15.08 \pm 0.56\text{cm})$  and for males  $(15.49 \pm 0.16\text{cm})$ , mouth width for females  $(7.60 \pm 0.09\text{cm})$  and for males  $(8.34 \pm 0.10\text{cm})$ , nose width for females  $(6.05 \pm 0.07\text{cm})$  for males  $(6.63 \pm 0.84\text{cm})$ , upper nasal height for females  $(4.02 \pm 0.05\text{cm})$  and for males  $(4.43 \pm 0.03\text{cm})$ , lower nasal height for females  $(1.37 \pm 0.03\text{cm})$  and for males  $(1.47 \pm 0.03\text{cm})$ , nasal tip projection for females  $(1.55 \pm 0.02\text{cm})$  and for males  $(1.68 \pm 0.03\text{cm})$ . There were significant differences observed in all other measured parameters except for the facial width. These values would be very useful in forensic anthropology and for facial reconstruction among the Isoko people.

**Keywords:** Photometry; Facial Analysis; Isoko people; Nigeria.

## INTRODUCTION

Isoko people are an ethno-linguistic group that inhabits the Isoko region of Delta State, Nigeria [1]. They are people of southern Nigeria, near the north western Niger delta. Their occupation is mainly farming and trading. Facial traits are major features in physical appearance, which is related to social acceptance, psychological wellbeing and self-esteem of an individual [2]. Facial beauty analysis can be characterized as a combination of symmetry, proportions and harmonious relationship among the structures [2]. The identification of aesthetic facial qualities began with ancient civilizations such as Egyptians and Greeks, who captured their ideals of beauty in art form [2]. Parameters used in facial aesthetics are currently based on Powell and Humpreys [3]. They formulated Suitable relationships between the face, the nose and defined facial angles have been formulated [2]. Studies have found ethnic differences on nasal indices among major ethnic groups in southern Nigeria [4]. A study on the soft tissue profile of adult Urhobos in Nigeria using nasal parameters also revealed significant differences between the males and females in all measurements. Photometric facial analyses of the aesthetic angles are being done to

determine the facial angles in humans as such techniques reduce or eliminates the radiation patients are exposed [5]. Whereas the shape of and features of the face provide our identity, much of our effort on others and their perceptions about us result from the way we use facial muscles to make the slight alterations in these features that constitute facial expression [6]. Soft tissue profile of other races have been reported in the Persian population in which sexual dimorphism was observed in the parameters measured [7] facial features, nasal height, oro-facial height and maxillary height of adult Ijaws [8], facial and aesthetic angles of Igbo and Yoruba ethnic groups of Nigeria, [9] young adult European Caucasians [10], Himachali males [11]. Adult Bini's [12] Adult Okrikans in Nigeria [13]. In a study to determine the facial, nasal, maxillary, mandibular and oro-facial height in adult Nigerians with normal facial morphology, the values obtained for males were found to be significantly higher than that for females where the facial height in males was  $12.28 \pm 3.39\text{cm}$ , nasal height  $4.50 \pm 1.23\text{cm}$ , maxillary height  $2.44 \pm 0.66\text{cm}$ , mandibular height  $4.49 \pm 1.23\text{cm}$  and oro-facial height  $6.90 \pm 1.89\text{cm}$  while for the females it was  $11.77 \pm 3.53\text{cm}$  for facial height,  $4.48 \pm 1.37\text{cm}$  for nasal height,  $2.30 \pm 0.69\text{cm}$  for

maxillary height,  $4.20 \pm 1.26$ cm for mandibular height and  $6.32 \pm 1.91$ cm for oro-facial height respectively [14].

This study is aimed at ascertaining the facial norms that define the linear parameters with respect to photometric analysis of the Isoko adults and also to establish a data base for this population.

## MATERIALS AND METHODS

A total of number of 180 subjects which consist of 90 males and 90 females of age range of 18-45 years were used for this study. The subjects were strictly natives of Isoko kingdom. Subjects were selected on the basis of the fact that their parents and grandparents up to the second generation were both of Isoko extraction who do not have any form of trauma or undergone craniofacial surgery. Informed consent was obtained from the subjects after which standard photographs of the lateral and frontal view of the face were taken in the natural head position (NHP). The photographic set up consist of a tripod stand supporting a sony digital camera (14.1 mega pixel) which was adjusted in such a way that the camera is 100cm away from the subject. A mirror was placed 120cm in front of the subject who was asked to look into the mirror with their lips relaxed. The frontal and lateral view photographs were taken by asking the subjects to stand in front of the graphic background facing the meter rule with a mirror held in front of the subjects. The purpose of the mirror was to ensure that the subjects

head were in the natural head position (NHP). The photographs of each subjects were taken twice and the best of each were used. The female subjects were asked to remove their earrings. All photographic records were scaled to life size and six linear parameters were obtained:

**Nasal Tip Projection (Sn-Prn):** This is the measured horizontal distance between the mid-facial vertical line and pro-nasale.

**Upper Nasal Height (N-Mn):** This is the measured distance between the nasion and mid-nasal.

**Lower Nasal Height (Mn-Sn):** This is the measured distance between the mid-nasal and sub-nasale. **Nasal Width (AI-AI):** This is the measured distance between the left and right alar.

**Mouth Width:** that mouth width is equal to the distance between the most lateral junctions of the canines and the first premolars.

**Facial Width:** This is the distance between the two most lateral points of the zygomatic arches [5].

## Data Analysis

An IMG PRO image analyser software was used to analyse the pictures while data obtained was analysed using Z-test.

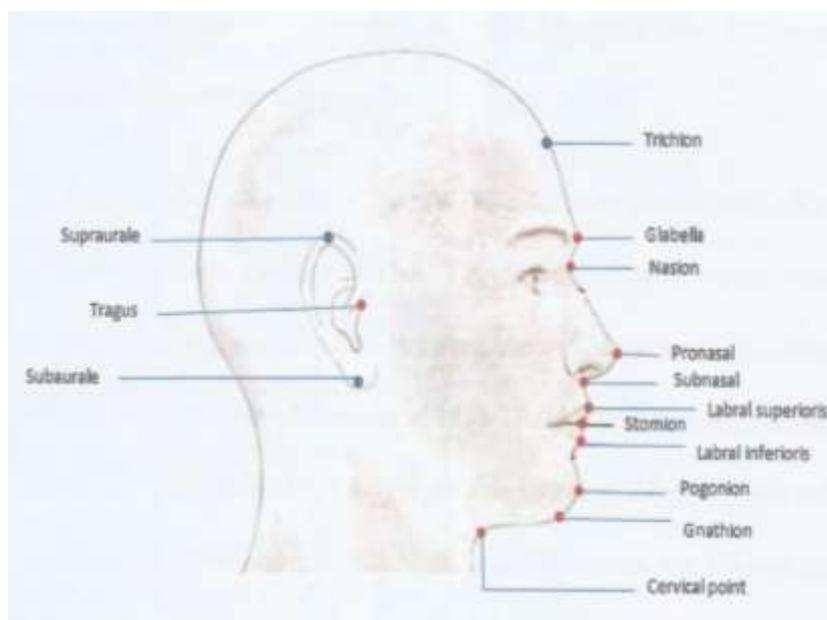


Fig-1: Showing the anatomical landmarks. Adopted from Prendergast [18].

## RESULTS

The results of this study are presented in Table-1. Table shows the descriptive statistics and comparison of mean values for the measured parameters in both males and females. There was a

significant difference in the mouth width, nose width, upper nasal height, lower nasal height and nasal tip projection except for the facial width which showed no significant difference.

Table-1: Descriptive statistics and comparison of mean values for measured parameters in males and females (cm)

Parameters	Sex	N	Mean±SEM	SD	Zcal
Face Width	F	90	15.08±1.56	1.49	1.83
	M	90	15.49±0.16	1.56	
Mouth Width	F	90	7.60±0.87	0.87	5.55
	M	90	8.34±0.10	0.94	
Nose Width	F	90	6.05±0.07	0.69	5.28
	M	90	6.63±0.84	0.80	
Upper Nasal Height	F	90	4.02±0.05	0.48	5.50
	M	90	4.43±0.03	0.51	
Lower Nasal Height	F	90	1.37±0.03	0.25	2.86
	M	90	1.47±0.03	0.28	
Nasal Tip Projection	F	90	1.55±0.02	0.20	2.71
	M	90	1.68±0.03	0.33	

P &lt; 0.05

## DISCUSSION

This study was carried out to provide a data base and facial norms that define the linear parameters of the Isoko people. Photography has been an excellent and convenient anthropometry tool for facial analysis and to compare pre and post-operative outcome in facial plastic surgery [15]. In comparing the results of the male and female parameters measured, it was observed that all values were higher in males, which correlate with the study of Bergman who reported that the facial heights for males are higher than those of females [16].

In this study, some measured parameters showed significant gender difference which was higher in males while the facial width showed no significant difference and this is in correlation with the research carried out by Vahid *et al.*, [7] which recorded higher values of mouth width 61.52cm in males as against the females which was 57.1cm. It was also observed that the nasal tip projection in males was higher in values 1.55±0.02cm when compared to the research carried out by Osunwoke and Omin [13] with nasal tip projection of 12.2±0.26mm.

The findings from this study corroborates with the result of the study on facial dimensions of Urhobo's by Oghenemavwe *et al.*, [17] in which all variables studied have the same mean male values higher than those of the female (p < 0.05). The lower nasal height results obtained from this study is closely related to the values of that of Osunwoke *et al.*, [12] with lower nasal height values of 10.8±0.52 and 10.03±0.19 for males and females respectively, however the values for upper nasal are slightly different with values of 31.9±0.56 for males and 2.80±3.01 for females.

The result of the study clearly showed that there is marked sexual dimorphism in the parameters measured which could be used as a tool for forensic identification and sexing of individuals where it was not stated abinitio. It is suggestive that the sexual

dimorphism seen was a result of hormonal difference between the male and female at the developmental stage in-utero. Again, with the data gotten from this study one can assume that the Isoko people have a database for racial identification when compared with other tribes in Nigeria and Africa at large [18].

## CONCLUSION

This study has determined the linear facial parameters of the Isoko adults. It has also shown that measured linear facial parameters using photometric facial analysis may be taken as a means of ethnic and racial identification and can be used for aesthetic treatment goals. This may also serve as tool for gender differentiation

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## CONFLICT OF INTEREST

We write to state that there is no conflict of interest.

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