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Sex and Tribal differences in Facial measurements of Nigerians of Yoruba, Hausa and Igbo origin

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Abstract

The face is the best morphological feature which distinguishes an individual. We tested the hypotheses that there are no significant gender and population differences in vertical facial morphological measurements and facial height proportions amongst Nigerians of the three major tribes of Hausa, Igbo and Yoruba. 150 males and 150 females from each tribe who were Hausas, Igbos or Yorubas by both parent and grandparents were used in the study. Total or Physiognomical Face Height (trichion - gnathion), Forehead Height (trichion - nasion), Morphological Face Height (nasion - gnathion), Nose Height or Nose Length (nasion - subnasale) and Lower Face Height (subnasale - gnathion) were measured in millimetres and statistically analyzed using the statistical SPSS 15 Software programme. Pairwise statistical significance of differences between two mean values by sex and tribe was determined using the student's t-test at $p \leq 0.05$. Comparative statistical analyses showed statistically significant differences in more than 50% of computed mean values (p < 0.05) of cephalometric parameters between the studied tribes. However, comparisons of Nose Height and Lower Face Height to Morphological Face Height to Morphological Face Height percentage proportions showed non-significant differences between the studied tribes. Our findings are not consistent with evaluated hypotheses, hence we concluded that Hausas, Igbos and Yorubas are not of same vertical facial morphological measurements.

Keywords: Tribal difference, Facial measurements, Nigerians.

Introduction

The face is the best feature which distinguishes an individual. The face represents the anterior part of the head in humans and extends from the forehead to the chin¹. It includes the eyes, noses, mouth and cheeks. It is a highly sensitive region of the human body with varied expressions depending on stimuli received by the brain from coordinating centres of emotions and from any of the senses of touch, taste, smell, temperature, hearing and vision. The facial tissues, muscles, nerves, arteries and veins are of great importance to human existence and survival. Clinical concerns results when facial structures are damaged, lesioned or lacerated¹. Facial biometrics and shape are therefore, vital for human recognition and communication, forensic analyses, and for the determination of beauty or facial symmetry.

Facial cephalometry involves quantitative evaluation of standardized measurements of the dimensions of component parts of the face with relation to specific reference points to assess biological variability within and among different human populations²⁻³. The application of facial cephalometry in comparative anatomical analyses of biological variability within and among different ethnic groups or populations informs biological anthropology and helps in treatment and research when applied in clinical sciences such as dentistry, oral and

maxillofacial surgery. Hence, normative facial data are important tools for the precise determination of the degree of deviations from the normal, facial surgical reconstructions, facial aesthetics, design of safety eyes equipment and correctional tools, evolutionary analyses, civil and criminal identification purposes²⁻³.

Nigeria according to the official records of her National Population Commission (NPC) has a population of over one hundred and forty million in 2006⁴ and a projected population of the country was one hundred and seventy eight million and five hundred thousand in 2014⁵. Nigeria is the world's most populous black nation and studies carried out using Nigerian subjects will be of great relevance to academic, security and healthcare personnel across the world. In addition, facial cephalometry is of great relevance to identification of gender and population differences. We are not aware of any previous study which examined gender and population differences in vertical facial morphological measurements and facial height proportions amongst the three Nigerian major tribes of Hausa, Igbo and Yoruba. Hence, in order to examine biological variability with regards to gender and population differences in Nigerians, we tested the hypotheses that Nigerian males and females of the three major tribes of Yoruba, Hausa and Igbo are of similar vertical facial morphological measurements and facial height proportions.

Materials and Methods

The purposive technique or judgement sampling method of research⁶ was used in this study. A reliability study was first conducted by the administration of the Vernier caliper (Tresna Limited, Tokyo, Japan) to a representative sample of 20 subjects selected from Sango Area in Ilorin, who did not form part of the final subjects. Cephalometric data collected on four different occasions were analyzed item by item (and correlated by means of Pearson product moment correlation) in-order to eliminate ambiguity. The Vernier caliper was, thereafter, certified as the instrument for the study having obtained satisfactory results.

In the main study, 300 subjects aged 18 - 30 years (150 males and 150 females) were randomly selected from each of the tribes of Hausa, Igbo and Yoruba. All subjects were of any of the three major tribes of Nigeria (Hausa, Igbo, and Yoruba) by both parent and grandparents. Furthermore, all subjects were students of tertiary institutions of Nigeria viz: the University of Ilorin, Ilorin, Kwara State; Kwara State Polytechnic, Ilorin, Kwara State; Kwara State College of Education, Ilorin, Kwara State and Lagos State University, Lagos State. Ethical approval was obtained from the Faculty of Basic Sciences of the University of Ilorin and the study was conducted ethically in accordance with the established procedures of 1964 Declaration of Helsinki. Informed written consent of each individual used in the study was sought and received before cephalometric data were obtained from each subject.

Heads of subjects were brought into the Frankfurt horizontal plane that passes through the two orbital points and poria¹⁻². Subjects stood upright while looking into the far distance and their heads were ensured to be in a relaxed comfortable condition and in anatomical position while measurements on the head were taken. The Total or Physiognomical Face Height (trichion - gnathion), Forehead Height (trichion - nasion), Morphological Face Height (nasion - gnathion), Nose Height or Nose Length (nasion - subnasale) and Lower Face Height (subnasale - gnathion) were determined and measured in millimetres on the face. (Figure-1).

Furthermore, percentage proportions of Nose Height (NH) and Lower Face Height (LFH) to Morphological Face Height (MFH) were determined from computed cephalometric parameters and compared between sexes of each of Hausa, Igbo and Yoruba tribes.

MFH = NH + LFH. Therefore, the percentage of NH to the MFH was determined as: NH/MFH X 100 The percentage of LFH to MFH was determined as: LFH/MFH X 100

Definitions of Terminologies: Trichion (tr): It is the point on the hairline in the midline of the forehead^{2,7,8}. (Figure-1).

Nasion (n): It is the point in the midline of both the nasal root and the naso-frontal suture. The slight ridge on which it is situated can be felt by the observer's fingernail. This point is above the line that connects the two inner canthi^{2,3,7,8}. (Figure 1).

Subnasale (sn): The point on the living body where the nasal septum between the nostrils merges with the upper cutaneous lip in the mid-sagittal plane^{2,3,7,8}. (Figure 1).

Gnathion (gn): The lowest median landmark on the lower border of the mandible. It is the lowest point used in measuring facial height^{2,3,7,8}. (Figure-1).

Statistical Analyses: Data collected from all subjects were computed and analyzed using the SPSS 15 statistical software programme. Pairwise comparisons of two mean values between Hausa males and females, Igbo males and females, Yoruba males and females, Hausa males and Igbo males, Hausa males and Yoruba males, Yoruba males and Igbo females, Hausa females and Yoruba females, Yoruba females and Igbo females and Yoruba females, Yoruba females and Igbo females were determined using the students' t-test and the alpha value (x) for the test of significance was set at $p \leq 0.05$.

Results and Discussion

Comparisons of the mean values of cephalometric parameters between males and females of each of Yoruba, Hausa and Igbo tribes: Comparative statistical analyses of the mean values of measured parameters in Hausas showed significant (p<0.05) higher mean values of the Forehead Height (58.7 in males and 52.6 in females), Physiognomical Face Height (174.9 in males and 166.0 in females), Nose Height (66.8 in males and 59.4 in females) and Morphological Face Height (126.4 in males and 117.9 in females) in males compared to females. (Tables 1 and 2). However, there was non-significant higher mean value (p>0.05) of Lower Face Height (59.6 in males and 58.5 in females) in Hausa males compared to females. (Tables-1 and 2).

Statistical comparisons of mean values of parameters in Igbos showed significant (p<0.05) higher mean values of the Physiognomical Face Height (179.1 in males and 168.4 in females), Morphological Face Height (121.1 in males and 110.3 in females), Nose Height (55.8 in males and 54.1 in females) and Lower Face Height (65.3 in males and 56.2 in females) in males compared to females. (Tables-1 and 2). However, there was non-significant higher mean value (p>0.05) of Forehead Height (58.2 in males and 57.1 in females) in Igbo males compared to females. (Tables-1 and 2).

In Yorubas, statistical comparisons of mean values of parameters showed significant (p<0.05) higher mean values of the Forehead Height (65.2 in males and 62.7 in females), Physiognomical Face Height (183.5 in males and 179.9 in

females) and Lower Face Height (63.9 in males and 60.6 in females) in males compared to females. (Tables 1 and 2). However, there were statistically significant (p<0.05) lower

mean values of the Morphological Face Height (113.9 in males and 117.0 in females) and Nose Height (50 and 56.4) in Yoruba males compared to their female counterparts. (Tables 1 and 2).



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asurements of the lateral aspects of
Trichion to Gnathion $(tr - gn)$
Trichion to Nasion. $(tr - n)$
Nasion to Gnathion (n - gn)
Nasion to Subnasale $(n - sn)$
Subnasale to Gnathion $(sn - gn)^{2,7,8}$

Table-1
Mean ± SD in millimetres of parameters of facial morphology in males by tribe

	Forehead Height (tr - n)	Physiognomical Face Height (tr - gn)	Morphological Face Height (n - gn)	Nose Height (n – sn)	Lower Face Height (sn - gn)
Hausa Males	58.7 ± 7.4	174.9 ± 15.6	126.4 ± 8.8	66.8	59.6 ± 6.7
Igbo Males	58.2 ± 6.9	179.1 ± 9.5	121.1 ± 5.6	55.8	65.3 ± 5.6
Yoruba Males	65.2 ± 6.2	183.5 ± 9.3	113.9 ± 12.8	50	63.9 ± 6.8

 $p \le 0.05$ = student's t-test, S.D. = Standard Deviations of 150 determinations, tr = trichion, n = nasion, sn = subnasale and gn = gnathion.

	Forehead Height (tr - n)	Physiognomical Face Height (tr - gn)	Morphological Face Height (n - gn)	Nose Height (n - sn)	Lower Face Height (sn - gn)
Hausa Females	52.6 ± 8.6	166.0 ± 17.9	117.9 ± 11.3	59.4	58.5 ± 7.0
Igbo Females	57.1 ± 10.8	168.4 ± 16.0	110.3 ± 8.4	54.1	56.2 ± 5.6
Yoruba Females	62.7 ± 6.6	179.9 ± 10.3	117.0 ± 8.3	56.4	60.6 ± 5.2

Table-2
Mean ± SD in millimetres of parameters of facial morphology in females by tribe

 $p \le 0.05$ = student's t-test, S.D. = Standard Deviations of 150 determinations, tr = trichion, n = nasion, sn = subnasale and gn = gnathion.

Comparisons of the mean values of cephalometric parameters amongst Hausa, Igbo and Yoruba males: Hausa males had statistically significant higher mean values (p<0.05) of the Morphological Face Height (126.4 in Hausas and 121.1 in Igbos) and Nose Height (66.8 in Hausas and 55.8 in Igbos), but statistically significant lower mean values (p<0.05) of the Physiognomical Face Height (174.9 in Hausas and 179.1 in Igbos) and Lower Face Height (59.6 in Hausas and 65.3 in Igbos) compared to Igbo males. (Table 1). There was statistically non-significant higher mean value (p>0.05) of the Forehead Height (58.7 in Hausas and 58.2 in Igbos) in Hausa males compared to Igbo males. (Table 1).

Hausa males had statistically significant higher mean values (p<0.05) of the Morphological Face Height (126.4 in Hausas and 113.9 in Yorubas) and Nose Height (66.8 in Hausas and 50 in Yorubas) compared to Yoruba males. (Table 1). However, there were statistically significant lower mean values (p<0.05) of the Forehead Height (58.7 in Hausas and 65.2 in Yorubas), Physiognomical Face Height (174.9 in Hausas and 183.5 in Yorubas) and Lower Face Height (59.6 in Hausas and 63.9 in Yorubas) in Hausa males compared to Yoruba males. (Table-1).

Furthermore, Yoruba males had statistically significant higher mean values (p<0.05) of the Forehead Height (65.2 in Yorubas and 58.2 in Igbos) and Physiognomical Face Height (183.5 in Yorubas and 179.1 in Igbos) compared to Igbo males. (Table 1). However, there were statistically significant lower mean values (p<0.05) of the Morphological Face Height (113.9 in Yorubas and 121.1 in Igbos), Nose Height (50 in Yorubas and 55.8 in Igbos) and Lower Face Height (63.9 in Yorubas and 65.3 in Igbos) in Yoruba males compared to Igbo males. (Table-1).

Comparisons of the mean values of cephalometric parameters amongst Hausa, Igbo and Yoruba females: Hausa females had statistically significant higher mean values (p<0.05) of the Morphological Face Height (117.9 in Hausas and 110.3 in Igbos), Nose Height (59.4 in Hausas and 54.1 in Igbos) and Lower Face Height (58.5 in Hausas and 56.2 in Igbos) compared to Igbo females. (Table-2). However, there were statistically significant lower mean values (p<0.05) of the Forehead Height (52.6 in Hausas and 57.1 in Igbos) and Physiognomical Face Height (166.0 in Hausas and 168.4 in

Igbos) in Hausa females compared to Igbo females. (Table-2).

Hausa females had statistically significant higher mean value (p<0.05) of the Nose Height (59.4 in Hausas and 56.4 in Yorubas), but statistically significant lower mean values (p<0.05) of the Physiognomical Face Height (166.0 in Hausas and 179.9 in Yorubas), Forehead Height (52.6 in Hausas and 62.7 in Yorubas) and Lower Face Height (58.5 in Hausas and 60.6 in Yorubas) compared to Yoruba females. (Table-2). There was statistically non-significant higher mean value (p>0.05) of the Morphological Face Height (117.9 in Hausas and 117.0 in Yorubas) in Hausa females compared to Yoruba females. (Table-2).

In addition, Yoruba females had statistically significant higher mean values (p<0.05) of Physiognomical Face Height (179.9 in Yorubas and 168.4 in Igbos), Forehead Height (62.7 in Yorubas and 57.1 in Igbos), Nose Height (56.4 in Yorubas and 54.1 in Igbos), Morphological Face Height (117.0 in Yorubas and 110.3 in Igbos) and Lower Face Height (60.6 in Yorubas and 56.2 in Igbos) compared to Igbo females. (Table-2).

Percentage Proportions of Nose Height (NH) and Lower Face Height (LFH) to Morphological Facial Height (MFH) in Hausas, Igbos and Yorubas by sex: Comparative statistical analyses showed higher percentage proportion of NH to MFH in Hausa males (52.8%) than in females (50.4%) and lower percentage proportion of LFH to MFH in Hausa males (47.2%) than in females (49.6%). (Tables 3 and 4). Comparative statistical analyses showed lower percentage proportion of NH to MFH in Igbo males (46.1%) than in females (49%) and higher percentage proportion of LFH to MFH in Igbo males (53.9%) than in females (51%). (Tables 3 and 4). Comparative statistical analyses showed lower percentage proportion of NH to MFH in Igbo males (51.9%) than in females (51%). (Tables 3 and 4). Comparative statistical analyses showed lower percentage proportion of NH to MFH in Yoruba males (43.9%) than in females (48.2%) and higher percentage proportion of LFH to MFH in Yoruba males (56.1%) than in females (51.8%). (Tables-3 and 4).

Comparisons of Percentage Proportions of Nose Height (NH) and Lower Face Height (LFH) to Morphological Facial Height (MFH) amongst Hausa, Igbo and Yoruba males: Comparative statistical analyses showed higher percentage proportion of NH to MFH in Hausa males (52.8%) than in Igbo males (46.1%) and lower percentage proportion of LFH to MFH in Hausa males (47.2%) than in Igbo males (53.9%). (Table-3). Comparative statistical analyses showed higher percentage proportion of NH to MFH in Hausa males (52.8%) than in Yoruba males (43.9%) and lower percentage proportion of LFH to MFH in Hausa males (47.2%) than in Yoruba males (56.1%). (Table-3). Statistical analyses showed lower percentage proportion of NH to MFH in Yoruba males (43.9%) than in Igbo males (46.1%) and higher percentage proportion of LFH to MFH in Yoruba males (56.1) than in Igbo males (46.1%) and higher percentage proportion of LFH to MFH in Yoruba males (56.1) than in Igbo males (53.9%). (Table-3).

Comparisons of Percentage Proportions of Nose Height and Lower Face Height to Morphological Facial Height (MFH) amongst Hausa, Igbo and Yoruba females: Comparative statistical analyses showed higher percentage proportion of NH to MFH in Hausa females (50.4%) than in Igbo females (49%) and lower percentage proportion of LFH to MFH in Hausa females (49.6%) than in Igbo females (51%). (Table-4). Statistical analyses showed higher percentage proportion of NH to MFH in Hausa females (50.4%) than in Yoruba females (48.2%) and lower percentage proportion of LFH to MFH in Hausa females (49.6%) than in Yoruba females (51.8%). (Table-4). Comparative statistical analyses showed lower percentage proportion of NH to MFH in Yoruba females (48.2%) than in Igbo females (49%) and higher percentage proportion of LFH to MFH in Yoruba females (51.8%) than in Igbo females (51%). (Table-4).

 Table-3

 Percentage Proportions of Nose Height and Lower Face

 Height to Morphological Face Height in males by tribe

	Nose Height Proportion (NH/MFH X 100)	Lower Face Height Proportion (LFH/MFH X 100)
Hausa Males	52.8%	47.2%
Igbo Males	46.1%	53.9%
Yoruba Males	43.9%	56.1%

 $p \le 0.05$ = student's t-test and MFH = Morphological Face Height Table-4

Percentage Proportions of Nose Height and Lower Face Height to Morphological Face Height in females by tribe				
	Nose Height (NH) Proportion (NH/MFH X 100)	Lower Face Height (LFH) Proportion (LFH/MFH X 100)		
Hausa Females	50.4%	49.6%		
Igbo Females	49%	51%		
Yoruba Females	48.2%	51.8%		

 $p \le 0.05$ = student's t-test and MFH = Morphological Face Height

Discussion: We investigated variations in cephalometric parameters (vertical linear measurements) of the face amongst the three major tribes in Nigeria viz: Yoruba, Hausa and Igbo. Comparative analyses showed sexual dimorphism with statistically significant higher mean values (p<0.05) in 80% (Hausa) and 60% (Igbo and Yoruba) of measured cephalometric parameters in males compared to females in the tribes studied. Results showed statistically non-significant higher mean values (p<0.05) of 20% (Hausa) and 40% (Igbo) of cephalometric parameters in males compared to females except in Yorubas with males having statistically significant (p<0.05) lower mean values in 40% of cephalometric parameters. (Tables-1 and-2).

These findings are in conformity with established anatomical principle that females have smaller crania with shorter facial features than males¹. This implied that males differ from females in facial measurements. Our observations are in agreement with the findings of earlier studies, which reported sexual dimorphism in comparisons of the mean morphological facial length, total facial length, nasal length, nasal breadth and facial width in male and female Binis of South-South region⁹, as well as total facial height and nasal height in male and female Igbos of South-East region of Nigeria¹⁰.

Results showed that Hausa males had statistically significant higher mean values (p<0.05) in 40% of parameters (Morphological Face Height and Nose Height), statistically significant lower mean values (p<0.05) in 40% of parameters (Physiognomical Face Height and Lower Face Height), but statistically non-significant higher mean values (p>0.05) in 20% of parameters (Forehead Height) compared to Igbo males. (Table 1). Similarly, Hausa females had statistically significant higher mean values (p<0.05) in 60% of parameters (Morphological Face Height, Nose Height and Lower Face Height), but statistically significant lower mean values (p<0.05) in 40% of parameters (Forehead Height and Physiognomical Face Height) compared to Igbo females. (Table 2). Our observations implied that Hausas and Igbos are not of same vertical facial morphological measurements.

Hausa males had statistically significant higher mean values (p<0.05) in 40% of parameters (Morphological Face Height and Nose Height), but statistically significant lower mean values (p<0.05) in 60% of parameters (Forehead Height, Physiognomical Face Height and Lower Face Height) compared to Yoruba males. (Table 1). Hausa females had statistically significant higher mean value (p<0.05) in 20% of parameters (Nose Height), statistically significant lower mean value (p<0.05) in 60% of parameters (Physiognomical Face Height, Forehead Height and Lower Face Height), but statistically nonsignificant higher mean value (p>0.05) in 20% of parameters (Morphological Face Height) compared to Yoruba females. (Table 2). Our observations implied that Hausas and Yorubas are not of same vertical facial morphological measurements. This observation is in agreement with the findings of a previous study which observed statistically non-significant higher mean value of Morphological Face Height in Hausas when compared to Yorubas¹¹.

Yoruba males had statistically significant higher mean values (p<0.05) in 40% of parameters (Forehead Height and Physiognomical Face Height), but statistically significant lower mean values (p<0.05) in 60% of parameters (Morphological Face Height, Nose Height and Lower Face Height) compared to Igbo males. (Table 1). Yoruba females had statistically significant higher mean values (p<0.05) in 100% of parameters (Physiognomical Face Height, Forehead Height, Nose Height, Morphological Face Height and Lower Face Height) compared to Igbo females. (Table 2). These observations implied that Yorubas and Igbos are not of same vertical facial morphological measurements.

Comparative statistical analyses showed higher percentage proportion of NH to MFH in Hausa males (52.8%) than in Igbo males (46.1%) and lower percentage proportion of LFH to MFH in Hausa males (47.2%) than in Igbo males (53.9%). (Table 3. There was higher percentage proportion of NH to MFH in Hausa females (50.4%) than in Igbo females (49%) and lower percentage proportion of LFH to MFH in Hausa females (49.6%) than in Igbo females (51%). (Table 4). Similarly, results showed higher percentage proportion of NH to MFH in Hausa males (52.8%) than in Yoruba males (43.9%) and lower percentage proportion of LFH to MFH in Hausa males (49.6%) than in Yoruba males (56.1%). (Table 3). There was higher percentage proportion of NH to MFH in Hausa females (50.4%) than in Yoruba females (48.2%) and lower percentage proportion of LFH to MFH in Hausa females (49.6%) than in Yoruba females (51.8%). (Table-4).

Results showed lower percentage proportion of NH to MFH in Yoruba males (43.9%) than in Igbo males (46.1%) and higher percentage proportion of LFH to MFH in Yoruba males (56.1) than in Igbo males (53.9%). (Table 3) There was lower percentage proportion of NH to MFH in Yoruba females (48.2%) than in Igbo females (49%) and higher percentage proportion of LFH to MFH in Yoruba females (51.8%) than in Igbo females (51%). (Table 4). The evaluated Nose Height to Morphological Face Height and Lower Face Height to Morphological Face Height percentage proportions in the studied tribes implied that Hausas, Yorubas and Igbos are of non-significantly different facial height proportions. (Tables-3 and 4).

Comparisons of measured cephalometric parameters such as Forehead height showed lower mean values in Nigerian males of Hausa: 58.7, Igbo: 58.2 and Yoruba: 65.2 tribes when compared to young adult males (18 -35 years) of North American Whites and African Americans which had measured Forehead Height of 67.1 and 71.3 respectively⁸. Similarly, Forehead height measurements showed lower mean values in Nigerian females of Hausa: 52.6, Igbo: 57 and Yoruba: 62.7 tribes when compared to 73, 63 and 69 as measured Forehead

Height values of females of Korean Americans¹², North American Whites¹³, and African Americans¹³ respectively.

Nose Height measurements showed higher mean values of 66.8, 55.8 in Hausa and Igbo males respectively, but lower mean value of 50 in Yoruba males when compared with young adult males (18 -35 years) of North American Whites: 55 and African Americans: 51^8 . Similarly, Nose Height measurements showed higher mean values of 59.4, 54.1 and 56.4 in Hausa, Igbo and Yoruba females respectively when compared with young adult females (18 - 35 years) of North American Whites: 51 and African Americans: 48 females⁸, and Korean Americans: 52^{12} .

Evaluations of measured mean values of Morphological Face Height showed higher mean values of 126.4 and 121.1 in Hausa and Igbo males respectively, but lower mean value of 113.9 in Yorubas when compared with those of Malaysian males, aged 18 - 35 years: 119¹⁴. Morphological Face Height measurements showed higher mean values of 117.9 and 117 in Hausa and Yoruba females respectively, but lower mean value of 110.3 in Igbos when compared with those of Malaysian females, aged 18 - 35 years: 112¹⁴.

Comparative measurements of Lower Face Height showed lower mean values of 59.6, 65.3 and 63.9 in Hausa, Igbo and Yoruba males respectively when compared with adult males, aged 18 - 35 years, of North American Whites: 73 and African Americans: 74.1⁸, and Malays: 69¹⁴. Similarly, measurements of Lower Face Height showed lower mean values of 58.5, 56.2 and 60.6 in Hausa, Igbo and Yoruba females respectively when compared with adult females, aged 18 - 35 years, of North American Whites: 64.3 and African Americans: 67^8 , Korean Americans: 66^{12} and Malays: 63.2^{14} .

Clearly, comparative analyses of measured mean values of Forehead height, Morphological Face Height, Nose Height and Lower Face Height indicated non-similarities in Hausa, Igbo and Yoruba tribes of Nigeria when compared with North American Whites, Korean Americans and Malays. This implied that the Forehead height, Morphological Face Height, Nose Height and Lower Face Height can be used for examinations of biological variability distinguishing members of Hausa, Igbo and Yoruba tribes of Nigeria from those of North American Whites, Korean Americans and Malays.

Comparisons of observed LFH to MFH proportions in Nigerians of Hausas (male: 47.2%, females: 49.6%), Igbos (male: 53.9%, females: 51%) and Yorubas (male: 56.1%, females: 51.8%) showed lower values when compared with Canadians of Northern European origin (59.5%) and Nepalese indigenes of Sunsari district of Nepal (56.3%) as reported in a previous study¹⁵. Similarly, comparisons by sexes showed that Nigerian males and females have lower LFH to MFH proportions when compared to Nepalese males (56.3%) and females (56.1%)¹⁵. This implied that facial height proportions could be useful guides in examinations of biological variability between

Nigerian citizens and those of Nepalese and Canadians of **5.** Northern Europe.

Conclusion

This study examined gender and population differences in vertical facial morphological measurements and facial height proportions amongst Nigerians of the three major tribes of Hausa, Igbo and Yoruba. We concluded that Nigerians of the three major tribes of Hausa, Igbo and Yorubaare of different vertical facial morphological measurements. However, there were non-significant differences between the studied tribes in facial height proportions. The findings of this study provide unique opportunity for comparative data of facial cephalometry and examinations of biological variability between Nigerians (Africans/Blacks), and other ethnic groups/nationalities of the world.

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