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FACIAL MORPHOMETRIC STUDY OF ADULT HAUSA MALE TAXI AND TRICYCLE DRIVERS IN KANO, NIGERIA

Isiyaku Ibrahim, Saleh Nuhu, Ayuba Yuhana, Mikail Isiyaku Umar

Department of Human Anatomy, Yusuf Maitama Sule University, Kano Nigeria
Department of Human Anatomy, University of Maiduguri, Nigeria
Department of Human Anatomy, Federal University Dutse, Jigawa Sate Nigeria
Department of Anatomy, Kampala International University, Uganda.

Ibrahimkibiya45@gmail.com, nuhusaleh88@gmail.com, yohanaayuba125@yahoo.com

Corresponding Author: Ibrahimkibiya45@gmail.com

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Abstract

Human faces contain several cues, for example, identity, emotional expression, age, gender, ethnicity, attractiveness, personality traits and many more. The aim of this study was to determine the facial parameters in the population of Hausa Male taxi and tricycle drivers in Kano, Nigeria and to compare them with those determined in earlier studies in different populations. Four hundred (402) subjects were selected from the two association in Kano state, Tsaya da Kafarka Taxi Drivers Association and Tricycle Operators Association Kano (TOAKAN), using random sampling methods, with the age range of the participants between 18-50 years and Those with facial deformities or craniofacial trauma, surgery, and congenital facial abnormalities were excluded from the study. Photographic methods were used to capture the face. The data were expressed as mean ± SD, frequency, and percentages. It was observed that facial height (tr_gn) was higher in the facial vertical dimensions than the rest with the mean value of 190.59 ±17.60mm, while the lower face width (go1_go2) was higher in the horizontal facial dimensions than the rest, with the mean value of 115.92±11.86mm. The right eye length (ex1_en1) was slightly lower (30.07±3.80mm) than the left (30.27±3.81mm). In conclusion the present study has established the baseline data of facial dimension of Hausa Male taxi and tricycle drivers in Kano, Nigeria.

1.0 Introduction

Human faces contain several cues, for example, identity, emotional expression, age, gender, ethnicity, attractiveness, personality traits and many more. Interpreting facial cues has been the subject of speculation for eras (1), and has attracted much attention from anatomists, sociologists, psychologists and computer scientists. The appearance of the face is the most variable part of the human body, and is influenced by age, sex, race and ethnicity. Testosterone (T) affect several facial features, and in Pubertal males, a high testosterone-to-oestrogen (T/E) ratio is thought to facilitate the lateral growth of the cheekbones, chin, mandibles, the forward growth of the bones of the eyebrow ridges and the lengthening of the lower face leading to a more robust face shape. In the pubertal female, the influence of oestrogen (E) leads to a more gracile facial shape with high eyebrows, less robust jaws and fuller lips (2). In the area of facial anthropometry, Farkas and his colleagues had compiled the single most comprehensive survey of ethnic groups from multiple regions around the world (3). Despite this comprehensive approach, the global range of variation for each facial measurements were not well documented (4). Due to vast ethnic variation in the facial profiles, facial linear distances and angles have been applied across different populations used for personal identity and can serve as a way of revealing information with respect to biological profiles like ancestry, sex, the age of an individual (5, 6). Knowledge of the craniofacial norms of the person's ethnic groups (7) and specific facial structures of the must be considered by Surgeons when planning maxillofacial and reconstructive surgery (8). Obtaining measurements of the soft tissues of the face is important in terms of achieving aesthetic criteria (9). Craniofacial anthropometry, as an important part of anthropology and medicine, is used for the fortitude of the morphological features of the head and face. Shape of Face be influenced by many factors, such as gender, race and ethnicity, climate, socio-economic, nutritional, and genetic factors. The determination of facial parameters is of countless importance for the assessment of facial trauma, congenital and traumatic deformities and easier identification of certain congenital malformations (10, 11). The aim of this study was to determine the facial parameters in the population of Hausa Male taxi and tricycle drivers in Kano, Nigeria and to compare them with the those determined in earlier studies in different populations, However, facial parameters between drugs taking and non-drug taking participants was also compared to find out the effect of drugs on facial anthropometric which is important for anthropological research, research in forensic medicine and clinical practice (reconstructive surgery) And also provide additional way of human characterization and identification. It can be used not only for the forensic sciences but to combat terrorism, illegal immigration, and provide new methods and techniques to validate personal identification.

2.0 Materials

2.1 Study area

The present research was conducted at Kano state, Nigeria with a population of 9,383,682 million people at the 2006 Nigerian census. The municipal area of the state stretched 137 km2 and encompasses of six local government areas; Dala, Fagge, Gwale, Kano Municipal Nassarawa and Tarauni with a population density of 2,163,225. The main residents of the city are Hausa people (12).

2.2 Study Population

The population is made up of male taxi and tricycle drivers within the urban area of the State. Four hundred (402) subjects were selected from the two associations in Kano state Tsaya da Kafarka Taxi Drivers Association and Tricycle Operators Association Kano (TOAKAN), using random sampling methods, with the age range of the participants between 18-50 years and Those with facial deformities or craniofacial trauma, surgery, and congenital facial abnormalities were excluded from the study.

2.3 Ethical Approval and Informed Consent

Before the commencement of the research, ethical approval was sought from Ethical Committee of the College of Health Science Bayero University Kano, Aminu Kano Teaching Hospital, Kano. Informed consents were sought from the participants (see the form in appendix I).

3.0 Methodology

3.1 Facial photographing

The photographic set up consists of a tripod (WT3570, China), and a digital camera (Nikon D40, China). The tripod was used for adjustment of height of the camera that allows the optical axis of the lens to be maintained in a horizontal position during the capturing and to prevent undesirable movement of the camera and the operator (13). To obtain

the photographs (frontal), individuals were asked to sit and look directly at the camera in front of them (14) keeping an upright and normal posture, with both arms free along the body. This position corresponds to the Broca's Natural Head Position (15, 16). The participants were positioned on a line marked on the floor 1.00m away from the camera, while posing in a neutral facial expression. Before capturing the face, the operator ensured that glasses and cap (if worn) had been removed and the participant's forehead, neck, and ears were clearly visible during the process (17). After the images were captured, they were downloaded to a personal computer and stored in jpeg format for processing and analyses.

3.2 Facial Analyses

The captured facial images were imported into a software, bio-analyser (a software developed using Microsoft visual basic version 6). Each image contained specific identification code. The images were arranged in a serial number of the frontal image. The facial image was displayed in the picture area. The facial landmarks were placed in the respective positions. The facial distances were measured automatically in a fraction of a minute by the bioanalyser. The entire measurements were exported to Microsoft Excel.

3.3 Direct Measurements of Facial features

For measurement error analyses, a direct facial anthropometry was adopted (18). This involved asking a participant to sit with his head in natural head position. A digital vernier caliper was then used to measure the facial linear dimension of the face directly. This helped in the determination of the factor to be used for real size measurements of the photographs. The factor was 0.50 which was obtained by dividing actual size measurement with actual pixel of the image measurement.

3.4 Facial Landmarks Identification

Standard anatomical landmarks and reference points were identified according to previous works (5, 18, 19) and were recognized using Bioanalyzer (a software developed using Microsoft visual basic version 6) for frontal facial analysis (see Table 1 and Plate. 1).

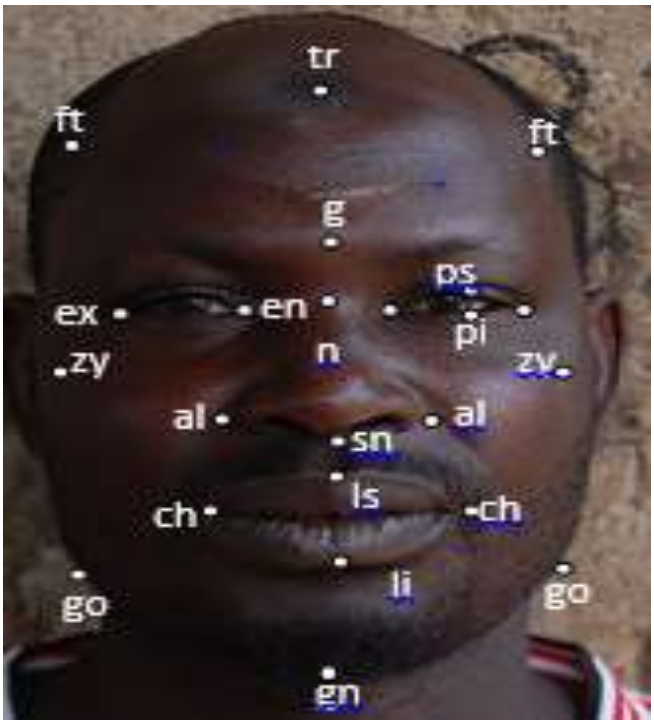

Plate 1: Landmarks used for facial measurements
al; alar, ch; cheilion, en; endocanthion, ex; exocanthion, gn; gnathion, go; gonion, ls; labiale superious, li; labiale inferious, n; nasion, pi; palpebrale inferious, ps; palpebrale superious, sn; subnasale, st; stomium, tr; trichion, zy; zygon, ft: frontotemporale.

Table 1: Anatomical Landmarks Used for Measurement of Facial Dimension.

S/N	Land marks	Abbr.	Anatomical description
1.	Alar	al	This is the most lateral point of the nasal wings
2.	Endocanthion	en	This is the inner corner of the eye fissure at the meeting points of eyelids
3.	Exocanthion	ex	It is the outer corner of the eye fissure where the eyelids meet
4.	Gnathion	gn	It is the lowest point on the lower border of the chin, in the midline
5	Labiale inferious	li	This is the mid-point of the lower vermilion line
6.	Labiale Superious	ls	This is the mid-point of the upper vermilion line
7.	Nasion	n	This is the midpoint of the nasofrontal suture.
8.	Palpebrale Inferious	pi	This is the lower eyelid center
9.	PalpebraleSuperious	ps	It is the upper eyelid center
10.	Stomium	st	This is the mid-point of the mouth orifices
11.	Trachion	tr	This is the mid-point of the hair line at the top of forehead
12.	Zygoma	zy	This is the most lateral point on the zygomatic arch
13.	Prosthion	pr	It is a point on the alveolar arch mid-point between the median upper incisor teeth
14	Gnathion	gn	It is the midpoint of the lower border of human mandible
15	Gonion	go	The point or apex of the angle of the lower jaw
16	Glabella	g	This is the most prominent point in the median sagittal plane between the supraorbital ridges
17	Subnasale	sn	It is the junction between the lower border of the nasal septum and the cutaneous portion of the upper lip, in the midline
18	Vertex	v	This is the highest point on the head with the head in the Frankfort horizontal plane
19	Pupil	p	This is a hole located in the centre of the iris of the eye

3.1 Facial Linear Dimension

The facial linear distances were obtained from the distance between one anatomical landmark to another (Table 2), 11 horizontals and 15 vertical direct measurements. The face parameters were measured using Bioanalyzer (a software developed using Microsoft visual basic version 6). The measurements were taken with subjects sitting on a chair in a relaxed mood. Twenty-six standard anthropometric measurements were obtained (Table 2) (Plates 2 & 3).

Standard anthropometric methods were used for all measurements. Linear measurements were reported in millimetres.

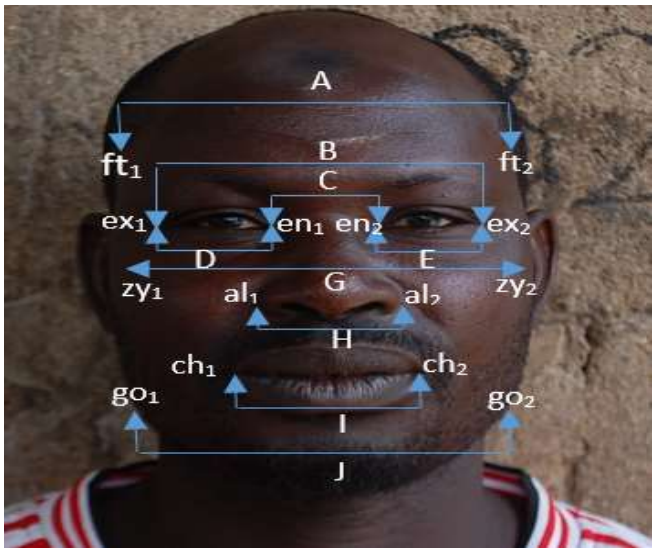

Plate 2: Anthropometric measurements I (Horinzontal distances) (A: Forehead Width (ft-ft), B: Biocular Width (ex-ex), C: Intercanthal Distance (en-en), D: Eye-Fissure Width (right) (ex-en), E: Eye-Fissure Width (left) (ex-en), G: Upper Face Width (zy-zy), H: Nose Width (al-al), I: Mouth Width (ch-ch) J: Lower Face Width (go-go).

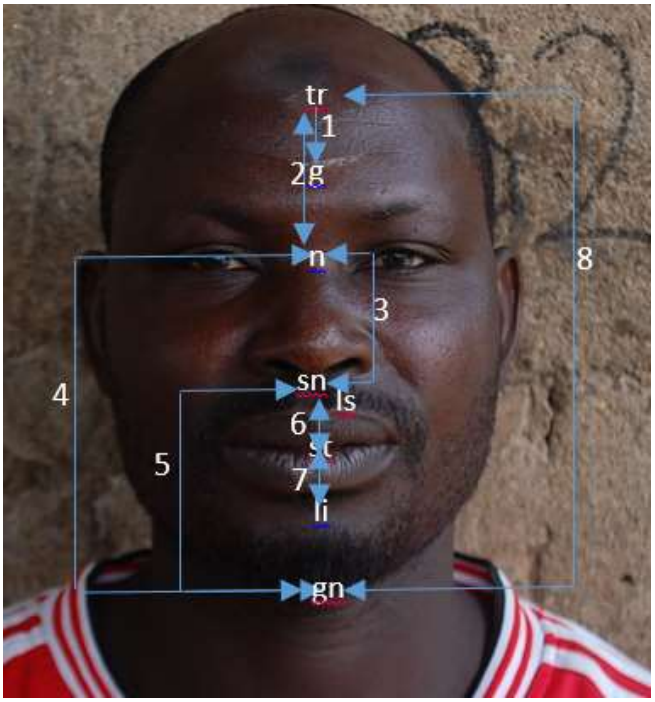

Plate 2: Anthropometric measurements II (Vertical distances) (1: Forehead Height I (tr-g), 2: Forehead Height II (tr-n), 3: Nose Length (n-sn), 4: Special Face Height (en-gn), 5: Lower Face Height (sn-gn), 6: Upper Vermillion Height (ls-st), 7: Lower Vermillion Height (st-li), 8: Face height.

Table 2: Linear facial dimensions with their corresponding landmarks

SN	Facial Dimensions	Landmarks
1	Facial width	zy-zy
2	Upper face height	n-pr
3	Face height	tr-gn
4	Nose wide	al-al
5	Special face height	n-gn
4	Lower face width	go-go
7	Eye length right	ex-en
8	Eye length left	ex-en
9	Intercanthal distance	en-en
10	Upper lip height	ls-st
11	Lower lip height	st- li
12	Eyebrow length	ebo-ebi
13	Mouth width	ch-ch
14	Forehead width	ft-ft
15	Biocular width	ex-ex
16	Interpupillary distance	rcp-lcp
17	Special face height	en-g
18	Lower face height	sn-gn
19	Special upper face height	g-sn

20	Philtrum length	sn-ls
21	Forehead height I	tr-g
22	Forehead height II	tr-n
23	Nose length	n-sn
24	Height of lower third of the face	st-gn
25	Mouth height	lLs-li
26	Orbital length	ps-pi

4.0 Measurement error

4.1 Precision of measurements

To quantify precision, technical error of measurement was determined, and two sets of measurements were taken with each method. These measurements were compared using technical error of measurement (TEM). This allowed assessment of random error. The TEM (also called the ‘‘method error statistic’’) is a standard-deviation−like estimate of error magnitude expressed in the original units of measurement. It can be used to generate both Intra and inter-observer precision estimates. When there are two measurements involved, the formula for TEM (20) is as follows:

Absolute TEM = $\sqrt{\sum di^2/2n}$

Where $\sum d2$ = summation of deviations (the difference between the 1st and 2nd measurements) raised to the second power,

n = a number of volunteers measured,

i= the number of deviations

The absolute TEM was expressed as percentages as follows.

Relative TEM = Absolute TEM/ VAV × 100

Where VAV = Variable average value, is the arithmetic mean of the mean between both measurements obtained (1st and 2nd measurements) of each volunteer for the same variable.

This procedure was performed for each one of the n participants and the n averages obtained and was summed up and divided by n (total of a number of participants) (21). The percentage scores were divided into five precision categories: scores less than 1% was deemed ‘‘excellent,’’ scores ranging from 1% to 3.9% were deemed ‘‘very good,’’ scores ranging from 4% to 6.9% were deemed ‘‘good,’’ scores ranging from 7% to 9.9% were deemed ‘‘moderate,’’ and scores exceeding 10% were deemed ‘‘poor (22).

4.2 Strength of Measurements (r)

The r was computed to demonstrate the strength of the relationship (similarities) between two measurements. Intra-class correlation (ICC) was used for this purpose. The values for the reliability coefficient ranged from 0 to 1, where ICC< 0 indicated ‘‘no reliability” and 0.6 to <0.8 indicated substantial reliability, and 1 indicated almost perfect reliability (23). The interval between two measurements was at least one week. 30 randomly selected records were used for this evaluation. Those dimensions with many differences between the first and the second measurements were discarded.

5.0 Statistical analyses

The data were expressed as mean ± SD, SD, independent t test was used to compared between 36 drugs participants and 36 non drugs taken were selected. SPSS version 20 statistical software (IBM Corporation, Armonk, NY) was used for the statistical analysis.

6.0 Results

Table 3: Shows assessment of measurement error in linear facial dimensions. It was observed that special face height showed least method error (1.65%) and philtrum length showed higher value of measurement error (9.66%). The rest of the facial measurements were also within the acceptable level of method error no variables was greater than 10%. Therefore, all measurements were retained. A systemic assessment of measurement error also showed no significant differences (P > 0.05) between first and second facial measurements.

Table 3: Assessment of measurement error in linear facial dimension

Variables	N	VAV	TEM	RTEM%
zy1_zy2	30	105.16	1.98	1.88
n_pr	30	64.94	1.84	2.83
tr_gn	30	186.74	4.20	2.25
al1_al2	30	46.10	3.21	6.97
n_gn	30	108.40	1.79	1.65
go1_go2	30	111.82	2.00	1.79
ex1_en1	30	27.52	1.29	4.70
ex2_en2	30	28.23	1.46	5.17
en1_en2	30	38.82	2.03	5.22
ls_st	30	11.28	0.71	6.33
st_li	30	11.59	0.99	8.53
ebo_ebi	30	43.05	1.04	2.42
ch1_ch2	30	56.86	1.49	2.63
ex1_ex2	30	95.02	2.14	2.25
sn_gn	30	63.28	5.16	8.15
g_sn	30	61.67	1.40	2.27
sn_ls	30	14.67	1.42	9.66
tr_g	30	61.21	1.47	2.40
tr_n	30	77.33	1.36	1.76
n_sn	30	45.77	2.74	5.98
st_gn	30	37.95	1.16	3.05
ls_li	30	21.79	1.33	6.10
ps1_pi1	30	10.81	0.65	5.99

NAV: Variable Average Value
TEM: Technical Error of Measurement
RTEM: Relative Technical Error of Measurement

Table 4: shows another method of the assessment of error in the facial dimensions. Higher single measured intra class correlation (ICC) was found in forehead height II (tr-n) and the lowest values found in nose width (al_al). The rest of the measurements were also greater than 0.89. A systemic assessment of measurement error also showed no significant differences (P > 0.05) between first and second facial measurements.

Table 4: Intra-Class Correlation (ICC) measurements of facial dimensions

S/N	VARIABLE	MEASUREMANT	N	ICC
1	zy1_zy2	Single measures	30	0.944
		Average measures		0.971
2	n_pr	Single measures	30	0.950
		Average measures		0.975
3	tr_gn	Single measures	30	0.931
		Average measures		0.964
4	al1_al2	Single measures	30	0.714
		Average measures		0.833
5	n_gn	Single measures	30	0.970
		Average measures		0.985

6	go1_go2	Single measures	30	0.953
		Average measures		0.976
7	ex1_en1	Single measures	30	0.850
		Average measures		0.919
8	ex2_en2	Single measures	30	0.794
		Average measures		0.885
9	en1_en2	Single measures	30	0.744
		Average measures		0.854
10	ls_st	Single measures	30	0.810
		Average measures		0.895
11	st_li	Single measures	30	0.759
		Average measures		0.863
12	ebo_ebi	Single measures	30	0.812
		Average measures		0.896
13	ch1_ch2	Single measures	30	0.917
		Average measures		0.957
14	ex1_ex2	Single measures	30	0.938
		Average measures		0.968
15	rcp_lcp	Single measures	30	0.921
		Average measures		0.959
16	sn_gn	Single measures	30	0.946
		Average measures		0.972
17	g_sn	Single measures	30	0.958
		Average measures		0.979
18	sn_ls	Single measures	30	0.823
		Average measures		0.903
19	tr_g	Single measures	30	0.960
		Average measures		0.979
20	tr_n	Single measures	30	0.970
		Average measures		0.985
21	n_sn	Single measures	30	0.767
		Average measures		0.868
22	st_gn	Single measures	30	0.940
		Average measures		0.969
23	ls_li	Single measures	30	0.878
		Average measures		0.935
24	ps1_pi1	Single measures	30	0.711
		Average measures		0.831

Table 5: shows descriptive statistics of demographic characteristics of the participants. Average age of participants was observed to be 37.77±7.98 and monthly income was 42549.50±22577.80 above the minimum wage of government's workers. The mean height (cm) and weight (kg) were 169.73 ±7.56 and 65.42±11.26, respectively. The range of accident involved in the participants while driving throughout their history was 0 to 9 times.

Table 6: shows frequency distribution of some socio-demographic characteristics of the participants. Only 9.45% are taking drugs that is 38 out of 402 in taxi and tricycle operators in Kano population and 13.93% of operators are smokers that is 56 out of 402. Similarly, it was observed that Kano municipal local government have large number of taxi and tricycle operators with 28.61% follow by Gwale local government with 27.11% lowest number are found in Tarauni local government t with only 4. 98%.

Table 5: Descriptive Statistics of demographic characteristics of the participants

Variable	Minimum	Maximum	Mean ± SD
Age (years)	18.00	50.00	37.77 ±7.98
Minimum Income per month	10000.00	100000.00	42549.50±22577.80
Number of Years Spend while Driving	1.00	32.00	11.53 ±7.05
Total number of Children	0.00	17.00	4.72 ±3.70
Total number of Male Children	0.00	10.00	2.57 ±2.25
Total number of Female Children	0.00	11.00	2.16 ±2.05
Total number of Wives	0.00	4.00	1.01 ±7.56
Height(cm)	121.00	190.00	169.73 ±7.56
Weight(kg)	41.00	115.00	65.42 ±11.26
Birth order	1.00	11.00	3.84 ±2.40
Number of Dents Present in the vehicles	0.00	12.00	2.85 ±1.72
Number of accidents involved	0.00	9.00	0.41 ±0.89

Table 7: shows descriptive statistics of the facial parameters of the study population. It was observed that facial height (tr_gn) was higher in the facial vertical dimensions than the rest with the mean value of 190.59 ±17.60mm, while the lower face width (go1_go2) was higher in the horizontal facial dimensions than the rest, with the mean value of 115.92±11.86mm. The right eye length (ex1_en1) was slightly lower (30.07±3.80mm) than the left (30.27±3.81mm). Similarly, the average right eye mouth eye angle was lower (25.66±2.390) than the left angle with mean of 26.33±2.210. The right eyebrow length (ebo1_ebi1) was slightly higher (42.72±5.25mm) than the left eyebrow length (ebo2_ebi2) with mean of 42.49±5.11mm).

Table 7 shows the descriptive statistics of the derived facial measures of masculinity and femininity of the study population. It was observed that averaged facial width to height ratio was 1.71±0.19. Upper lip height (ULh) was 15.86±3.16mm, lower lip height (LLh) was 16.53±3.21 and nose width (Nw) was 68.51±5.33. All the three measures were rendered as percentage of interpupillary distance. Upper lip height (ULh) was lower than lower lip height (LLh). Averaged Cheek-bone prominence was 0.96±0.06. For the Index I, II and III were measured as 1.55±0.07, 1.09±0.07 and 108.36 ±11.35, respectively.

Table 7: Descriptive statistics of the facial parameters of the study population

Parameters (mm)	Minimum	Maximum	Mean ± SD
zy1_zy2	82.96	145.00	111.13 ± 10.76
n_pr	40.88	101.00	65.51 ±8.55
tr_gn	146.06	234.65	190.59 ±17.60
al1_al2	35.66	61.88	47.49 ±5.02
n_gn	79.40	154.12	111.37±11.67
go1_go2	87.46	154.62	115.92±11.86
ex1_en1	20.20	43.24	30.07±3.80
ex2_en2	21.16	45.60	30.27±3.81
en1_en2	25.76	54.91	39.40±4.57
ls_st	5.73	17.49	10.98±2.26
st_li	4.24	16.81	11.48±2.47
ebo1_ebi1	27.90	61.27	42.72±5.25
ebo2_ebi2	31.49	60.11	42.49±5.11
ebo_ebi	32.51	58.68	42.60±4.61

ch1_ch2	40.03	72.30	56.39±6.01
ft1_ft2	80.72	130.34	103.94±10.53
ex1_ex2	78.71	125.67	99.75±9.43
Eye length	21.69	43.29	30.18±3.65
rcp_lcp	53.38	90.17	69.46±6.59
sn_gn	44.93	91.23	66.13±7.87
g_sn	43.48	87.75	63.07±6.89
sn_ls	9.34	22.68	15.32±3.18
tr_g	42.53	87.87	62.16±9.12
tr_n	54.75	107.88	80.29±9.63
n_sn	30.58	65.66	45.37±6.10
st_gn	28.23	56.99	39.90±5.52
ls_li	13.35	32.73	22.38±4.20
ps_pi	8.03	14.29	10.71±1.39

Table 8: shows comparison of facial parameters between drugs taking and non-drug taking participants. It was observed that none of the facial linear dimensions showed significant differences between drugs taking and non-drug taking participants except n_pr, n_gn, ft_ft, tr_g, tr_n, n_sn and st_gn.

Table 8: Comparison of facial parameters between drugs taking and non-drug taking participants.

	Drugs taking (n=38)	Non drug taking (n=38)		
Parameters (MM)	Mean ± SD	Mean ± SD	t value	P value
zy1_zy2	110.32± 10.29	117.20± 13.19	-2.535	0.117
n_pr	67.07± 6.48	72.86± 10.88	-2.817	0.008
tr_gn	192.39± 16.35	198.38± 18.33	-1.503	0.308
al1_al2	47.69± 4.64	47.45± 5.15	0.215	0.283
n_gn	112.69± 9.41	120.90± 16.77	-2.631	0.002
go1_go2	117.05± 11.92	122.14± 11.82	-1.869	0.733
ex1_en1	29.27± 4.39	32.11± 4.32	-2.847	0.999
ex2_en2	29.70± 3.77	32.79± 4.54	-3.22	0.454
en1_en2	40.28± 5.05	39.41± 4.13	0.822	0.44
ls_st	10.86± 2.02	11.91± 2.35	-2.102	0.048
st_li	11.54± 2.72	12.48± 2.90	-1.466	0.429
ebo1_ebi1	43.56± 4.78	42.99± 5.71	0.464	0.142
ebo2_ebi2	43.95± 4.61	43.34± 6.29	0.48	0.043
ch1_ch2	57.98± 5.09	57.04± 6.26	0.719	0.097
ft1_ft2	104.43± 7.73	108.29± 13.11	-1.561	0.001
ex1_ex2	99.07± 9.65	105.55± 10.32	-2.828	0.462
rcp_lcp	68.94± 6.46	72.45± 6.99	-2.275	0.474
sn_gn	66.82± 6.71	69.68± 9.73	-1.492	0.1
g_sn	63.73± 6.90	63.52± 7.65	0.129	0.272
sn_ls	16.02± 3.04	15.27± 2.97	1.102	0.972
tr_g	61.99± 7.84	70.84± 11.08	-4.019	0.007

tr_n	79.74± 8.63	88.54± 12.57	-3.558	0.004
n_sn	45.95± 5.13	50.81± 7.85	-3.191	0.001
st_gn	40.15± 4.56	40.95± 6.81	-0.603	0.02
ls_li	22.46±4.19	23.85± 4.90	-1.337	0.252
ps1_pi1	10.83± 1.15	11.11±1.45	-0.95	0.069

7.0 Discussion

From this study, the measurements were found to be reproducible with a negligible error for the intra observer errors estimated. This was based on the acceptable level of TME reported in the previous study (22). The systemic assessment of measurement and ICC of the measurements have fallen within the prescribed limits (24). This has made the results more robust and reliable. The minimal error of measurement observed in the present study will be have less influence in the interpretation of the results in the context of the global data. Similarly, this may provide more opportunity to compare results using different methodologies. Since, the facial morphometric quantify using photogrammetric methods has resulted to be similar to what was obtained using direct anthropometry with acceptable methods level of error.

The comprehensive global range of variation for each facial measurements documented in the previous studies (3, 4) were devoid of some detailed of other ethnic groups including Hausa population. In addition, wide range of variation in facial metrics (Table 4.48) were reported among various racial and ethnic groups such as Hausa, Turkish, Malaysian Indian, Afro-American, Chinese, America, European Caucasian, and Arabians have been reported by several authors. (3, 6, 18, 25, 26, 27).

The base line data of the facial morphometric obtained showed variation with what was reported in the previous population (Table 9). The mean values of facial metrics in the present study was higher in nose wide compared to the findings of the previous studies (6, 18, 25, 26, 27). However, lower mean values were recorded in the present study in nose length. It was also documented that nose was significantly wide in both sexes of Asia Black ethnic groups (3). It was concluded that African American males also had shorter nasal length, wider alar width compared to the white man, and the average nose of the African American man was shorter and projected less from the face (6, 18). This differences in the measures pertained to the nose project the important of nasal dimensions for purposes of racial classification.

The mean values of facial metrics in the present study was higher in right eye length compared to what was reported by (27), intercanthal distance, and mouth width compared to the findings of the previous studies (6, 18, 25, 26, 27) forehead width compared to result from (26) etc. However, lower mean values was recorded in the present study in forehead height I, lower face height than the results conducted by (6, 18, 26) and Special upper face height than the studies conducted by (26, 27) etc. The mean values of left eye length, biocular width and upper lip height were similar to findings reported in the literature (25, 26, 27). These variations project the usefulness of the facial anthropometry in the racial and ethnic identification. This may be explained by the fact that environmental (28, 29) and genetic factors has direct influences on body anthropometry including facial morphology (30, 31). Age is also another factor that influence the body architecture. A study conducted on different ethnic and racial group reveal the exceptional role of age in facial anthropometry (32, 33). However, other factors such socioeconomic and life style may seems to have influence on the facial anthropometry. In most of the previous studies these factors were not reported (26, 34). This may limit the level of direct comparison between the present study and other studies in the literatures. For example, the life style of the participant can be retrieved through their occupation as taxi and tricycle drives which promote more of sedentary life with long period of setting than active movement. The use of drugs is common in theses target population. It is therefore imperative to holistically consider the wide range of factors that influence the facial morphometric before reaching definite conclusion on the existing variability across different race and ethnic groups in the globes.

Stable feature such as facial distance, indices and digit ratios were observed to be less affected by drug consumption. It was documented that ratios exemplify by digit ratio are less affected by factor such as age (36). This indicates that stables features not altered by drug consumption. However, facial distances which are highly influence by factor such as age, sex, environmental and genetic factors (37, 38, 39).

Conclusion

The present study established the baseline data of facial dimension of Hausa Male taxi and tricycle drivers in Kano, Nigeria.

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Table 9: Comparison of the male craniofacial anthropometric norms between Hausa, Turkish, Malaysian Indian, North American Caucasian and Hausa adults (present study)

Landmark	Hausa (27)	African American (06)	Turkish (26)	Malaysian Indian (25)	North American white (18)	Present study
ex-enr	29.14± 2.31	-	33.89±2.5	-	-	30.07±3.80
n-sn	-	50.60	68.80±9.6	-	54.80	45.37±6.10
tr-g	-	60.20	52.72±9.6	-	57.00	42.16±9.12
en-en	31.72±3.12	32.80	33.17±2.7	31.7±1.9	31.30	39.40±4.57
ex-en (l)	29.08± 2.07	33.20	33.91±2.3	30.7±1.6	31.3±1.4	30.27±3.81
zy-zy	116.83±8.90	139.50	129.06±7.0	136.3±4.8	139.1±6.3	111.13 ± 10.76
al-al	40.68±3.11	42.10	35.15±2.9	39.5±2.6	34.90	47.49 ±5.02
ch-ch	50.4 ±4.15	53.70	51.55±4.0	47.3±3.3	54.50	56.39±6.01
go-go	104.9±7.71	-	111.55±9.2	-	-	115.92±11.86
tr-n	-	71.30	52.72±9.6	-	67.10	80.29±9.63
en-gn	100.88±6.78	112.00	113.17±6.5	-	117.70	111.37±11.67
sn-gn	62.98±5.22	74.10	70.54±5.5	67.7±3.5	72.60±4.5	66.13±7.87
ls-st	10.97±1.47	-	6.87±1.7	9.2±1.3	9.5±1.5	10.98±2.26
st-li	12.84±2.14	-	9.23±1.7	11.5±1.6	11.0±1.2	11.48±2.47
g-sn	83.45±5.52	-	73.46±5.1	-	-	63.07±6.89
ft-ft	-	-	118.34±6.1	-	-	103.94±10.53
ex-ex	-	-	99.74±5.4	92.1±4.1	90.7±3.8	99.75±9.43
g-sn	-	62.4	-	-	67.2	63.07±6.89

BAYERO UNIVERSITY, KANO
COLLEGE OF HEALTH SCIENCES
OFFICE OF THE PROVOST

ETHICAL APPROVAL

1. Consent to Participate in the Research

Study of relationship of Facial masculinity-femininity with 2D:4D, Aggression and Trustworthiness among Hausa Population in Kano Metropolis

You are asked to participate in a research study conducted by ISHAKU IBRAHIM from the Department of Human Anatomy, Faculty of Basic Medical Sciences, Bayero University Kano.

If you have any question or concerns about the research, please feel free to contact ISHAKU IBRAHIM Department of Human Anatomy, Faculty of Basic Medical Sciences, BUK, kano, 08130291284, ibrahimkibiya45@gmail.com, ibrahimkibiya45@nwu.edu.ng

2. Purpose of the Study

The study will assess relationship of Facial masculinity-femininity with 2D:4D, Aggression and Trustworthiness among Hausa Population in Kano Metropolis

3. **Procedures**

The data collection will involve collecting information with regard to bio data, here the participant will be asked to provide some information relevant to his bio data. This can be done in less than 3minutes

In the second phase of the study a picture of the face (frontal view) and finger scanning and measurents (2D: 4D of left and right), these can be achieved 10 within minutes

4. Potential Risk and Discomfort

There is no associated risk with this procedure and the only discomfort may be the time you will sacrifice while taking the measurement.

5. Potential Benefits to Participant and/or to society

This research may of potential benefit to the participant and/or society in the following ways;

i. . The knowledge of the facial masculinity and femininity in relation to the behavirol traits such as aggression and trustworthiness, the ability to detect such behaviours as aggression and trustworthiness by security personnel has become important in providing safety for a citizens.

ii. The knowledge of the facial masculinity and femininity of the patient by surgeons will also be helpful for the clinician in the treatment of maxillofacial and reconstructive surgery.

iii. The knowledge of the 2D: 4D ratio in relation to the facial masculinity and femininity of the individual support to the effects of prenatal androgens (as indicated by 2D: 4D ratio).

iv. The opportunity to know your length of 2D:4D and facial profiles and other important parameters such as height, weight, among others.

v. The participant may have an opportunity to come in contact with the equipment used in the study as well as gaining knowledge about the names and uses of such equipment

vi. Measuring the head and facial variables provides room for establishment of the indicator and diagnostic criteria as well as information potentially usable in clinical practice and art. Moreover, the facial proportion are known to have been used to create the so called ‘facial canon’, which is an ideal of beauty particularly occurring during the renaissance periods.

6. Payment for Participation

Incentive and refreshment will be offered to the participant after participation

7. **Confidentiality**

Every effort will be made to ensure confidentiality of any identify information that is obtained in connection with this study. The variables and information collected will only be used for the aims and objectives of the study as well as scientific publications. I assure you that your pictures and other information will be kept in strict confidence.

7. Participation and Withdrawal

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may exercise the option of removing your data from the study. You may also refuse to answer any questions you don’t want to answer

and still remain in the study. The researcher may withdraw you from this research if circumstances arise that warrant doing so.

8. Right of Research Participants

You may withdraw you consent at any time and discontiue participation without penalty. You are waiving any legal claims, right or remedies because of your participation in this research study. This study will be reviewed and received ethics clearance through the Committee on ethics from college of clinical sciences Aminu Kano Teching Hospital Bayero University Kano. If you have questions regarding your right as a research participant contact; the Committee on ethics,

9. Signature of Research Participants/ Legal Representative

I have read the information provided for the study titled. Study on relationship of Facial masculinity-femininity with 2D:4D, Aggression and Trustworthiness among Hausa Population in Kano Metropolis, as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form