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Facial Anthropometric Norms of the Young Black South African Woman

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Background: Ethnic pride and the push toward preservation of ethnicity in all areas of aesthetic and reconstructive medicine has created the need for normative facial anthropometric data specific to localized geographical populations. This study aimed to gather a set of soft tissue anthropometric norms for the young Black South African woman and to compare this with international data and neoclassical anthropometric maxims.
Methods: In total, 156 Black female students from Sefako Makgatho University between 18 and 25 years of age, with a normal dental occlusion and a normal body mass index were included in the study. Computer-based photographic analysis of participants' faces in anterior, lateral, and basal views was undertaken under strict studio conditions and compared with international studies.
Results: Facial height proportions tended toward a smaller upper facial third in comparison with mid and lower facial thirds. Nasal width was greater than other populations, and exceeded the neoclassical canon of one-fifth of facial width. Nasal tip projection was greater than Congolese and African American counterparts. Vermilion height ratios approximated a ratio of 1:1 with lip protrusion beyond the classical Rickets E-line.
Conclusions: The "classical" anthropometric measurements most often quoted in academic literature, although important in their own right, do not consider the distinct differences in facial anthropometric norms between population and racial groups. These differences must be taken into consideration to preserve ethnic traits and optimize aesthetic outcomes. *(Plast Reconstr Surg Glob Open 2023; 11:e4942; doi: 10.1097/GOX.0000000000004942; Published online 28 April 2023.)*

INTRODUCTION

In the postmodern age, an eagerness to embrace the uniqueness of each individual culture has sparked a nationalistic pride in one's heritage and background.[1] Nowhere is that more apparent than in the recognition of beauty—specifically that of the face.

Anthropometry and Neoclassical Canons

The study of anthropometric norms is vital in the planning of facial reconstruction for craniofacial, orthodontic, and orthognathic interventions. Increasing popularity in cosmetic surgery and medical aesthetics has made this knowledge even more important in the planning of procedures. The idea of an innate set of geometric norms to govern the make-up of a "normal face" is one that can be traced back to Ancient Egypt and Greece in many forms of art.[2] The "neoclassical canons" described by Renaissance artists further refined this concept, firstly with the use of Phi as the "divine" ratio to describe the relationship between many key anatomical measurements, and the splitting of the face into equal "horizontal thirds and vertical fifths"[3] (Fig. 1).

The classical descriptions of anthropometry are not without their limitations, especially when observing differing ethnic groups. Farkas et al compared the interethnic, sexual, and age-related variabilities to these neoclassical canons and found many variations between these "ideals" and international populations.[4] Interestingly, Farkas found that the neoclassical canons did not even conform to the norms of North American White people, and were even more lacking when describing those of other ethnicities.[4,5]

The African Face

The study of the African face was first found in the realm of anthropology.[6] Sushner was one of the first

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clinicians to research the differences in Black faces, in particular, those of the African American population.[7] He concluded that the soft tissue norms previously identified by Rickets, Steiner and Holdaway were not applicable to African American subjects who had facial profiles that were more protrusive.[7]

The African Nose

The African nose has long been studied to understand the key differences that contribute to its overall shape. The terms "African," "Negroid," and "Platyrrhine" nose have come to be synonymous with a shortened columellar, decreased tip projection, wider alar, and broader nasal dorsum.[8] This definition is problematic because it generalizes a vast population of nonhomogeneous people with origins spanning an entire continent and beyond. This problem was not lost on Ofodile et al, who sought to further define the heterogeneous population of African Americans into "Afro-Indian," "Afro-White," and "African."[9] Building on this work, Porter et al went on to study the African American female nose in 2003.[10] When comparing with White subjects, they found, in particular, a decreased columellar height to lobule ratio, a high variability in nasal base shape and axis, a wider nasal width in comparison with intercanthal distance, a more acute nasolabial angle, and an increased nasofrontal angle.[10] Three main nasal base/axis relationships were also identified in this study, namely the triangular base/vertical axis, oval base/horizontal axis, and the trapezoidal base/inverted axis combinations corresponding to Farkas classification 3, 4, and 7 (Fig. 2).[10,11] Rohrich and Muzaffar went on to describe the "classic" differences between African American noses and White noses as a practical guide to the rhinoplasty surgeon to preserve ethnicity and natural aesthetics.[12] Their findings were that while the African nose is in no way homogeneous, it generally has a wider depressed dorsum with a low radix, a poorly defined and under-projected tip, and a decreased nasal length and height.[11] They also describe an increased interalar width and/or an excess in alar flaring.[12]

Takeaways

Question: What are the facial anthropometric norms of the young, Black, South African women? How do they compare to those of ethnically and regionally different populations, as well as commonly known neoclassical canons?

Findings: Photogrammetric facial analysis of the study population identified significant differences in the general facial, nasal, lip, and chin measurements when compared with ethnically and regionally different populations and also varied greatly from the neoclassical canons.

Meaning: There is a need for regionally specific anthropometric norms for international populations with less reliance on neoclassical canons when planning and performing interventions of the face.

The Knowledge Gap

A "cookie-cutter" approach when treating individuals of different cultures, geographical groups, and races

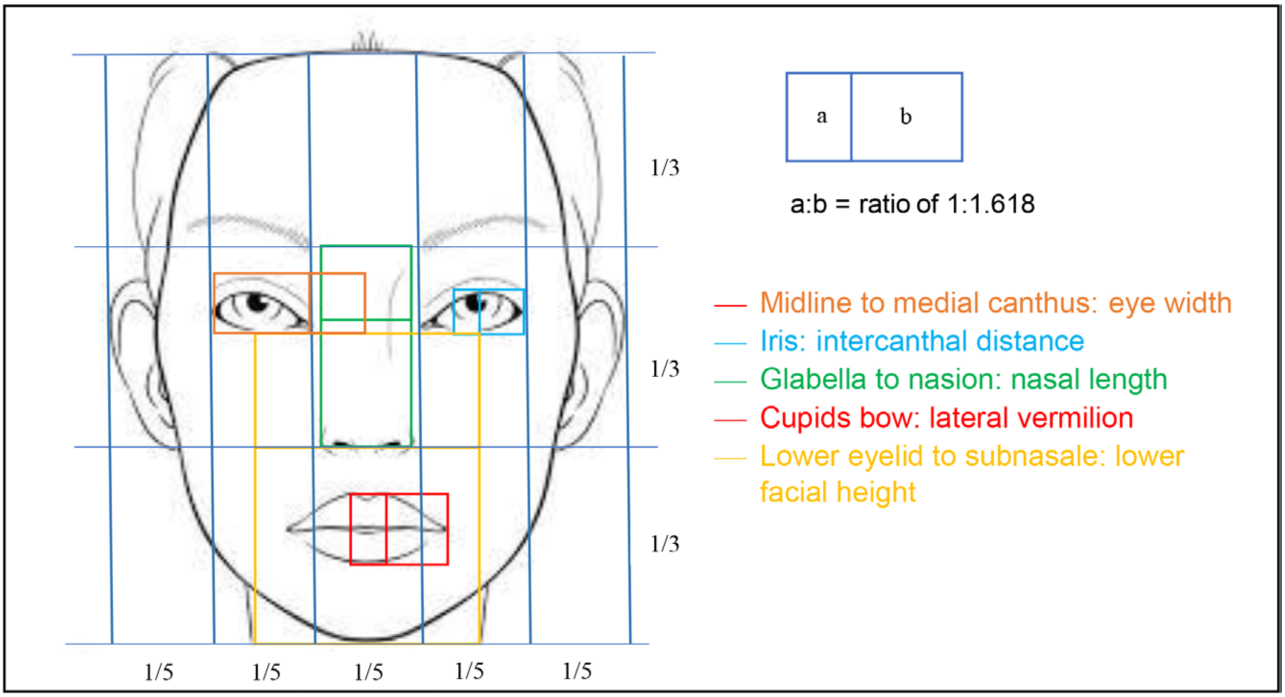


Fig. 1. Illustration of the human face divided up into the "neoclassical canons" of vertical fifths and horizontal thirds of the face. Examples of the golden ratio as it relates to various measurements of the face represented by coloured blocks.

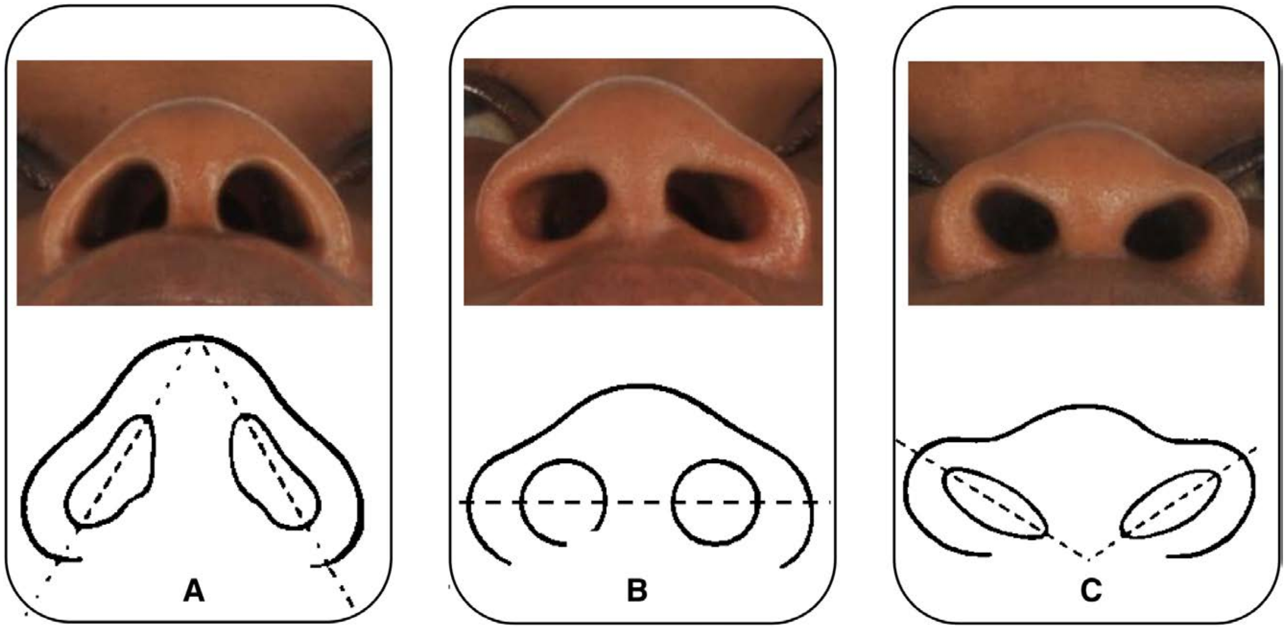


Fig. 2. Nostril base/alar axis relationship as adapted from the original work of Farkas et al in 1983.[10] A, Triangular base/vertical axis. B, Oval base/horizontal axis. C, Trapezoidal base/inverted axis.

is no longer an acceptable practice. Data for the young Black South African female face have yet to be studied in sufficient detail and with large enough numbers to grant significantly powered results. Practitioners treating this population have come to rely on population data from alternative regions such as those of central Africa and African American populations, thus ignoring the regional uniqueness of the Black South African woman at the expense of the ultimate outcome.

The key objectives of the study are to:

1. Gather a database of soft tissue facial anthropometric values of young Black South African women to aid in describing the "norms" of this population.
2. Compare these data with international population groups.

These data will assist in the achievement of regionally sensitive and individualized treatment of the women in the region, and also highlight the need for locally-specific data for other populations internationally.

METHODS

Ethical approval was obtained from the Sefako Makgatho Health Sciences University Ethical Committee (ref: SMUREC/M/282/2020). Sample size was calculated using the mean nasolabial angle of 84.4±13.3 degrees from a previous study conducted in Cape Town, South Africa by Miles and Naidoo, 80% power, alpha of 5% and effect size of 2.[13] A sample size of 156 was obtained using the G-power statistical software, version 3.1.9.6.[14]

An observational study design was used to investigate the population of young Black South African women, of traditional South African descent.

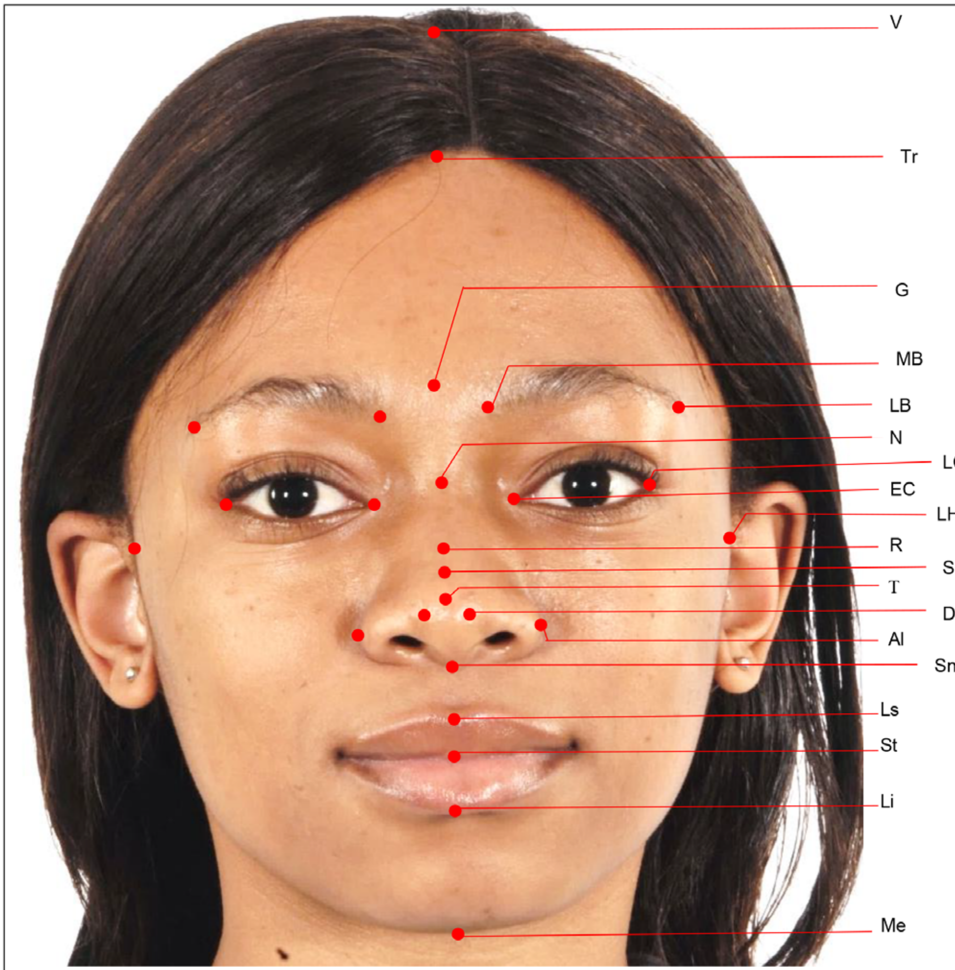
Inclusion criteria include:

1. Women aged 18–25 years;
2. Normal body mass index (BMI) (18.5–24.9);
3. Normal dental occlusion;
4. No previous facial or orthodontic treatments, including neurotoxin and fillers, as well as previous facial trauma;
5. No facial congenital abnormalities.

These criteria served to identify the norms of the "ideal" youthful Black face in those who have reached skeletal and dental maturity. A convenience sampling technique was used to gather 156 female student participants from Sefako Makgatho Health Sciences University in Tswane, South Africa, between January 2021 and June 2021.

Materials, Apparatus, and Equipment

- Students were approached by one examiner and an assistant at Sefako Makgatho Health Sciences University (SMU), and informed consent was obtained.
- Participants were assessed observationally for gross facial symmetry (obvious facial asymmetries were excluded from the study) and normal dental occlusion.
- Anterior, lateral, and basal view photographs were taken of the participants' faces. Within the strict conditions of the SMU audiovisual photography studio, a Nikon D700 camera (12.1 megapixel) with an AF-S Micro Nikkor 105 mm 1:2.8G ED lens, mounted on an adjustable tripod stand with spirit level was used with triangulated soft-box lighting. The camera was placed 1.5 m away from the participants. Anterior and lateral photographs were taken with the head in the natural position



KEY

G	Glabella	**N**	Nasion	**CP**	Corneal Plane
IR	Infraorbital Rim	**R**	Rhinion	**S**	Supratip
T	Tip	**Cb**	Columellar Breakpoint	**Sn**	Subnasale
ABJ	Alar Base Junction	**AC**	Alar Crease	**Ls**	Labrale Superius
ST	Stomion	**Li**	Labrale Inferius	**Sl**	Mentolabial Sulcus
PG	Pogonion	**Me**	Menton	**Tr**	Tragion
C	Cervical Point				

Fig. 3. Anterior facial anthropometric landmarks.

and lips in repose. Basal photographs were taken, with the neck extended until the columellar and alar rims were perpendicular to the camera lens. A matte white backdrop was used as well as a standardized linear ruler mounted above the participants head placed in the vertical plane of the glabellar, malar eminence and columellar for anterior, lateral, and basal photographs, respectively. The ruler and other physically measured linear measurements were used to establish a magnification scale for the subsequent photogrammetric analysis

Digital photographs were analyzed, and measurements were performed using IC Measure version 2.0.0.245 and Rhinobase (2000–2001), both with a track-record of clinical reliability.[15–17] Linear and angular measurements as well as ratios were performed on anterior (Figure 3, Table 1), lateral (Figure 4, Table 2) and basal views (Figure 5, Table 3).

Statistical Analysis

Statistical analysis of data was performed to determine the mean and standard deviation (SD) values of each

Table 1. Anterior View Linear and Angular Measurements

Upper facial height	Trichion to glabella
Midfacial height	Glabella to subnasale
Lower facial height	Subnasale to menton
Interalar width	Left to right alar
Intercanthal width	Left to right endocanthus
Upper vermilion height	Labrale superius to stomion
Lower vermilion height	Stomion to labrale inferius
Upper lip length	Subnasale to stomion
Lower lip length	Stomion to mental crease
Canthal tilt	Angle between the line from medial and lateral canthus to a line perpendicular to the midline

measurement. The data were compared with the results of similar studies found in a literature review of Black African faces from Central and Northern Africa, African American populations, and North American White populations using individual Student *t* tests. Studies were included based on geographical location, participant demographics, and study methodology where similar and comparable to the index study (Table 4). Statistical significance was determined at *P* less than 0.05. The statistics software used for analysis was Statistical Package for Social Sciences, version 23 (SPSS Statistics for Windows. Release 14; IBM Corp, Armonk, N.Y.).

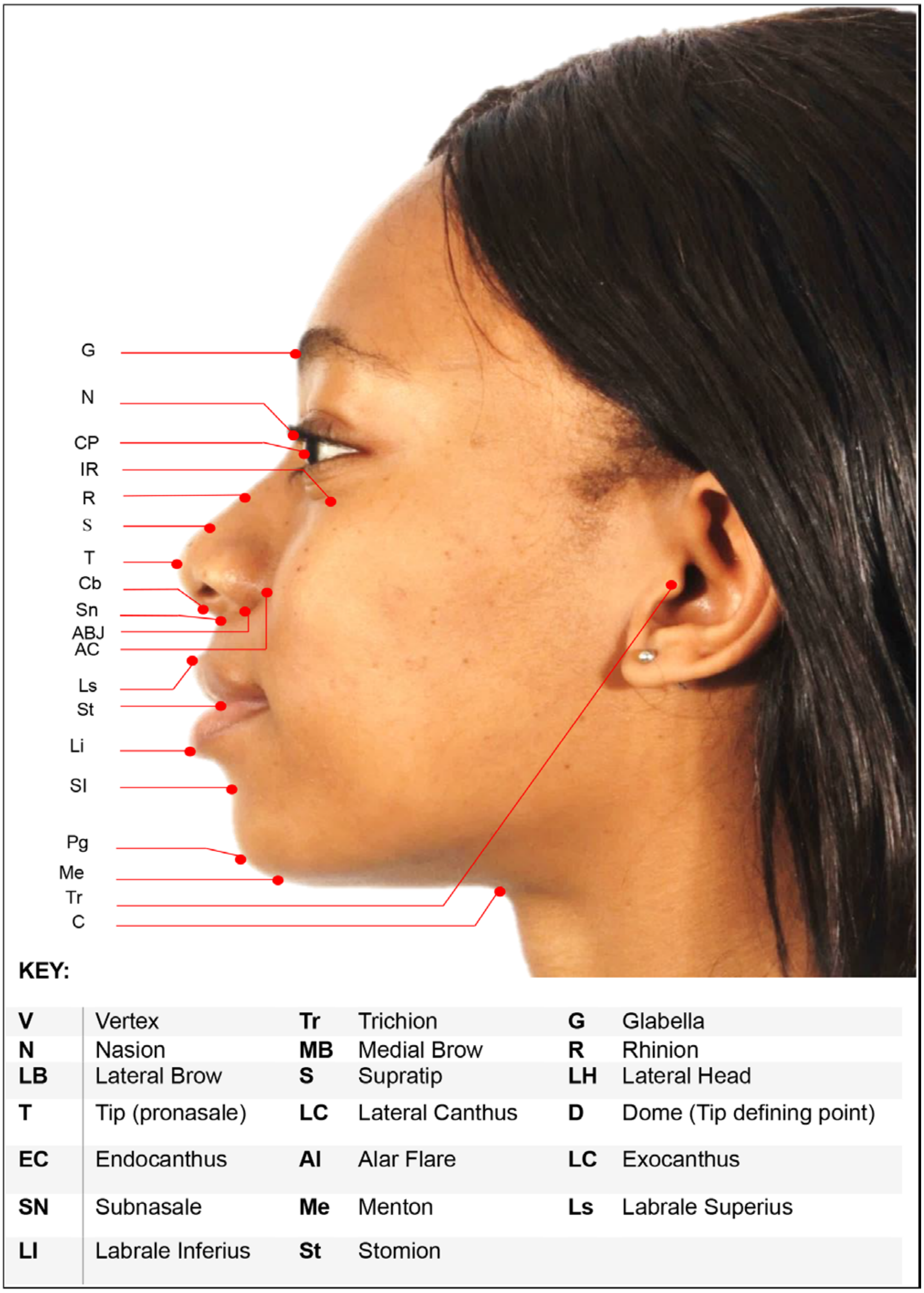


Fig. 4. Lateral facial anthropometric landmarks.

Table 2. Lateral View Linear and Angular Measurements

Nasofrontal angle	Glabella to nasion to nasal tip
Nasofacial angle	Angle between: 1. glabella to pogonion and 2. nasion to nasal tip
Nasolabial angle	Angle between: 1. columellar break to subnasale & 2. subnasale to labrale superius
Nasomental angle	Angle between: 1. nasion to nasal tip and 2. nasal tip to pogonion
Mentocervical angle	Angle between: 1. glabella to pogonion and 2. menton to cervical point
Nasal length	Nasion to nasal tip
Tip projection	Alar crease to nasal tip
Radix projection	Corneal plane to nasion
Chin protrusion	Distance from pogonion to vertical facial plane (a line perpendicular to frankfort horizontal starting at the nasion)
Angle of facial convexity	Angle between lines: 1. glabella to subnasale and 2. subnasale to pogonion
Mentolabial sulcus	The distance from the depth of the sulcus perpendicular to a line from labrale inferius to pogonion

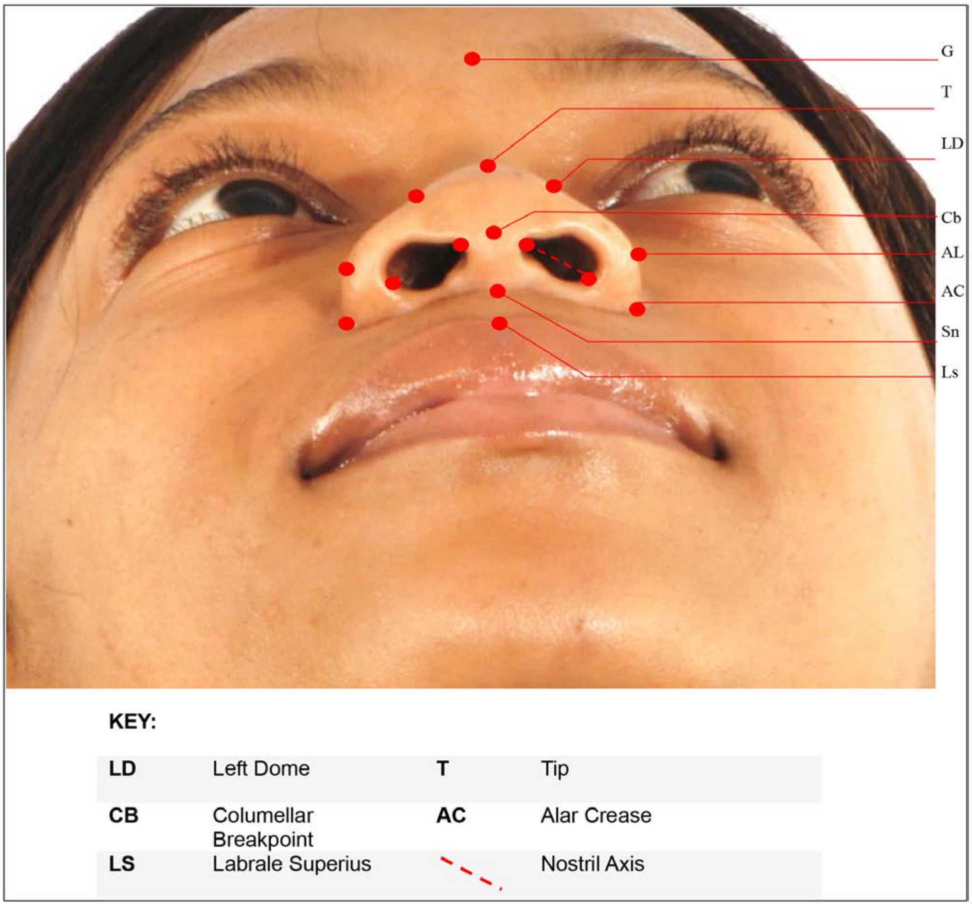


Fig. 5. Basal soft tissue anthropometric landmarks.

Table 3. Basal View Linear and Angular Measurements

Columella height	Subnasale to columellar break point
Alar Base	Alar crease right to left
Alar Flare	(AL to AL) – (AC to AC)
Nostril Type	According to Porter et al (2003)[9]: vertical, horizontal, inverted axis. See Figure 4
Lobule Width	Lobule dome left to right

Reliability

Intra-examiner reliability was tested by the remeasuring of all anthropometric indices (both linear and angular) in 10 randomly selected participant photographs. The error of method was then calculated by comparing the first and second measurements with the use of the Dahlberg formula.[18]

Differences in general facial (morphological) measurements less than 2 mm, angular measurements less than 2.5 degrees, and remaining aesthetic linear measurements less than 0.5 mm were considered to be within an acceptable range of error.[19]

RESULTS

Population Demographics

Population demographics are detailed in Tables 5 and 6. The demographic analysis showed a mean age of 21

Table 4. Demographic and Methodological Data of International Studies

Study	Country	Sample Size	Age	BMI	Method of Measurement
Miles and Naidoo[12]	South Africa	15	23.4 ± SD 3.8 y	Not specified	Photogrammetric + cephalometric
Olusanya[25]	Nigeria	51	16–31 y	22.3 ± SD 3.72	Direct caliper
Virdi[18]	Kenya	36	>18 y students	Not specified	Direct + photogrammetric
Salah[26]	Sudan	100	17–23 y	Not specified	Photogrammetric
Esabish[27]	Congo	71	18–30 y	Not specified	Photogrammetric
Farkas[4,28]	USA: African Americans White	100 200	18–30 y	Not specified	Direct + photogrammetric

Table 5. Sample Population Demographics

Total (n = 156)	Mean	Median	Max	Min	SD
Age	21	21	25	18	2.12
Height (m)	1.6	1.6	1.8	1.4	0.063025
Weight	56.8	57.1	73.0	41.2	6.847209
BMI	21.8	21.9	25.0	18.5	2.179092

years and a BMI of 21.8 in the study group. Tribal variation within the index population showed a predominance of Pedi, Tsonga, Tswana and Venda participants, which was to be expected with the geographical location of this study.

Reliability

Dahlberg formula analysis of the intra-examiner reliability is detailed in Table 7. All general facial, angular and aesthetic linear measurements fell within the acceptable range of error prescribed in our methods.

General Facial Measurements

A comparison of general facial dimensions demonstrates many statistically significant differences between ethnic groups when compared with the index South African study (Tables 8–9). Many of these differences hold relatively small margins, with some being in the region of 5 mm or less in difference, with overlapping standard deviations. An example of this is the comparison of the upper, mid, and lower facial height of the Kenyan population in relation to the index population. Of more interest are the relative and ratio-based measurements of each measurement within the entire face. The midface and lower face of South African women tends to be similar in height, with means of 69.3 ± 5.1 mm and 67.8 ± 5.44 mm, respectively, whereas the upper facial height tends to be shorter (60.2 ± 6.96 mm). Although in conflict with the neoclassical canon of "equal horizontal thirds," this finding is mirrored in studies in both Black and White female populations from Kenya and the United States of America and comes in contrast to the Sudanese and Nigerian populations where upper facial height approaches that of the mid and lower face. Due to the variable nature of the upper facial height due to trichion position, this difference may be due to variation in local hairstyle trends rather than an absolute anatomical discrepancy.

The mean facial width (bizygonal) in the index study was significantly larger than that of the participants from Nigeria, Kenya, and Sudan as well as North American White participants ($P < 0.0001$), whereas there was no significant difference in African American participants ($P = 0.2147$). The facial width-to-height ratio shows a value of 0.71 ± 0.04 (the width is roughly 70% of the height).

Eye Measurements

The mean intercanthal distance was found to be 34.7 ± 3.3 mm in length. The mean intercanthal distance to facial width ratio of 0.25 ± 0.02 or 25% of the facial width. This indicates the deviation of the young South African female face away from the neoclassical canons of "vertical fifths," where intercanthal distance is 20% of the facial width.

The mean canthal tilt in participants showed a superolateral inclination of the lateral canthus in comparison to the medial canthus of 6.9 ± 2.7 degrees. These findings are summarized in Table 10.

Nasal Measurements

Tables 11 and 12 summarize the linear and angular nasal measurements from the index and international studies. Nasal length was found to have a mean of 38.8 ± 3.78 mm. The projection of the radix from the corneal plane was 7.8 ± 3.18 mm, which may guide the rhinoplasty surgeon on the need for dorsal augmentation. The tip projection with a mean of 21.5 ± 2.9 mm, together with a significantly larger nasofrontal angle, shows a less-projected nasal tip compared with ethnicities examined in other studies. This finding is consistent with a nasofacial angle of 31.3 ± 3 degrees and columellar length of 8.2 ± 1.69 mm. The nasolabial angle approximates that of Kenyan participants but is unsurprisingly less than that of North

Table 6. Tribal Variation Amongst Sample Population

Tribal Affiliation	Ndebele	Pedi	Sotho	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu
Number	3	53	3	9	28	24	19	3	14
Percentage	1.9	40	1.9	5.8	17.9	15.4	12.2	1.9	9

Table 7. Intra-examiner Reliability: Dahlberg Formula

General Measurements	Dahlberg Coefficient
Upper facial height	0.648
Midfacial height	0.819
Lower facial height	0.154
Facial width	0.661
Angle of facial convexity	1.3
Intercanthal width	0.329
Canthal slant	0.035
Interalar width	0.329
Nasal measurements	
Nasal length	0.953
Alar flare	0.03109
Radix projection	0.209
Tip projection	0.067
Alar base	0.26682
Lobule width	0.22
Columella length	0.113
Nasofrontal angle	2
Nasofacial angle	0.712
Nasolabial angle	2.456
Nasomental angle	0.8
Lip measurements	
Upper lip height	0.066
Lower lip height	0.127
Upper vermilion height	0.102
Lower vermilion height	0.093
Upper lip projection	0.025
Lower lip projection	0.0196
Chin measurement	
Mandibular height	0.103
Chin projection	0.375
Depth of mentolabial sulcus	0.07
Mentocervical angle	0.613

All results showed an acceptable level of error with general facial (morphological) measurements less than 2 mm, angular measurements less than 2.5degrees, and aesthetic linear measurements less than 0.5 mm.

Table 8. Results of General Facial Measurement: Index Study

Facial Measurement (mm)	Mean	Median	Max	Min	SD
Upper facial height	60.2	60.1	80.7	46.0	6.96
Midfacial height	69.3	69.0	84.7	58.0	5.134
Lower facial height	67.8	68.1	81.7	56.0	5.44
Facial width	139.2	139.7	153.7	122.0	6.83
Angle of facial convexity	7.9	7.0	19.0	0.0	4.80
Facial width: height	0.71	0.70	0.80	0.59	0.04

American White participants, indicating an inferiorly rotated, flatter nasal tip in comparison. This measurement however, is significantly greater than that of African American and Congolese populations.

The mean interalar width is 42.9 ± 3.1 mm, which was significantly wider than those of other studies, and the interalar to intercanthal width ratio shows the width of the nose to be (24.5 ± 12.2)% larger than the intercanthal distance. This correlates to a medial canthus that lies more medial to a vertical line from the alar-facial groove of the young Black South African woman and therefore deviates from the neoclassical canon of equal vertical fifths.

Table 9. Comparison of General Facial Dimensions of Index Study versus Local and International Studies

	Present Study	Miles and Naidoo		Olusanyo		Virdi		Salah		Farkas			
Country	South Africa	South Africa		Nigeria		Kenya		Sudan		USA			
Race group	Black	Black		Black		Black		Black		White		African American	
No. participants	156	15		51		36		100		200		50	
	Mean (SD)	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*
Upper facial height	60.2 (6.9)	—	—	62.5 (6.1)	0.0349	55.4 (3.3)	<0.0001	74.2 (11.9)	<0.0001	52.3 (6)	<0.0001	55.7 (0.7)	<0.0001
Midfacial height	69.3 (5.1)	67.36 (4.8)	0.2171	58.8 (6.7)	<0.0001	63.3 (4.8)	<0.0001	77.9 (11.1)	<0.0001	63.1 (4.4)	<0.0001	62.0 (0.4)	<0.0001
Lower facial height	67.8 (5.4)	77.8 (5.5)	<0.0001	63.6 (5.0)	<0.0001	65 (4.8)	0.0047	78.1 (10.1)	<0.0001	64.3 (4)	<0.0001	67 (0.5)	0.2975
Facial width	139.2 (6.8)	—	—	122.5 (6.37)	<0.0001	130.1 (3.5)	<0.0001	103.4 (6.1)	<0.0001	120 (4.6)	<0.0001	135 (0.5)	0.2147

Comparative studies by Miles & Naidoo, Olusanya et al, Virdi et al, Farkas et al and Salah et al.[4,13,19,26–29] Individual student *t* test performed with *P* provided. Significant at *P* less than 0.05.

Table 10. Eye Measurements

	Mean	Median	Max	Min	SD
Intercanthal distance (ID)	34.7	34.4	46.9	27.3	3.298482
Canthal tilt (degrees)	6.8	6.7	14.0	-2.3	2.687014
ID to facial width	0.25	0.25	0.36	0.20	0.02

Index study: eye measurements (linear measurements in mm; angular measurements in degrees).

Other key factors include an alar flare of 1.7 ± 0.9 mm, and a wide, rounded lobule measuring 25.0 ± 2.5 mm or rather, (63.7 ± 7.1) % of the nasal width. Nostril subtypes in this sample were found to be predominantly "oval base/horizontal axis," with the second most common being that of the "trapezoidal base/inverted axis."

Lip Measurements

Lip measurements of the index (Table 13) as well as international studies (Table 14) are detailed below. The analysis of the upper to lower vermilion ratio is more than the classical 1:1.618 described by the golden ratio, with the upper exceeding the height of the lower vermilion in many cases (mean upper to lower ratio of 1.2:1).

Ethnic comparison of the lips of the current study population with those from other populations reveals decreased upper vermilion height but no significant difference in lower vermillion height when compared with Kenyan counterparts. The upper and lower lip lengths are comparable to those in other studies where despite a statistically significant difference in lower lip height, this difference was only 1.2 mm.

Lip projection in relation to the Ricketts E-line is classically described as the upper lip falling 4 mm behind and the lower lip falling 2 mm behind the E-line.[20] The index population, however, has significantly more protrusive lips with a mean of 2.4±2.1 mm and 5.2±2.2 mm protrusion beyond the E-line for the upper and lower lip, respectively. In summary, the young Black South African woman has full lips with increased protrusion beyond the Ricketts E-line and an upper to lower vermilion thickness, which approximates a 1:1 ratio.

Chin and Mandibular Measurements

The mean mandibular height measured from mentolabial crease to menton was 43.6 ± 4.4 mm in this study population (Table 15). The classical principle of Gonzalez-Ulloa is that the chin should lie 0–2 mm behind the vertical facial plane.[21] In this sample, the mean chin projection indicated the chin fell 10.2 mm behind this line. This legitimizes the need for ethnic-specific norms for this measurement or the need for alternative measurement techniques when considering other ethnicities.

The mean depth of the mentolabial sulcus was 4.5 ± 1.3 mm. This measurement was not performed by the international studies included; however, a previous study of African American subjects by Flynn in 1989 showed a mean mentolabial sulcus depth of 5.5 ± 1.3 mm.[22] Despite this showing statistical significance using a Student *t* test ($P = 0.006$), the difference in means is only 1 mm with "normal" ranges overlapping.[22]

The mean mentocervical angle in this study population was 82.3 ± 6.2 degrees, which is within the "normal" range of 80–95 degrees initially described by Humphries and Powell in 1984, when describing White women.[23]

CONCLUSIONS

There are significant differences in facial anthropometric measurements between Black South African women and those from other ethnic and geographical backgrounds. The general facial proportions of young Black South African women are similar to those of Kenyan and Nigerian populations with upper facial heights being less than that of the lower and midface, thus deviating from the neoclassical canon of equal horizontal thirds. The intercanthal distance makes up approximately 25% of the facial width

Table 11. Nasal Measurements

Linear Measurements (mm)	Mean	Median	Max	Min	SD
Nasal length	38.8	38.6	48.9	29.6	3.778
Radix projection	7.8	7.6	15.6	0.0	3.177
Tip projection	21.5	21.5	31.0	10.3	2.929
Interalar width	42.9	43.0	51.8	34.2	3.061
Base width	39.5	39.5	51.8	31.6	3.241
Alar flare	1.7	1.7	5.0	0.0	0.916
Lobule width	25.0	24.9	33.8	17.4	2.490
Lobule width to nasal width	0.637	0.635	0.837	0.43	0.071
Columella length	8.2	8.3	12.5	4.4	1.693
Interalar/intercanthal distance (%)	124.5	123.5	157.6	91.7	12.2
Angular measurements					
Nasofrontal angle	141.0	141.0	180.0	129.0	5.764
Nasofacial angle	31.3	31.3	38.4	22.7	3.028
Nasolabial angle	85.6	85.6	110.0	58.0	10.818
Nasomental angle	134.8	134.5	150.0	125.0	4.412
Nostril subtype	Total	%			
Triangular base/vertical axis	29	18.6			
Oval base/horizontal axis	86	55.1			
Trapezoidal base/inverted axis	41	26.3			

Table 12. Comparison of Nasal Angular Measurements of Index Study versus Local and International Studies

	Present Study	Miles and Naidoo		Esabish		Virdi		Farkas			
Country	South Africa	South Africa		Congo		Kenya		USA			
Race group	Black	Black		Black		Black		White		African American	
No. participants	156	15		71		36		200		50	
	Mean (SD)	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*
Nasofrontal Angle	141 (5.8)	—	—	131.3 (5.6)	<0.0001	127.9 (3.0)	<0.0001	134.3 (7)	<0.0001	127.6 (8.1)	<0.0001
Nasolabial Angle	85.6 (10.8)	82.6 (10.9)	0.306	79.3(0.7)	<0.0001	85.2 (13.8)	0.8499)	104.2 (9.8	<0.0001	73.9 (14.5)	<0.0001

Comparative studies by Miles and Naidoo, Esabish et al, Virdi et al, Farkas et al [4,5,13,19,28] Individual Student *t* test performed with *P* provided. Significant *P* less than 0.05.

Table 13. Lip Measurements for Index Study

Linear Measurments (mm)	Mean	Median	Max	Min	SD
Upper lip height	23.9	23.7	30.9	17.9	2.510
Lower lip height	19.5	19.7	26.6	12.9	2.495
Upper vermillion height	11.0	11.0	16.4	6.0	2.043
Lower vermillion height	13.2	13.4	19.5	8.1	1.852
Upper lip projection (E-line)	2.4	2.3	7.7	– 3.2	2.145
Lower lip projection (E-line)	5.2	5.3	10.1	– 1.8	2.160
Ratios					
Upper: lower vermilion	0.838	0.827	1.423	0.510	0.151
Upper vermilion: lip	0.458	0.460	0.726	0.276	0.077
Lower vermilion: lip	0.685	0.677	0.985	0.380	0.120
Lower vermilion: lip	0.685	0.677	0.985	0.380	0.120

and, together with the nasal width that is larger than the intercanthal distance, deviates from the neoclassical canons of equal fifths. There is a gentle superolateral canthal tilt of 6.9 degrees on average. The nose is generally flatter in comparison with other populations, indicated by a wider nasofrontal angle and decreased tip projection. The nasal base is generally wider than that of the other populations examined. The nasolabial angle is also more acute than that of White people, indicating a more inferiorly rotated tip, and flatter nose. The nostril base/axis of inclination subtype is generally that of a horizontal or inverted axis. The lips are full, with an upper to lower vermillion ratio approximating 1:1. The lips are also more protrusive than the classical teaching of Ricketts, with the upper and lower lips sitting in front of the E-line rather than behind it.[20] The mandible and chin, as well as their relationship to the face and neck closely approximate the findings of Flynn as well as Humphries and Powell when describing African American and White populations.[22,23]

DISCUSSION

This study highlights the nuance and sensitivity required to treat patients from varying ethnicities such as that of the Black South African woman. Furthermore, there may also be a degree of tribal variation within the South African population that was not fully elucidated in this study due to lack of sufficient representation from all tribal groups. This is an area for further research and may prove to show additional subtle differences.

The "aesthetic ideal" of this population is to be found within the "normal" ranges detailed in this study. Although these ranges may be relatively wide in some cases, the work of Symons as well Baudouin et al in their description of "facial averageness" showed substantial evidence that the aesthetic ideals of any given population tends toward the average.[24,25] It is therefore hypothesized that the mean values from this study could be used as a guide to this ideal value, bearing in mind the need for further research in this area.

Clinicians treating patients of varying or mixed ethnic backgrounds may find themselves needing to use multiple data sets from different populations. Any clinical decision in this scenario would need to be individualized according to the predominant ethnic features and based on multiple points of reference, including the patient's ethnic identity, aesthetic desires, and the clinician's discretion and artistic intuition.

Table 14. Comparison of Lip Measurements of Index Study versus Local and International Studies

	Present Study	Miles and Naidoo		Esabish		Virdi	
Country	**South Africa**	**South Africa**		**Congo**		**Kenya**	
Race Group	Black	Black		Black		Black	
No. participants	156	15		71		36	
	Mean (SD)	Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*
Upper vermilion height	11 (2.0)	—	—	—	—	13.4 (0.9)	<0.0001
Lower vermilion height	13.2 (1.9)	—	—	—	—	13.6 (1)	0.229
Upper lip length	23.9 (2.5)	25.5 (3.1)	0.0217	24 (2.5)	0.7802	25 (2.5)	0.8290
Lower lip length	19.5 (2.5)	—	—	20.7 (1.1)	<0.0001	20.7 (1.1)	<0.0001

Comparative studies by Miles and Naidoo, Esabish et al, Virdi et al.[13,19,28] Individual Student t test performed with P provided. Significant at $P < 0.05$.

Table 15. Chin and Mandibular Measurements for Index Study

(mm)	Mean	Median	Max	Min	SD
Mandibular height	43.6	43.6	54.5	33.8	4.364
Chin projection	11.2	10.9	22.5	3.0	2.960
Depth of Mentolabial Sulcus	4.6	4.5	8.2	0.8	1.299
Mentocervical angle	82.3	83.1	96.5	66.2	6.216

This study has shed light on the need for a new data set for the Black South African woman and, indeed, those of all ethnic backgrounds to guide the modern healthcare professional in facial reconstruction and cosmetic and dental interventions. It also serves to highlight the shortcomings of the "classical norms" that are most often quoted in medical literature and the need to scrutinize all medical data that may be confounded by ethnic and geographical variables.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

The patient provided written consent for the use of her image.

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