

Original Article

International Anthropometric Study of Facial Morphology in Various Ethnic Groups/Races

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When anthropometric methods were introduced into clinical practice to quantify changes in the craniofacial framework, features distinguishing various races/ethnic groups were discovered. To treat congenital or post-traumatic facial disfigurements in members of these groups successfully, surgeons require access to craniofacial databases based on accurate anthropometric measurements. Normative data of facial measurements are indispensable to precise determination of the degree of deviations from the normal. The set of anthropometric measurements of the face in the population studied was gathered by an international team of scientists. Investigators in the country of the given ethnic group, experienced and/or specially trained in anthropometric methods, carried out the measurements. The normal range in each resultant database was then established, providing valuable information about major facial characteristics. Comparison of the ethnic groups' databases with the established norms of the North America whites (NAW) offered the most suitable way to select a method for successful treatment. The study group consisted of 1470 healthy subjects (18 to 30 years), 750 males and 720 females. The largest group (780 subjects, 53.1%) came from Europe, all of them Caucasians. Three were drawn from the Middle-East (180 subjects, 12.2%), five from Asia (300 subjects, 20.4%) and four from peoples of African origin (210 subjects, 14.3%). Their morphological characteristics were determined by 14 anthropometric measure-

ments, 10 of them used already by classic facial artists, Leonardo da Vinci and Albrecht Dürer, complemented by four measurements from the nasal, labio-oral and ear regions. In the regions with single measurements, identical values to NAW in forehead height, mouth width, and ear height were found in 99.7% in both sexes, while in those with multiple measurements, vertical measurements revealed a higher frequency of identical values than horizontal ones. The orbital regions exhibited the greatest variations in identical and contrasting measurements in comparison to NAW. Nose heights and widths contrasted sharply: in relation to NAW the nose was very or extremely significantly wide in both sexes of Asian and Black ethnic groups. Among Caucasians, nose height significantly differed from NAW in three ethnic groups, with one shorter and two greater. In the Middle Eastern groups nose width was identical to those of NAW but the height was significantly greater. The present study, conducted by investigators working separately across the world and with small samples of the population, is clearly preliminary in nature and extent. Yet it may fulfill its mission if medical and anthropological investigators continue the work of establishing normative data of the face. These data are urgently needed by medical professionals but have been lacking up till now in western and northern Europe, Asia, and Africa.

Over the last century wars, poverty, and political turmoil in Europe, Asia and Africa have led to sharply increased migration of numerous peoples to North America. These newcomers represent a much broader spectrum of races and ethnic groups than were seen in earlier waves of immigration. This influx of diverse peoples has important implications for craniofacial surgeons and other medical professionals

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whose work involves analysis and correction of morphological disfigurements and anomalies of the head and face.¹ Unfortunately, normative data of the head and face of more recent immigrants remain largely unavailable.

Although physical anthropologists have long been aware of differences in facial measurements among races and ethnic groups,²⁻⁷ for centuries the neoclassical facial canons established during the Renaissance⁸ went unchallenged. Only in recent years has the validity of these canons been systematically investigated.⁹⁻¹² These initial studies, based on anthropometric techniques, led to comparisons of facial differences among races and ethnic groups not represented in earlier investigations. The present study, to our knowledge, is the broadest yet conducted in terms of geographical reach and diversity of subjects. It compares data from 25 countries across the world to norms established previously for North American whites (NAW).¹³

The aim of this study are as follows:

1. To establish the normal range of measurements of the craniofacial complex selected for the study in all participating ethnic/racial groups
2. To establish the frequency of identical, very or extremely significantly smaller or greater measurements in these groups in relation to the normal range of NAW
3. To identify the craniofacial region(s) that contribute most to significant differences between NAW and other ethnic/racial groups
4. To identify the measurements that contribute most to the anthropometric quality of the facial region.

SUBJECTS AND METHODS

The study group consisted of 1470 healthy young subjects, 750 males and 720 females, 18 to 30 years of age, drawn from five regions of the world: Europe, the Middle East, Asia, Africa, and North America. The largest group (780 subjects, 53.1%) were of Caucasian origin and came from 13 countries in Europe (Azerbaijan, Bulgaria, Croatia, Czech Republic, Germany, Greece, Hungary, Italy, Poland, Portugal, Russia, Slovakia and Slovenia). Three countries in the Middle East (Egypt, Iran, Turkey) were represented (180 subjects, 12.2%) and five from Asia (India, Japan, the Chinese of Singapore, Vietnam and Thailand, 300 subjects, 20.4%). Finally, there were 210 subjects (14.3%) with an African origin (Angola, the Tonga and Zulu nations of Africa, and African-Americans from the United States).

We selected 14 anthropometric measurements to determine the morphologic characteristics of the craniofacial complex. Ten of them were the neoclassical facial canons of the Renaissance used by da Vinci and Dürer⁹ (tr-n, zy-zy, sn-gn, en-en, en-ex, n-sn, al-al, ch-ch, sa-sba and the inclination of the nasal bridge), complemented by three facial (tr-gn, n-gn and go-go) and one orbital measurement (ex-ex) (Figs 1,2). In each participating nation 30 males and 30 females (omitted in the Tonga nation) were examined by physical anthropologists, anatomists, plastic surgeons, or dentists working in university hospitals and medical institutes, who volunteered their help to provide the data for the study. The first author was in close contact with the participants, giving special attention for using the accepted anthropometric techniques to ensure the accuracy of measurements. Details of the anthropometric measuring techniques have been published previously.¹³

For evaluation of the distributional differences among measurement values in ethnic groups (Caucasians of Europe, ethnic groups in the Middle East, Asia and Africa), the data base of the North American white population was used as a reference group.¹³

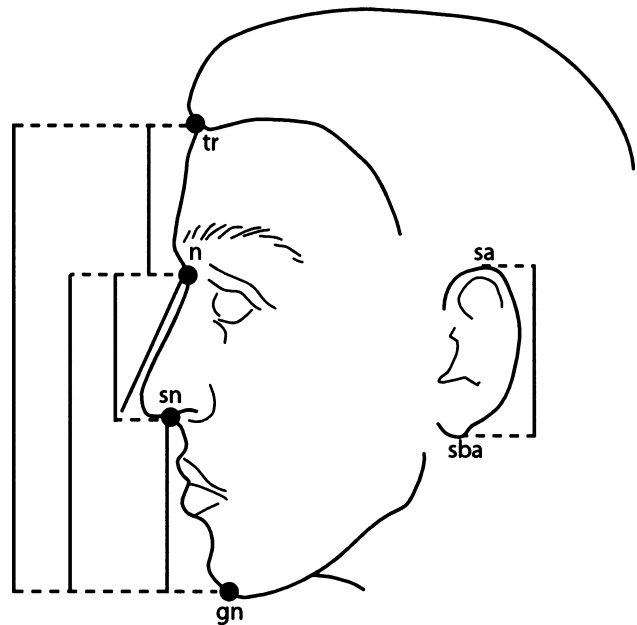


Fig 1 Measurements on the lateral aspect of the face: Head: tr-n (forehead height) Face: tr-gn (physiognomical face height) n-gn (morphological face height) sn-gn (lower face height) Nose: n-sn (nose height), in: (inclination of the nasal bridge) Ear: sa-sba (length of the auricle).

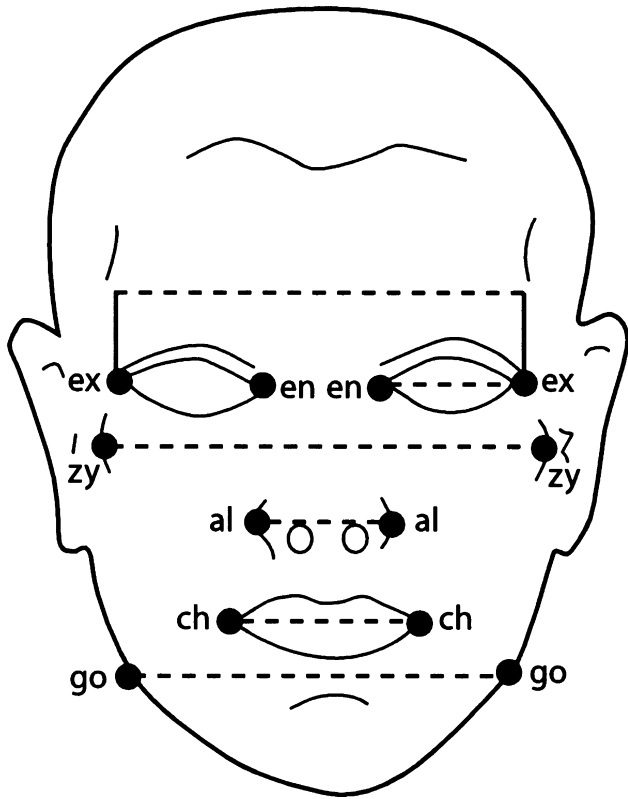


Fig 2 Measurements on the frontal aspect of the face: Orbits: en-en (intercanthal width) ex-ex (biocular width) en-ex (eye fissure length) Face: zy-zy (face width) go-go (mandible width) Nose: al-al (morphological nose width) Labio-oral region: ch-ch (mouth width).

First, the NAW distribution for a given measurement was divided into three categories: one central category, spanning +2 standard deviation (SD) to -2 SD around the mean and indicated in tables 1-26 as the normal range, and two outer categories, designated either as significantly smaller (more than -2 SD from the mean) or larger (more than +2 SD from the mean). Next, each subject's specific measurement was placed in the appropriate category, resulting in a frequency distribution of counts. Finally, a goodness-of-fit χ^2 statistic was calculated for these three *observed* frequencies compared with the *expected* frequencies derived from the NAW distribution.

The following descriptors were used to indicate the degree of statistical significance: only *P* values of ≤ 0.009 were considered statistically significant, those between 0.009 and 0.001 were termed very significant, and those < 0.001 were termed extremely significant. *P* values between 0.01 and 0.05, representing differences too small to be visually discerned, were not considered significant.

RESULTS

The craniofacial measurements of 25 ethnic groups of Caucasoid, Middle Eastern, Asian and African origin are summarized below.

Craniofacial Regions With a Single Measurement: Their Relationship to the North American White Normal Range

Head

Forehead heights (tr-n) of 13 Caucasian male and 12 female groups (92.3%) were identical to those of

Table 1. Normal Range of Measurements of North American White Young Adult Population

Measurement	Males					Females				
	-2 SD	-1 SD	Mean	+1 SD	+2 SD	-2 SD	-1 SD	Mean	+1 SD	+2 SD
tr-n	57.3	63.7	70.1	76.5	82.9	50.5	57.0	63.3	70.0	76.5
tr-gn	171.3	179.4	187.5	195.6	203.7	157.5	165.0	172.5	180.0	187.5
n-gn	107.7	114.5	121.3	128.1	134.9	101.4	106.6	111.8	117.0	122.2
sn-gn	59.9	65.9	71.9	77.9	83.9	56.5	61.0	65.5	70.0	74.5
zy-zy	128.5	132.8	137.1	141.4	145.7	119.3	124.6	129.9	135.2	140.5
go-go	85.5	91.3	97.1	102.9	108.7	79.3	85.2	91.1	97.0	102.9
en-en	27.5	30.2	32.9	35.6	38.3	26.8	29.2	31.6	34.0	36.4
en-ex	28.6	29.9	31.2	32.5	33.8	27.1	28.9	30.7	32.5	34.3
ex-ex	82.2	85.8	89.4	93.0	96.6	78.8	82.8	86.8	90.8	94.8
n-sn	46.0	49.5	53.0	56.5	60.0	43.7	46.3	48.9	51.5	54.1
al-al	29.5	32.1	34.7	37.3	39.9	27.6	29.5	31.4	33.3	35.2
noseinclin	22.4	27.0	31.6	36.2	40.8	19.4	24.7	30.0	35.3	40.6
ch-ch	46.7	50.0	53.3	56.6	59.9	43.4	46.6	49.8	53.0	56.2
sa-sba	55.0	58.7	62.4	66.1	69.8	51.7	55.1	58.5	61.9	65.3

Table 2a. Azerbaijan Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.5	64.7	78.9	23	76.7	7	23.3	0	0	NS
FACE										
tr-gn	167.1	185.1	203.1	28	93.3	1	3.3	1	3.3	NS
n-gn	110.5	121.3	132.1	29	96.7	0	0	1	3.3	NS
sn-gn	60.0	69.0	78.0	30	100.0	0	0	0	0	NS
zy-zy	136.7	147.5	158.3	10	33.3	0	0	20	66.7	<0.00001
go-go	98.1	106.3	114.5	22	73.3	0	0	8	26.7	p = 0.03
ORBITS										
en-en	23.8	30.8	37.8	22	73.3	7	23.3	1	3.3	NS
en-ex	31.0	34.4	37.8	9	30.0	0	0	21	70.0	<0.00001
ex-ex	87.8	96.2	104.6	16	53.3	0	0	14	46.7	p = 0.0004
NOSE										
n-sn	49.1	55.9	62.7	26	86.7	0	0	4	13.3	NS
al-al	30.9	35.7	40.5	28	93.3	0	0	2	6.7	NS
nasal bridge inclination	27.0	39.8	52.6	20	66.7	0	0	10	33.3	p = 0.008
LABIO-ORAL REGION										
ch-ch	46.4	53.4	60.4	29	96.7	0	0	1	3.3	NS
EAR										
sa-sba	57.4	65.6	73.8	23	76.7	0	0	7	23.3	NS

Table 2b. Azerbaijan Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	52.8	60.6	68.4	30	100.0	0	0	0	0	NS
FACE										
tr-gn	161.8	175.4	189.0	29	96.7	0	0	1	3.3	NS
n-gn	103.5	111.5	119.5	30	100.0	0	0	0	0	NS
sn-gn	56.8	63.6	70.4	30	100.0	0	0	0	0	NS
zy-zy	128.3	138.7	149.1	22	73.3	0	0	8	26.7	p = 0.03
go-go	91.1	102.9	114.7	20	66.7	0	0	10	33.3	p = 0.008
ORBITS										
en-en	26.1	30.5	34.9	29	96.7	1	3.3	0	0	NS
en-ex	30.6	33.8	37.0	23	76.7	0	0	7	23.3	NS
ex-ex	86.2	94.2	102.2	17	56.7	0	0	13	43.3	p = 0.0009
NOSE										
n-sn	45.1	52.3	59.5	23	76.7	0	0	7	23.3	NS
al-al	28.4	33.8	39.2	23	76.7	0	0	7	23.3	NS
nasal bridge inclination	29.0	39.4	49.8	23	76.7	0	0	7	23.3	NS
LABIO-ORAL REGION										
ch-ch	42.3	49.7	57.1	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	54.2	61.2	68.2	27	90.0	0	0	3	10	NS

Table 3a. Bulgarian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	52.0	66.4	80.8	26	86.7	3	10.0	1	3.3	NS
FACE										
tr-gn	166.9	184.3	201.7	28	93.3	1	3.3	1	3.3	NS
n-gn	107.7	122.9	138.1	28	93.3	1	3.3	1	3.3	NS
sn-gn	59.9	69.5	79.1	29	96.7	1	3.3	0	0	NS
zy-zy	128.3	139.5	150.7	25	83.3	1	3.3	4	13.3	NS
go-go	90.6	108.8	127.0	14	46.7	0	0	16	53.3	0.00008
ORBITS										
en-en	25.3	32.3	39.3	26	86.7	2	6.7	2	6.7	NS
en-ex	28.1	31.3	34.5	26	86.7	0	0	4	13.3	NS
ex-ex	83.1	94.7	106.3	24	80.0	0	0	6	20.0	NS
NOSE										
n-sn	46.4	54.0	61.6	29	96.7	0	0	1	3.3	NS
al-al	29.4	36.0	42.6	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	20.7	30.9	41.1	26	86.7	2	6.7	2	6.7	NS
LABIO-ORAL REGION										
ch-ch	42.2	49.8	57.4	23	76.7	7	23.3	0	0	NS
EAR										
sa-sba	56.4	64.4	72.4	28	93.3	0	0	2	6.7	NS

Table 3b. Bulgarian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.0	63.4	76.8	28	93.3	2	6.7	0	0	NS
FACE										
tr-gn	156.9	170.5	184.5	29	96.7	1	3.3	0	0	NS
n-gn	101.4	111.0	120.6	29	96.7	0	0	1	3.3	NS
sn-gn	52.8	61.6	70.4	27	90.0	3	10.0	0	0	NS
zy-zy	122.1	130.9	139.7	30	100.0	0	0	0	0	NS
go-go	89.1	98.7	108.3	25	83.3	0	0	5	16.7	NS
ORBITS										
en-en	25.3	29.7	34.1	29	96.7	1	3.3	0	0	NS
en-ex	27.8	30.4	33.0	29	96.7	0	0	1	3.3	NS
ex-ex	82.1	91.9	101.7	24	80.0	0	0	6	20.0	NS
NOSE										
n-sn	45.7	52.1	58.5	24	80.0	0	0	6	20.0	NS
al-al	23.6	33.0	42.4	28	93.3	0	0	2	6.7	NS
nasal bridge inclination	21.2	31.2	41.2	28	93.3	0	0	2	6.7	NS
LABIO-ORAL REGION										
ch-ch	42.0	46.2	50.4	27	90.0	3	10.0	0	0	NS
EAR										
sa-sba	53.0	59.0	65.0	30	100.0	0	0	0	0	NS

Table 4a. Czech Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	63.4	69.6	75.8	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	165.9	181.7	197.5	29	96.7	1	3.3	0	0	NS
n-gn	107.5	117.5	127.5	30	100.0	0	0	0	0	NS
sn-gn	61.1	70.7	80.3	30	100.0	0	0	0	0	NS
zy-zy	108.3	134.9	161.5	21	70.0	5	16.7	4	13.3	NS
go-go	101.9	109.5	117.1	27	90.0	0	0	3	10.0	NS
ORBITS										
en-en	24.7	30.9	37.1	26	86.7	4	13.3	0	0	NS
en-ex	25.8	29.4	33.0	21	70.0	9	30.0	0	0	0.02
ex-ex	76.4	84.2	92.0	25	83.3	0	0	5	16.7	NS
NOSE										
n-sn	45.8	54.0	62.2	29	96.7	1	3.3	0	0	NS
al-al	31.2	36.2	41.2	26	86.7	0	0	4	13.3	NS
nasal bridge inclination	29.0	33.0	37.0	30	100.0	0	0	0	0	NS
LABIO-ORAL REGION										
ch-ch	46.6	53.8	61.0	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	56.9	64.3	71.7	29	96.7	0	0	1	3.3	NS

Table 4b. Czech Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	54.7	67.3	79.9	29	96.7	0	0	1	3.3	NS
FACE										
tr-gn	166.7	182.9	199.1	28	93.3	1	3.3	1	3.3	NS
n-gn	104.0	112.6	121.2	27	90.0	0	0	3	10.0	NS
sn-gn	50.6	66.0	81.4	28	93.3	1	3.3	1	3.3	NS
zy-zy	97.6	126.4	155.2	22	73.3	6	20.0	2	6.7	NS
go-go	100.3	107.1	113.9	29	96.7	0	0	1	3.3	NS
ORBITS										
en-en	24.3	29.1	33.9	27	90.0	3	10.0	0	0	NS
en-ex	24.0	28.2	32.4	18	60.0	12	40.0	0	0	0.002
ex-ex	71.7	80.3	88.9	30	100.0	0	0	0	0	NS
NOSE										
n-sn	44.7	52.1	59.5	23	76.7	1	3.3	6	20.0	NS
al-al	28.8	33.8	38.8	23	76.7	1	3.3	6	20.0	NS
nasal bridge inclination	25.5	32.3	39.1	30	100.0	0	0	0	0	NS
LABIO-ORAL REGION										
ch-ch	43.4	50.2	57.0	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	54.3	61.7	69.1	26	86.7	0	0	4	13.3	NS

Table 5a. Croatian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	48.5	60.3	72.1	15	50.0	15	50.0	0	0	0.0002
FACE										
tr-gn	158.9	180.1	201.3	28	93.3	2	6.7	0	0	NS
n-gn	104.0	119.8	135.6	30	100.0	0	0	0	0	NS
sn-gn	53.6	66.0	78.4	25	83.3	5	16.7	0	0	NS
zy-zy	128.7	140.7	152.7	22	73.3	1	3.3	7	23.3	NS
go-go	89.5	102.1	114.7	25	83.3	0	0	5	16.7	NS
ORBITS										
en-en	26.1	31.5	36.9	29	96.7	1	3.3	0	0	NS
en-ex	26.9	30.5	34.1	26	86.7	3	10.0	1	3.3	NS
ex-ex	83.1	92.5	101.9	21	70.0	2	6.7	7	23.3	NS
NOSE										
n-sn	47.8	53.8	59.8	29	96.7	0	0	1	3.3	NS
al-al	31.1	36.5	41.9	26	86.7	0	0	4	13.3	NS
nasal bridge inclination	22.5	35.9	49.3	23	76.7	0	0	7	23.3	NS
LABIO-ORAL REGION										
ch-ch	42.7	50.5	58.3	24	80.0	6	20.0	0	0	NS
EAR										
sa-sba	53.8	63.6	73.4	24	80.0	6	20.0	0	0	NS

Table 5b. Croatian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.0	62.2	74.4	30	100.0	0	0	0	0	NS
FACE										
tr-gn	155.2	172.6	190.0	30	100.0	0	0	0	0	NS
n-gn	98.6	110.4	122.2	30	100.0	0	0	0	0	NS
sn-gn	51.3	60.7	70.1	24	80.0	6	20.0	0	0	NS
zy-zy	119.6	133.2	146.8	26	86.7	0	0	4	13.3	NS
go-go	83.6	94.6	105.6	26	86.7	0	0	4	13.3	NS
ORBITS										
en-en	24.9	29.7	34.5	25	83.3	5	16.7	0	0	NS
en-ex	34.5	38.3	42.1	20	66.7	10	33.3	0	0	0.008
ex-ex	76.7	86.3	95.9	25	83.3	3	10.0	2	6.7	NS
NOSE										
n-sn	42.8	50.0	57.2	27	90.0	2	6.7	1	3.3	NS
al-al	28.9	32.9	36.9	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	22.3	33.7	45.1	26	86.7	4	13.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	40.1	46.9	53.7	26	86.7	4	13.3	0	0	NS
EAR										
sa-sba	51.1	59.1	67.1	27	90.0	2	6.7	1	3.3	NS

Table 6a. German Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.3	69.9	86.5	26	86.7	1	3.3	3	10.0	NS
FACE										
tr-gn	160.0	182.2	204.4	26	86.7	4	13.3	0	0	NS
n-gn	99.4	116.0	132.6	26	86.7	4	13.3	0	0	NS
sn-gn	53.3	67.9	82.5	26	86.7	3	10.0	1	3.3	NS
zy-zy	118.2	133.2	148.2	23	76.7	6	20.0	1	3.3	NS
go-go	85.6	97.6	109.6	29	96.7	0	0	1	3.3	NS
ORBITS										
en-en	26.0	31.2	36.4	26	86.7	4	13.3	0	0	NS
en-ex	26.5	31.9	37.3	22	73.3	1	3.3	7	30.0	NS
ex-ex	78.9	87.9	96.9	28	93.3	2	6.7	0	0	NS
NOSE										
n-sn	40.8	52.0	63.2	26	86.7	2	6.7	2	6.7	NS
al-al	29.6	34.0	38.4	29	96.7	1	3.3	0	0	NS
nasal bridge inclination	19.8	29.2	38.6	27	90.0	3	10.0	0	0	NS
LABIO-ORAL REGION										
ch-ch	44.1	50.9	57.7	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	54.7	63.1	71.5	27	90.0	0	0	3	10.0	NS

Table 6b. German Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.9	66.3	78.7	24	80.0	0	0	6	20.0	NS
FACE										
tr-gn	156.5	170.9	185.3	29	96.7	0	0	1	3.3	NS
n-gn	99.5	109.5	119.5	29	96.7	1	3.3	0	0	NS
sn-gn	52.9	63.3	73.7	26	86.7	0	0	4	13.3	NS
zy-zy	105.0	123.4	141.8	26	86.7	0	0	4	13.3	NS
go-go	81.5	91.5	101.5	29	96.7	1	3.3	0	0	NS
ORBITS										
en-en	22.6	28.6	34.6	27	90.0	3	10.0	0	0	NS
en-ex	28.0	31.8	35.6	25	83.3	1	3.3	4	13.3	NS
ex-ex	80.0	86.4	92.8	30	100.0	0	0	0	0	NS
NOSE										
n-sn	45.8	51.4	57.0	23	76.7	0	0	7	23.3	NS
al-al	25.6	31.0	36.4	23	76.7	0	0	7	23.3	NS
nasal bridge inclination	23.0	29.0	35.0	30	100.0	0	0	0	0	NS
LABIO-ORAL REGION										
ch-ch	41.2	48.2	55.2	28	93.3	0	0	2	6.7	NS
EAR										
sa-sba	50.4	58.4	66.4	22	73.3	0	0	8	26.7	0.03

Table 7a. Greek Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	47.2	64.3	81.5	24	80.0	6	20.0	0	0	NS
FACE										
tr-gn	152.9	178.7	204.5	22	73.3	8	26.7	0	0	0.03
n-gn	105.4	120.0	134.6	29	96.7	1	3.3	0	0	NS
sn-gn	50.4	65.8	81.2	26	86.7	4	13.3	0	0	NS
zy-zy	105.8	128.6	151.4	14	46.7	14	46.7	2	6.7	0.0003
go-go	90.5	108.7	126.9	14	46.7	0	0	16	53.3	0.00008
ORBITS										
en-en	22.8	30.0	37.8	22	73.3	8	26.7	0	0	0.03
en-ex	26.8	34.8	42.8	14	46.7	1	3.3	15	50.0	0.00002
ex-ex	78.9	93.7	108.5	21	70.0	0	0	9	30.0	0.02
NOSE										
n-sn	47.3	55.5	63.7	26	86.7	0	0	4	13.3	NS
al-al	29.9	35.7	41.5	26	86.7	1	3.3	3	10.0	NS
nasal bridge inclination	21.1	35.5	49.9	23	76.7	0	0	7	23.3	NS
LABIO-ORAL REGION										
ch-ch	42.4	51.8	61.2	29	96.7	1	3.3	0	0	NS
EAR										
sa-sba	55.8	63.2	70.6	29	96.7	0	0	1	3.3	NS

Table 7b. Greek Females

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.3	63.1	72.9	29	96.7	0	0	1	3.3	NS
FACE										
tr-gn	160.0	173.8	187.6	30	100.0	0	0	0	0	NS
n-gn	102.2	116.4	130.6	30	100.0	0	0	0	0	NS
sn-gn	54.7	63.3	71.9	27	90.0	3	10.0	0	0	NS
zy-zy	122.6	132.2	141.8	29	96.7	0	0	1	3.3	NS
go-go	90.2	99.2	108.2	22	73.3	0	0	8	26.7	0.03
ORBITS										
en-en	24.5	29.5	34.5	26	86.7	4	13.3	0	0	NS
en-ex	26.4	32.0	37.6	23	76.7	2	6.7	5	16.7	NS
ex-ex	75.6	87.8	100.0	27	90	0	0	3	10	NS
NOSE										
n-sn	46.2	52.8	59.4	20	66.7	0	0	10	33.3	0.008
al-al	28.0	32.4	36.8	28	93.3	0	0	2	6.7	NS
nasal bridge inclination	22.4	34.0	45.6	25	83.3	0	0	5	16.7	NS
LABIO-ORAL REGION										
ch-ch	41.7	50.3	58.9	26	86.7	1	3.3	3	10.0	NS
EAR										
sa-sba	51.8	58.8	65.8	30	100.0	0	0	0	0	NS

Table 8a. Hungarian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	56.8	72.8	88.8	26	86.7	0	0	4	13.3	NS
FACE										
tr-gn	152.9	181.3	209.7	25	83.3	4	13.3	1	3.3	NS
n-gn	103.8	120.0	136.2	27	90.0	1	3.3	2	6.7	NS
sn-gn	56.4	64.2	72.0	29	96.7	0	0	1	3.3	NS
zy-zy	131.5	142.1	152.7	20	66.7	0	0	10	33.3	0.008
go-go	92.6	106.6	120.6	21	70.0	0	0	9	30.0	0.02
ORBITS										
en-en	27.1	31.7	36.3	29	96.7	1	3.3	0	0	NS
en-ex	31.7	37.7	43.7	3	10.0	0	0	27	90.0	<0.00001
ex-ex	90.4	100.4	110.4	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	49.8	55.0	60.2	30	100.0	0	0	0	0	NS
al-al	32.3	37.3	42.3	23	76.7	0	0	7	23.3	NS
nasal bridge inclination	25.6	34.0	42.4	28	93.3	1	3.3	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	48.8	57.0	65.2	20	66.7	0	0	10	33.3	0.008
EAR										
sa-sba	54.7	63.9	73.1	27	90.0	0	0	3	10.0	NS

Table 8b. Hungarian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	57.2	69.2	81.2	28	93.3	0	0	2	6.7	NS
FACE										
tr-gn	154.0	169.4	184.8	28	93.3	2	6.7	0	0	NS
n-gn	101.6	112.4	123.2	27	90.0	1	3.3	2	6.7	NS
sn-gn	49.1	56.7	64.3	16	53.3	14	46.7	0	0	0.0004
zy-zy	124.3	131.3	138.3	30	100.0	0	0	0	0	NS
go-go	83.6	95.0	106.4	28	93.3	0	0	2	6.7	NS
ORBITS										
en-en	27.6	31.2	34.8	29	96.7	1	3.3	0	0	NS
en-ex	30.1	34.9	39.7	3	10.0	0	0	27	90.0	<0.00001
ex-ex	87.7	97.3	106.9	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	45.5	52.5	59.5	16	53.3	14	46.7	0	0	0.0004
al-al	29.7	33.5	37.3	25	83.3	0	0	5	16.7	NS
nasal bridge inclination	20.6	32.8	45.0	29	96.7	0	0	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	44.0	51.6	59.2	27	90.0	0	0	3	10.0	NS
EAR										
sa-sba	52.8	60.2	67.6	28	93.3	0	0	2	6.7	NS

Table 9a. Italian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	47.5	63.1	78.7	23	76.7	6	20.0	1	3.3	NS
FACE										
tr-gn	164.8	186.0	207.2	25	83.3	3	10.0	2	6.7	NS
n-gn	113.3	124.7	136.2	29	96.7	0	0	1	3.3	NS
sn-gn	61.0	71.4	81.8	30	100.0	0	0	0	0	NS
zy-zy	131.4	143.2	155.0	19	64.3	0	0	11	36.7	0.004
go-go	102.5	116.3	130.1	3	10.0	0	0	27	90.0	<0.00001
ORBITS										
en-en	25.4	30.2	35.0	24	80.0	6	20.0	0	0	NS
en-ex	29.5	33.9	38.3	15	50.0	0	0	15	50.0	0.0002
ex-ex	86.8	93.8	100.8	23	76.7	0	0	7	23.3	NS
NOSE										
n-sn	48.4	56.2	64.0	26	86.7	0	0	4	13.3	NS
al-al	27.9	32.1	36.3	27	90.0	3	10.0	0	0	NS
nasal bridge inclination	19.0	28.6	38.2	26	86.7	4	13.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	43.2	50.8	58.4	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	54.4	63.2	72.0	28	93.3	0	0	2	6.7	NS

Table 9b. Italian Females

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	45.8	59.4	73.0	27	90.0	3	10.0	0	0	NS
FACE										
tr-gn	153.0	171.4	189.8	26	86.7	3	10.0	1	3.3	NS
n-gn	102.8	113.8	124.8	28	93.3	0	0	2	6.7	NS
sn-gn	53.6	64.4	75.2	28	93.3	2	6.7	0	0	NS
zy-zy	125.1	133.3	141.5	29	96.7	0	0	1	3.3	NS
go-go	95.3	104.9	114.5	7	23.3	1	3.3	22	73.3	<0.00001
ORBITS										
en-en	21.2	27.6	34.0	19	63.3	11	36.7	0	0	0.004
en-ex	28.5	32.7	36.9	24	80.0	0	0	6	20.0	NS
ex-ex	81.5	89.5	97.5	27	90.0	0	0	3	10.0	NS
NOSE										
n-sn	38.5	52.1	65.7	25	83.3	0	0	5	16.7	NS
al-al	24.7	29.5	34.3	24	80.0	6	20.0	0	0	NS
nasal bridge inclination	18.9	27.5	36.1	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	40.1	47.7	55.3	27	90.0	2	6.7	1	3.3	NS
EAR										
sa-sba	49.5	57.5	65.5	29	96.7	1	3.3	0	0	NS

Table 10a. Polish Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	58.2	68.8	79.4	30	100.0	0	0	0	0	NS
FACE										
tr-gn	165.5	181.9	198.3	29	96.7	1	3.3	0	0	NS
n-gn	105.3	117.5	129.7	30	100.0	0	0	0	0	NS
sn-gn	60.5	68.1	75.7	29	96.7	1	3.3	0	0	NS
zy-zy	133.2	142.6	152.0	22	73.3	0	0	8	26.7	0.03
go-go	85.8	98.8	111.8	27	90.0	2	6.7	1	3.3	NS
ORBITS										
en-en	25.5	30.3	35.1	25	83.3	5	16.7	0	0	NS
en-ex	30.0	34.0	38.0	11	36.7	0	0	19	63.3	<0.00001
ex-ex	80.2	90.2	100.2	26	86.7	0	0	4	13.3	NS
NOSE										
n-sn	46.9	53.7	60.5	30	100.0	0	0	0	0	NS
al-al	31.2	35.2	39.2	30	100.0	0	0	0	0	NS
nasal bridge inclination	21.5	30.9	40.3	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	46.1	52.5	58.9	30	100.0	0	0	0	0	NS
EAR										
sa-sba	55.1	63.3	71.5	27	90.0	0	0	3	10.0	NS

Table 10b. Polish Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.9	63.7	76.5	30	100.0	0	0	0	0	NS
FACE										
tr-gn	154.3	172.1	189.9	28	93.3	1	3.3	1	3.3	NS
n-gn	98.2	111.6	125.0	27	90.0	0	0	3	10.0	NS
sn-gn	51.7	60.5	69.3	25	83.3	5	16.7	0	0	NS
zy-zy	124.5	135.5	146.5	26	86.7	0	0	4	13.3	NS
go-go	85.5	93.9	102.3	29	96.7	0	0	1	3.3	NS
ORBITS										
en-en	24.8	29.2	33.6	27	90.0	3	10.0	0	0	NS
en-ex	29.2	32.8	36.4	25	83.3	0	0	5	16.7	NS
ex-ex	81.0	87.4	93.8	30	100.0	0	0	0	0	NS
NOSE										
n-sn	44.8	51.2	57.6	27	90.0	0	0	3	10.0	NS
al-al	27.2	32.6	38.0	30	100.0	0	0	0	0	NS
nasal bridge inclination	22.5	30.9	39.3	29	96.7	0	0	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	43.4	49.0	54.6	29	96.7	1	3.3	0	0	NS
EAR										
sa-sba	53.4	58.6	63.8	29	96.7	0	0	1	3.3	NS

Table 11a. Portuguese Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	55.8	67.6	79.4	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	176.5	190.7	204.9	30	100.0	0	0	0	0	NS
n-gn	113.1	124.5	135.9	27	90.0	0	0	3	10.0	NS
sn-gn	58.2	69.6	81.0	29	96.7	1	3.3	0	0	NS
zy-zy	114.3	125.1	135.9	8	26.7	22	73.3	0	0	<0.00001
go-go	80.0	87.6	95.2	18	60.0	12	40.0	0	0	0.002
ORBITS										
en-en	23.3	30.5	37.7	22	73.3	8	26.7	0	0	0.03
en-ex	33.3	38.1	42.9	2	6.7	0	0	28	93.3	<0.00001
ex-ex	87.7	99.3	110.9	6	20.0	0	0	24	80.0	<0.00001
NOSE										
n-sn	51.7	59.5	67.3	19	63.3	0	0	11	36.7	0.004
al-al	30.8	36.6	42.4	24	80.0	0	0	6	20.0	NS
nasal bridge inclination	23.6	34.2	44.8	27	90.0	0	0	3	10.0	NS
LABIO-ORAL REGION										
ch-ch	41.8	50.0	58.2	23	76.7	7	23.3	0	0	NS
EAR										
sa-sba	54.3	60.9	67.5	29	96.7	1	3.3	0	0	NS

Table 11b. Portuguese Female (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	51.4	62.2	73.0	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	158.4	177.4	196.4	27	90.0	1	3.3	2	6.7	NS
n-gn	104.2	118.2	132.2	23	76.7	0	0	7	23.3	0.05
sn-gn	53.6	62.8	72.0	28	93.3	2	6.7	0	0	NS
zy-zy	109.6	120.4	131.2	16	53.3	14	46.7	0	0	0.004
go-go	76.7	84.3	91.9	28	93.3	2	6.7	0	0	NS
ORBITS										
en-en	23.5	29.1	34.7	24	80.0	6	20.0	0	0	NS
en-ex	30.7	35.9	41.1	10	33.3	0	0	20	66.7	<0.00001
ex-ex	81.3	93.9	106.5	19	63.3	0	0	11	36.7	0.004
NOSE										
n-sn	49.0	57.8	66.6	6	20.0	0	0	24	80.0	<0.00001
al-al	27.1	31.9	36.7	28	93.3	0	0	2	6.7	NS
nasal bridge inclination	25.1	32.7	40.3	29	96.7	0	0	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	39.5	45.3	51.1	22	73.3	8	26.7	0	0	0.03
EAR										
sa-sba	48.2	55.4	62.6	27	90.0	3	10.0	0	0	NS

Table 12a. Russian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	59.5	75.1	90.7	24	80.0	1	3.3	5	16.7	NS
FACE										
tr-gn	168.2	184.4	200.2	28	93.3	1	3.3	1	3.3	NS
n-gn	110.3	122.9	135.5	29	96.7	0	0	1	3.3	NS
sn-gn	53.9	64.5	75.1	24	80.0	6	20.0	0	0	NS
zy-zy	132.4	141.2	150.0	27	90.0	0	0	3	10.0	NS
go-go	93.0	103.8	114.6	25	83.3	0	0	5	16.7	NS
ORBITS										
en-en	30.4	34.2	38.0	30	100.0	0	0	0	0	NS
en-ex	29.6	34.6	39.6	10	33.3	0	0	20	66.7	<0.00001
ex-ex	91.1	98.9	106.7	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	46.5	51.7	56.9	30	100.0	0	0	0	0	NS
al-al	31.2	35.8	40.4	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	29.4	37.4	45.4	22	73.3	0	0	8	26.7	0.03
LABIO-ORAL REGION										
ch-ch	44.9	52.5	60.1	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	56.1	63.1	70.1	29	96.7	0	0	1	3.3	NS

Table 12b. Russian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	57.3	70.7	84.1	24	80.0	0	0	6	20.0	NS
FACE										
tr-gn	157.0	174.4	191.8	28	93.3	1	3.3	1	3.3	NS
n-gn	101.4	114.2	127.0	29	96.7	0	0	1	3.3	NS
sn-gn	47.4	61.4	75.4	21	70.0	8	26.7	1	3.3	0.04
zy-zy	122.7	132.3	141.9	28	93.3	0	0	2	6.7	NS
go-go	90.4	98.6	106.8	25	83.3	0	0	5	16.7	NS
ORBITS										
en-en	26.7	32.7	38.7	27	90.0	0	0	3	10.0	NS
en-ex	30.7	34.5	38.3	13	43.3	0	0	17	56.7	0.00003
ex-ex	87.6	94.6	101.6	16	53.3	0	0	14	46.7	0.0004
NOSE										
n-sn	43.6	50.4	57.2	26	87.7	1	3.3	3	10.0	NS
al-al	28.8	33.2	37.6	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	26.1	38.9	51.7	19	63.3	0	0	11	36.7	0.004
LABIO-ORAL REGION										
ch-ch	41.9	48.1	54.3	29	96.7	1	3.3	0	0	NS
EAR										
sa-sba	53.2	59.2	65.2	29	96.7	0	0	1	3.3	NS

Table 13a. Slovak Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.8	68.8	83.8	27	90.0	2	6.7	1	3.3	NS
FACE										
tr-gn	166.1	183.7	201.3	29	96.7	1	3.3	0	0	NS
n-gn	99.2	115.0	130.8	24	80.0	6	20.0	0	0	NS
sn-gn	50.7	63.7	76.7	24	80.0	6	20.0	0	0	NS
zy-zy	123.7	134.7	145.7	25	83.3	4	13.3	1	3.3	NS
go-go	101.6	118.6	135.6	4	13.3	0	0	26	86.7	<0.00001
ORBITS										
en-en	27.0	32.6	38.2	29	96.7	0	0	1	3.3	NS
en-ex	31.7	34.9	38.1	5	16.7	0	0	25	83.3	<0.00001
ex-ex	90.1	100.7	111.3	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	47.9	53.5	59.1	30	100.0	0	0	0	0	NS
al-al	29.2	33.6	38.0	29	96.7	1	3.3	0	0	NS
nasal bridge inclination	29.9	33.9	37.9	30	100.0	0	0	0	0	NS
LABIO-ORAL REGION										
ch-ch	45.2	53.2	61.2	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	58.1	63.9	69.7	30	100.0	0	0	0	0	NS

Table 13b. Slovak Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	52.6	66.2	79.8	28	93.3	0	0	2	6.7	NS
FACE										
tr-gn	152.2	169.7	186.9	28	93.3	2	6.7	0	0	NS
n-gn	98.5	109.3	120.1	27	90.0	3	10.0	0	0	NS
sn-gn	50.0	58.6	67.2	19	63.3	11	36.7	0	0	0.004
zy-zy	113.6	125.0	136.4	25	83.3	5	16.7	0	0	NS
go-go	96.6	105.4	114.2	13	43.3	0	0	17	56.7	<0.00001
ORBITS										
en-en	25.9	30.7	35.5	29	96.7	1	3.3	0	0	NS
en-ex	28.3	32.3	36.3	24	80.0	0	0	6	20.0	NS
ex-ex	88.1	96.1	104.1	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	44.6	49.4	54.2	29	96.7	0	0	1	3.3	NS
al-al	27.0	30.6	34.2	29	96.7	1	3.3	0	0	NS
nasal bridge inclination	25.5	32.3	39.1	30	100.0	0	0	0	0	NS
LABIO-ORAL REGION										
ch-ch	42.9	48.9	54.9	30	100.0	0	0	0	0	NS
EAR										
sa-sba	52.7	59.3	65.9	30	100.0	0	0	0	0	NS

Table 14a. Slovenian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.7	69.3	87.9	25	83.3	3	10.0	2	6.7	NS
FACE										
tr-gn	160.7	181.3	202.9	25	83.3	3	10.0	2	6.7	NS
n-gn	103.6	116.6	129.6	28	93.3	2	6.7	0	0	NS
sn-gn	57.0	66.8	76.6	28	93.3	2	6.7	0	0	NS
zy-zy	124.6	136.2	147.8	28	93.3	2	6.7	0	0	NS
go-go	92.3	106.3	120.3	20	66.7	10	33.3	0	0	0.008
ORBITS										
en-en	28.0	32.0	36.0	29	96.7	1	3.3	0	0	NS
en-ex	30.6	36.4	42.2	5	16.7	0	0	25	83.3	<0.00001
ex-ex	93.8	102.6	111.4	2	6.7	0	0	28	93.3	<0.00001
NOSE										
n-sn	48.2	56.2	64.2	26	86.7	0	0	4	13.3	NS
al-al	30.1	35.9	41.7	25	83.3	0	0	5	16.7	NS
nasal bridge inclination	25.3	36.3	47.3	26	86.7	0	0	4	13.3	NS
LABIO-ORAL REGION										
ch-ch	45.2	53.0	60.8	26	86.7	1	3.3	3	10.0	NS
EAR										
sa-sba	55.1	63.3	71.5	26	86.7	1	3.3	3	10.0	NS

Table 14b. Slovenian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	51.7	65.3	78.9	29	96.7	0	0	1	3.3	NS
FACE										
tr-gn	140.2	170.4	200.6	25	83.3	3	10.0	2	6.7	NS
n-gn	90.2	108.8	127.4	28	93.3	2	6.7	0	0	NS
sn-gn	51.4	61.4	71.4	26	86.7	4	13.3	0	0	NS
zy-zy	119.1	129.5	139.9	29	96.7	0	0	1	3.3	NS
go-go	89.9	100.7	111.5	21	70.0	0	0	9	30.0	0.02
ORBITS										
en-en	24.6	30.2	35.8	26	86.7	4	13.3	0	0	NS
en-ex	28.8	33.2	37.6	21	70.0	0	0	9	30.0	0.02
ex-ex	85.9	96.1	106.3	10	33.3	0	0	20	66.7	<0.00001
NOSE										
n-sn	47.4	52.0	56.6	27	90.0	0	0	3	10.0	NS
al-al	28.1	33.1	38.1	26	86.7	1	3.3	3	10.0	NS
nasal bridge inclination	30.3	39.9	49.5	16	53.3	0	0	14	46.7	0.0004
LABIO-ORAL REGION										
ch-ch	42.8	49.2	55.6	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	51.4	59.6	67.8	27	90.0	1	3.3	2	6.7	NS

Table 15a. Iranian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	37.0	53.4	69.8	6	20.0	24	80.0	0	0	<0.00001
FACE										
tr-gn	159.9	180.3	200.7	25	83.3	5	16.7	0	0	NS
n-gn	116.6	132.4	148.2	21	70.0	0	0	9	30.0	0.02
sn-gn	63.7	73.3	82.9	30	100.0	0	0	0	0	NS
zy-zy	127.0	138.4	149.8	25	83.3	1	3.3	4	13.3	NS
go-go	92.5	105.9	119.3	22	73.3	0	0	8	26.7	NS
ORBITS										
en-en	31.9	27.3	32.7	15	50.0	15	50.0	0	0	<0.00001
en-ex	34.2	37.2	30.2	6	20.0	24	80.0	0	0	<0.00001
ex-ex	78.8	91.8	104.8	16	53.3	2	6.7	12	40.0	0.002
NOSE										
n-sn	56.2	62.6	69.0	9	30.0	0	0	21	70.0	<0.00001
al-al	29.3	35.3	41.3	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	16.8	26.6	36.4	24	80.0	6	20.0	0	0	NS
LABIO-ORAL REGION										
ch-ch	44.1	50.3	56.5	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	51.4	61.2	71.0	26	86.7	4	13.3	0	0	NS

Table 15b. Iranian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	40.3	56.9	73.5	23	76.7	7	23.3	0	0	NS
FACE										
tr-gn	160.9	175.9	190.9	29	96.7	0	0	1	3.3	NS
n-gn	108.7	120.3	131.9	18	60.0	0	0	12	40.0	0.002
sn-gn	57.4	66.2	75.0	30	100.0	0	0	0	0	NS
zy-zy	118.3	131.7	145.1	28	93.3	0	0	2	6.7	NS
go-go	88.7	102.7	116.7	14	46.7	0	0	16	53.3	0.00008
ORBITS										
en-en	17.6	24.6	31.6	10	33.3	20	66.7	0	0	<0.00001
en-ex	17.8	24.4	31.0	5	16.7	25	83.3	0	0	<0.00001
ex-ex	68.0	79.8	91.6	15	50.0	15	50.0	0	0	0.0002
NOSE										
n-sn	52.9	58.5	64.1	2	6.7	0	0	28	93.3	<0.00001
al-al	27.1	32.1	37.1	28	93.3	0	0	2	6.7	NS
nasal bridge inclination	18.2	28.2	38.2	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	39.8	45.0	50.2	21	70.0	9	30.0	0	0	0.02
EAR										
sa-sba	52.0	59.0	66.0	28	93.3	0	0	2	6.7	NS

Table 16a. Turkish Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	49.7	61.9	74.1	23	76.7	7	23.3	0	0	NS
FACE										
tr-gn	173.7	186.5	199.3	30	100.0	0	0	0	0	NS
n-gn	121.9	127.7	133.5	30	100.0	0	0	0	0	NS
sn-gn	57.5	65.9	74.3	28	93.3	2	6.7	0	0	NS
zy-zy	124.0	140.4	156.8	23	76.7	1	3.3	6	20.0	NS
go-go	100.9	109.5	118.1	13	43.3	0	0	17	56.7	0.00003
ORBITS										
en-en	27.6	32.8	38.0	29	96.7	0	0	1	3.3	NS
en-ex	28.2	30.6	33.0	30	100.0	0	0	0	0	NS
ex-ex	89.6	95.8	102.0	16	53.3	0	0	14	46.7	0.0004
NOSE										
n-sn	51.1	58.1	65.1	21	70.0	0	0	9	30.0	0.02
al-al	32.2	36.8	41.4	26	86.7	0	0	4	13.3	NS
nasal bridge inclination	21.1	28.5	35.9	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	46.6	53.0	59.4	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	57.6	64.8	72.0	26	86.7	0	0	4	13.3	NS

Table 16b. Turkish Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	46.7	60.7	74.7	26	86.7	4	13.3	0	0	NS
FACE										
tr-gn	160.4	179.2	198.0	24	80.0	0	0	6	20.0	NS
n-gn	102.2	116.4	130.6	21	70.0	0	0	9	30.0	0.02
sn-gn	51.5	59.1	66.7	24	80.0	6	20.0	0	0	NS
zy-zy	125.9	134.5	143.1	28	93.3	0	0	2	6.7	NS
go-go	84.4	100.0	115.6	18	60.0	0	0	12	40.0	0.002
ORBITS										
en-en	27.3	31.7	36.1	30	100.0	0	0	0	0	NS
en-ex	26.6	29.8	33.0	29	96.7	0	0	1	3.3	NS
ex-ex	83.8	93.2	101.6	17	56.7	0	0	13	43.3	0.0009
NOSE										
n-sn	47.2	55.2	63.2	13	43.3	0	0	17	56.7	0.00003
al-al	28.7	32.9	37.1	27	90.0	0	0	3	10.0	NS
nasal bridge inclination	18.1	27.9	37.7	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	41.8	47.6	53.4	27	90.0	3	10.0	0	0	NS
EAR										
sa-sba	53.8	60.0	66.2	29	96.7	1	3.3	0	0	NS

Table 17a. Egyptian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	44.6	63.6	82.6	24	80.0	6	20.0	0	0	NS
FACE										
tr-gn	150.1	176.9	203.7	22	73.3	8	26.7	0	0	0.03
n-gn	101.2	116.4	131.6	26	86.7	4	13.3	0	0	NS
sn-gn	51.3	64.1	76.9	23	76.7	7	23.3	0	0	NS
zy-zy	126.0	139.8	153.6	24	80.0	1	3.3	5	16.7	NS
go-go	88.7	97.9	107.1	30	100.0	0	0	0	0	NS
ORBITS										
en-en	27.6	31.8	36.0	30	100.0	0	0	0	0	NS
en-ex	27.9	31.5	35.1	26	86.7	0	0	4	13.3	NS
ex-ex	80.6	89.0	97.4	27	90.0	3	10.0	0	0	NS
NOSE										
n-sn	43.4	54.6	65.8	28	93.3	0	0	2	6.7	NS
al-al	24.4	32.4	40.4	27	90.0	3	10.0	0	0	NS
nasal bridge inclination	26.4	37.2	48.0	25	83.3	0	0	5	16.7	NS
LABIO-ORAL REGION										
ch-ch	40.9	48.3	55.7	22	73.3	8	26.7	0	0	0.03
EAR										
sa-sba	55.2	61.0	66.8	30	100.0	0	0	0	0	NS

Table 17b. Egyptian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	49.2	61.2	73.2	28	93.3	2	6.7	0	0	NS
FACE										
tr-gn	143.6	161.4	179.2	23	76.7	7	23.3	0	0	NS
n-gn	92.1	103.1	114.1	19	63.3	11	36.7	0	0	0.004
sn-gn	48.8	57.8	66.8	20	66.7	10	33.3	0	0	0.008
zy-zy	119.9	130.3	140.7	29	96.7	0	0	1	3.3	NS
go-go	84.0	91.2	98.4	30	100.0	0	0	0	0	NS
ORBITS										
en-en	26.3	30.9	35.5	29	96.7	1	3.3	0	0	NS
en-ex	26.7	30.8	34.3	27	90.0	2	6.7	1	3.3	NS
ex-ex	77.9	86.3	94.9	27	90.0	1	3.3	2	6.7	NS
NOSE										
n-sn	37.0	47.4	57.8	27	90.0	2	6.7	1	3.3	NS
al-al	21.9	29.3	36.7	21	70.0	9	30.0	0	0	0.02
nasal bridge inclination	21.6	34.6	47.6	25	83.3	0	0	5	16.7	NS
LABIO-ORAL REGION										
ch-ch	39.3	46.7	54.1	23	76.7	7	23.3	0	0	NS
EAR										
sa-sba	50.6	57.8	65.0	28	93.3	2	6.7	0	0	NS

Table 18a. Indian Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	50.7	65.5	80.3	25	83.3	3	10.0	2	6.7	NS
FACE										
tr-gn	156.7	161.3	165.9	0	0	30	100.0	0	0	<0.00001
n-gn	101.1	112.5	124.9	23	76.7	7	23.3	0	0	NS
sn-gn	52.7	62.7	72.7	23	76.7	7	23.3	0	0	NS
zy-zy	127.2	135.8	144.4	29	96.7	1	3.3	0	0	NS
go-go	96.2	102.8	109.4	29	96.7	0	0	1	3.3	NS
ORBITS										
en-en	29.7	34.1	38.5	30	100.0	0	0	0	0	NS
en-ex	26.2	30.2	34.2	24	80.0	5	16.7	1	3.3	NS
ex-ex	91.8	98.8	105.8	24	80.0	5	16.7	1	3.3	NS
NOSE										
n-sn	39.8	47.2	54.6	18	60.0	12	40.0	0	0	0.002
al-al	30.9	37.9	44.9	20	66.7	0	0	10	33.3	0.008
nasal bridge inclination	21.3	32.5	43.7	27	90.0	1	3.3	2	6.7	NS
LABIO-ORAL REGION										
ch-ch	41.8	51.0	60.2	24	80.0	5	16.7	1	3.3	NS
EAR										
sa-sba	54.1	61.1	68.1	28	93.3	1	3.3	1	3.3	NS

Table 18b. Indian Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	45.6	64.2	82.8	25	83.3	2	6.7	3	10.0	NS
FACE										
tr-gn	146.4	163.0	179.6	23	76.7	7	23.3	0	0	NS
n-gn	90.5	101.5	112.5	19	63.3	11	36.7	0	0	0.004
sn-gn	48.2	57.2	66.2	16	53.3	14	46.7	0	0	0.0004
zy-zy	108.0	124.9	141.7	26	86.7	4	13.3	0	0	NS
go-go	86.6	97.4	107.9	29	96.7	0	0	1	3.3	NS
ORBITS										
en-en	25.1	30.9	36.7	28	93.3	2	6.7	0	0	NS
en-ex	26.9	31.3	35.7	26	86.7	1	3.3	3	10.0	NS
ex-ex	87.5	97.5	107.5	10	33.3	0	0	20	66.7	<0.00001
NOSE										
n-sn	36.5	43.7	50.9	17	56.7	13	43.3	0	0	0.0009
al-al	29.0	33.8	38.6	22	73.3	1	3.3	7	23.3	NS
nasal bridge inclination	22.5	31.7	40.9	29	96.7	0	0	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	40.5	46.5	52.5	26	86.7	4	13.3	0	0	NS
EAR										
sa-sba	46.7	57.1	67.5	24	80.0	5	16.7	1	3.3	NS

Table 19a. Singaporean Chinese Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.3	67.1	80.9	26	86.7	4	13.3	0	0	NS
FACE										
tr-gn	172.9	187.3	201.7	24	80.0	5	16.7	1	3.3	NS
n-gn	113.0	123.6	134.2	29	96.7	0	0	1	3.3	NS
sn-gn	62.2	72.8	83.4	29	96.7	0	0	1	3.3	NS
zy-zy	133.4	144.6	155.8	18	60.0	0	0	12	40.0	0.002
go-go	96.1	107.3	118.5	4	13.3	0	0	26	86.7	<0.00001
ORBITS										
en-en	31.0	37.6	44.2	16	53.3	0	0	14	46.7	0.0004
en-ex	27.0	29.4	31.8	24	80.0	6	20.0	0	0	NS
ex-ex	83.7	91.7	99.7	27	90.0	1	3.3	2	6.7	NS
NOSE										
n-sn	47.8	53.8	59.8	30	100.0	0	0	0	0	NS
al-al	33.4	39.2	45.0	14	46.7	1	3.3	15	50.0	<0.00001
nasal bridge inclination	20.2	27.2	34.2	26	86.7	4	13.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	44.0	49.6	55.2	25	83.3	5	16.7	0	0	NS
EAR										
sa-sba	53.1	60.7	68.3	27	90.0	2	6.7	1	3.3	NS

Table 19b. Singaporean Chinese Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	49.1	64.1	79.1	27	90.0	0	0	3	10.0	NS
FACE										
tr-gn	159.6	176.2	192.8	28	93.3	0	0	2	6.7	NS
n-gn	105.1	114.9	124.7	25	83.3	5	16.7	0	0	NS
sn-gn	55.2	66.4	77.6	28	93.3	0	0	2	6.7	NS
zy-zy	128.2	136.2	244.2	27	90.0	0	0	3	10.0	NS
go-go	95.5	102.3	109.1	5	16.7	0	0	25	83.3	<0.00001
ORBITS										
en-en	29.7	36.1	42.5	15	50.0	0	0	15	50.0	0.0002
en-ex	25.0	28.4	31.8	18	60.0	12	40.0	0	0	0.002
ex-ex	76.9	87.3	97.7	29	96.7	0	0	1	3.3	NS
NOSE										
n-sn	45.1	51.7	58.3	26	86.7	0	0	4	13.3	NS
al-al	33.0	37.2	41.4	7	23.3	0	0	23	76.7	<0.00001
nasal bridge inclination	17.3	24.5	31.7	29	96.7	1	3.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	40.7	47.3	53.9	28	93.3	2	6.7	0	0	NS
EAR										
sa-sba	49.8	57.6	65.4	28	93.3	2	6.7	0	0	NS

Table 20a. Vietnamese Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	54.3	65.3	76.3	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	164.3	180.9	197.5	26	86.7	4	13.3	0	0	NS
n-gn	112.0	121.2	130.4	30	100.0	0	0	0	0	NS
sn-gn	59.7	71.1	82.5	29	96.7	0	0	1	3.3	NS
zy-zy	135.2	144.0	152.8	21	70.0	0	0	9	30.0	0.02
go-go	99.8	110.4	121.0	12	40.0	18	60.0	0	0	0.00001
ORBITS										
en-en	32.1	36.7	41.3	26	86.7	0	0	4	13.3	NS
en-ex	24.3	29.1	33.9	17	56.7	12	40.0	1	3.3	0.002
ex-ex	87.1	91.5	95.9	30	100.0	0	0	0	0	NS
NOSE										
n-sn	46.1	52.1	58.1	30	100.0	0	0	0	0	NS
al-al	36.0	40.2	44.4	12	40.0	0	0	18	60.0	0.00001
nasal bridge inclination	16.4	24.0	31.6	20	66.7	10	33.3	0	0	0.008
LABIO-ORAL REGION										
ch-ch	38.3	47.5	56.7	19	63.3	11	36.7	0	0	0.004
EAR										
sa-sba	54.5	59.9	65.3	29	96.7	1	3.3	0	0	NS

Table 20b. Vietnamese Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	54.9	63.3	71.7	30	100.0	0	0	0	0	NS
FACE										
tr-gn	156.9	171.1	185.3	30	100.0	0	0	0	0	NS
n-gn	103.7	113.1	122.5	30	100.0	0	0	0	0	NS
sn-gn	56.2	64.0	71.8	29	96.7	1	3.3	0	0	NS
zy-zy	128.5	134.3	140.1	30	100.0	0	0	0	0	NS
go-go	98.8	104.8	110.8	8	26.7	0	0	22	73.3	<0.00001
ORBITS										
en-en	31.2	36.6	42.0	17	56.7	0	0	13	43.3	0.0009
en-ex	25.2	29.2	33.2	27	90.0	3	10.0	0	0	NS
ex-ex	82.5	89.9	97.3	29	96.7	0	0	1	3.3	NS
NOSE										
n-sn	42.4	50.4	58.4	25	83.3	2	6.7	3	10.0	NS
al-al	35.6	39.8	44.0	0	0	0	0	30	100.0	<0.00001
nasal bridge inclination	12.8	21.8	30.8	22	73.3	8	26.7	0	0	0.03
LABIO-ORAL REGION										
ch-ch	38.5	48.5	58.5	21	70.0	7	23.3	2	6.7	NS
EAR										
sa-sba	55.0	59.8	64.6	29	96.7	0	0	1	3.3	NS

Table 21a. Thai Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	56.9	66.9	76.9	28	93.3	2	6.7	0	0	NS
FACE										
tr-gn	169.7	185.1	205.0	30	100.0	0	0	0	0	NS
n-gn	111.5	123.5	135.5	27	90.0	0	0	3	10.0	NS
sn-gn	62.2	72.4	82.6	30	100.0	0	0	0	0	NS
zy-zy	136.1	147.1	158.1	12	40.0	0	0	18	60.0	0.00001
go-go	100.0	109.5	119.0	14	46.7	0	0	16	53.3	0.00008
ORBITS										
en-en	31.2	37.2	43.2	21	70.0	0	0	9	30.0	0.02
en-ex	25.8	29.8	33.5	28	93.3	2	6.7	0	0	NS
ex-ex	82.5	91.5	100.5	27	90.0	0	0	3	10.0	NS
NOSE										
n-sn	47.1	51.5	55.9	30	100.0	0	0	0	0	NS
al-al	36.4	40.8	45.2	7	23.3	0	0	23	76.7	<0.00001
nasal bridge inclination	20.8	27.4	34.0	26	86.7	4	13.3	0	0	NS
LABIO-ORAL REGION										
ch-ch	45.5	50.3	55.1	30	100.0	0	0	0	0	NS
EAR										
sa-sba	51.6	62.4	73.2	24	80.0	3	10.0	3	10.0	NS

Table 21b. Thai Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	52.9	65.3	77.7	29	96.7	0	0	1	3.3	NS
FACE										
tr-gn	155.4	172.8	190.2	28	93.3	1	3.3	1	3.3	NS
n-gn	102.4	112.8	123.2	29	96.7	0	0	1	3.3	NS
sn-gn	53.6	62.6	71.6	27	90.0	3	10.0	0	0	NS
zy-zy	125.7	138.3	150.9	23	76.7	0	0	7	23.3	NS
go-go	96.2	106.0	115.8	6	20.0	0	0	24	80.0	<0.00001
ORBITS										
en-en	31.0	36.0	41.0	20	66.7	0	0	10	33.3	0.008
en-ex	25.1	28.9	32.7	26	86.7	4	13.3	0	0	NS
ex-ex	89.0	99.0	109.0	22	73.3	1	3.3	7	23.3	NS
NOSE										
n-sn	43.1	49.5	55.9	27	90.0	1	3.3	2	6.7	NS
al-al	34.2	40.2	46.2	2	6.7	0	0	28	93.3	<0.00001
nasal bridge inclination	16.9	23.1	29.3	27	90.0	3	10.0	0	0	NS
LABIO-ORAL REGION										
ch-ch	38.8	45.4	52.0	24	80.0	6	20.0	0	0	NS
EAR										
sa-sba	52.9	60.3	67.7	27	90.0	0	0	3	10.0	NS

Table 22a. Japanese Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	47.4	63.0	78.6	23	76.7	7	23.3	0	0	NS
FACE										
tr-gn	174.8	191.4	208.0	28	93.3	0	0	2	6.7	NS
n-gn	109.0	122.8	136.6	29	96.7	0	0	1	3.3	NS
sn-gn	57.2	69.4	81.6	29	96.7	1	3.3	0	0	NS
zy-zy	136.0	147.2	158.4	13	43.3	0	0	17	56.7	0.00003
go-go	101.5	117.3	133.1	5	16.7	0	0	25	83.3	<0.00001
ORBITS										
en-en	31.3	37.5	43.7	18	60.0	0	0	12	40.0	0.002
en-ex	26.1	30.7	35.3	23	76.7	4	13.3	3	10.0	NS
ex-ex	95.5	103.9	122.3	1	3.3	0	0	29	96.7	<0.00001
NOSE										
n-sn	47.1	56.9	66.7	23	76.7	0	0	7	23.3	NS
al-al	33.2	38.2	43.2	19	63.3	0	0	11	36.7	0.004
nasal bridge inclination	16.1	27.7	39.3	22	73.3	4	13.3	4	13.3	NS
LABIO-ORAL REGION										
ch-ch	41.4	48.4	55.4	23	76.7	7	23.3	0	0	NS
EAR										
sa-sba	58.0	65.6	73.2	27	90.0	1	3.3	2	6.7	NS

Table 22b. Japanese Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	48.1	60.5	72.9	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	168.4	182.8	197.2	23	76.7	0	0	7	23.3	NS
n-gn	102.4	113.8	125.2	28	93.3	1	3.3	1	3.3	NS
sn-gn	51.0	62.8	74.6	27	90.0	3	10.0	0	0	NS
zy-zy	129.4	141.2	153.0	13	43.3	0	0	17	56.7	0.00003
go-go	104.4	115.6	126.8	0	0	0	0	30	100.0	<0.00001
ORBITS										
en-en	29.4	35.0	40.6	23	76.7	0	0	7	23.3	NS
en-ex	25.2	29.2	33.2	24	80.0	6	20.0	0	0	NS
ex-ex	91.3	93.3	107.3	2	6.7	0	0	28	93.3	<0.00001
NOSE										
n-sn	43.5	53.3	63.1	19	63.3	1	3.3	10	33.3	0.01
al-al	32.3	37.1	41.9	6	20.0	0	0	24	80.0	<0.00001
nasal bridge inclination	18.8	30.0	41.2	28	93.3	1	3.3	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	28.9	46.5	54.1	25	83.3	5	16.7	0	0	NS
EAR										
sa-sba	54.3	61.9	69.5	25	83.3	0	0	5	16.7	NS

Table 23a. Angolan Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	49.3	63.9	78.5	24	80.0	6	20.0	0	0	NS
FACE										
tr-gn	164.4	182.6	200.8	10	33.3	20	66.7	0	0	<0.00001
n-gn	90.1	112.1	134.1	23	76.7	7	23.3	0	0	NS
sn-gn	57.7	67.3	76.9	29	96.7	1	3.3	0	0	NS
zy-zy	129.6	139.8	150.0	26	86.7	0	0	4	13.3	NS
go-go	88.0	97.4	106.8	29	96.7	1	3.3	0	0	NS
ORBITS										
en-en	28.3	36.3	44.3	22	73.3	0	0	8	26.7	0.03
en-ex	23.3	28.5	33.7	13	43.3	16	53.3	1	3.3	0.00009
ex-ex	76.3	92.7	99.1	23	76.7	2	6.7	5	16.7	NS
NOSE										
n-sn	42.6	49.8	57.0	27	90.0	3	10.0	0	0	NS
al-al	41.5	46.3	51.1	0	0	0	0	30	100.0	<0.00001
nasal bridge inclination	23.1	33.9	44.7	26	86.7	1	3.3	3	10.0	NS
LABIO-ORAL REGION										
ch-ch	48.4	54.4	60.4	30	100.0	0	0	0	0	NS
EAR										
sa-sba	51.1	57.5	63.9	25	83.3	5	16.7	0	0	NS

Table 23b. Angolan Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	46.9	64.9	82.9	26	86.7	2	6.7	2	6.7	NS
FACE										
tr-gn	154.6	172.4	190.2	22	73.3	6	20.0	2	6.7	NS
n-gn	83.7	106.5	129.3	17	56.7	12	40.0	1	3.3	0.002
sn-gn	49.0	63.2	76.4	23	76.7	6	20.0	1	3.3	NS
zy-zy	124.4	132.8	141.2	29	96.7	0	0	1	3.3	NS
go-go	78.9	90.3	101.7	21	70.0	6	20.0	3	10.0	NS
ORBITS										
en-en	27.4	36.6	45.8	15	50.0	0	0	15	50.0	0.0002
en-ex	19.5	27.1	34.7	12	40.0	18	60.0	0	0	0.00001
ex-ex	79.4	87.0	94.6	18	60.0	6	20.0	6	20.0	0.009
NOSE										
n-sn	37.6	46.6	55.6	21	70.0	7	23.3	2	6.7	NS
al-al	34.6	40.8	47.0	1	3.3	0	0	29	96.7	<0.00001
nasal bridge inclination	21.5	36.1	50.7	24	80.0	0	0	6	20.0	NS
LABIO-ORAL REGION										
ch-ch	41.7	52.9	64.1	22	73.3	0	0	8	26.7	0.03
EAR										
sa-sba	47.2	55.0	62.8	24	80.0	6	20.0	0	0	NS

Table 24. Tonga Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	56.1	62.7	69.3	29	96.7	1	3.3	0	0	NS
FACE										
tr-gn	144.8	161.8	178.8	13	43.3	17	56.7	0	0	0.00003
n-gn	98.1	109.5	120.9	18	60.0	12	40.0	0	0	0.002
sn-gn	57.2	66.0	74.8	29	96.7	1	3.3	0	0	NS
zy-zy	130.7	133.3	134.9	30	100.0	0	0	0	0	NS
go-go	65.3	72.3	79.3	30	100.0	0	0	0	0	NS
ORBITS										
en-en	28.2	34.8	41.4	27	90.0	0	0	3	10.0	NS
en-ex	23.9	28.0	32.2	10	33.3	20	66.7	0	0	<0.00001
ex-ex	82.1	90.9	99.7	25	83.3	1	3.3	4	13.3	NS
NOSE										
n-sn	40.8	49.2	57.6	23	76.7	7	23.3	0	0	NS
al-al	38.2	44.0	49.8	1	3.3	0	0	29	96.7	<0.00001
nasal bridge inclination										
LABIO-ORAL REGION										
ch-ch	45.4	53.2	61.0	28	93.3	1	3.3	1	3.3	NS
EAR										
sa-sba	48.4	55.8	63.2	18	60.0	12	40.0	0	0	0.002

NAW, to 1 of 3 (33.3%) from the Middle East, and to 100% in the 5 Asian and 4 African ethnic groups. Only in Croatian males (Table 5) and Iranians (Table 17) was the forehead height extremely significantly smaller.

Labio-oral region

Mouth width (ch-ch) was identical to that of the NAW in 12 of 13 Caucasian groups (92.3%), 4 of 5 of Asian groups (80%), and all Middle Eastern and African ethnic groups. The mouth width was very significantly larger in 33.3% of Hungarian males (Table 8) and significantly smaller in 36.7% of Vietnamese males (Table 20).

Ear

Ear lengths (sa-sba) of Caucasians (Tables 2–14), Middle Eastern groups (Tables 15–17), and Asian groups (Tables 18–22) were the same as those of NAW. Among the African ethnic groups (Tables 23–26), the Tonga males' ear length was smaller in a very significant frequency (40%).

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Facial Region

Of the five measurements, the three vertical ones (tr-gn, n-gn, sn-gn) showed a higher percentage (76.9%, 10 of 13 groups) of identical values to those of NAW than the two horizontal ones (zy-zy, go-go) (38.5%, 5 of 13) in both sexes of Caucasian groups. The lower face height (sn-gn) in Hungarian females was extremely significantly and in Slovakian females very significantly smaller (Tables 8,13). Of the two horizontal measurements, the mandible width (go-go) displayed significantly larger rather than smaller values slightly more often (9) than did face width (7). In Portuguese males, the face and mandible widths were extremely significantly smaller and in females very significantly smaller (Table 11), while among Italians and Slovaks the mandible width was extremely significantly increased in both sexes (Tables 9,13).

In the three Middle Eastern male groups all vertical measurements were identical to those of NAW.

Table 25a. Zulu Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.7	71.3	88.9	25	83.3	2	6.7	3	10.0	NS
FACE										
tr-gn	168.0	188.6	209.2	27	90.0	2	6.7	1	3.3	NS
n-gn	108.0	121.8	135.6	30	100.0	0	0	0	0	NS
sn-gn	64.4	72.2	80.0	30	100.0	0	0	0	0	NS
zy-zy	120.1	129.3	138.5	20	66.7	10	33.3	0	0	0.008
go-go	93.2	104.4	115.6	25	83.3	0	0	5	16.7	NS
ORBITS										
en-en	29.1	36.5	43.9	23	76.7	0	0	7	23.3	NS
en-ex	29.9	34.5	39.1	11	36.7	0	0	19	63.3	<0.00001
ex-ex	88.9	99.3	109.7	8	26.7	0	0	22	73.3	<0.00001
NOSE										
n-sn	39.0	50.2	61.4	24	80.0	5	16.7	1	3.3	NS
al-al	36.2	42.0	47.8	6	20.0	0	0	24	80.0	<0.00001
nasal bridge inclination	23.0	36.6	50.2	21	70.0	1	3.3	8	26.7	0.04
LABIO-ORAL REGION										
ch-ch	47.6	56.2	64.8	24	80.0	2	6.7	4	13.3	NS
EAR										
sa-sba	52.2	57.8	63.4	26	86.7	4	13.3	0	0	NS

Table 25b. Zulu Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	53.7	69.1	84.5	23	76.7	0	0	7	23.3	NS
FACE										
tr-gn	159.3	179.1	198.9	24	80.0	1	3.3	5	16.7	NS
n-gn	102.5	113.7	124.9	28	93.3	1	3.3	1	3.3	NS
sn-gn	57.2	65.4	73.6	29	96.7	0	0	1	3.3	NS
zy-zy	118.8	128.4	138.0	29	96.7	1	3.3	0	0	NS
go-go	87.0	102.0	113.4	22	73.3	0	0	8	26.7	0.03
ORBITS										
en-en	29.7	34.5	39.3	27	90.0	0	0	3	10.0	NS
en-ex	27.8	33.4	39.0	21	70.0	0	0	9	30.0	0.02
ex-ex	87.1	96.9	106.7	11	36.7	0	0	19	63.3	<0.00001
NOSE										
n-sn	34.9	49.5	64.1	14	46.7	7	23.3	9	30.0	0.0004
al-al	32.2	38.0	43.8	7	23.3	0	0	23	76.7	<0.00001
nasal bridge inclination	22.5	34.9	47.3	24	80.0	0	0	6	20.0	NS
LABIO-ORAL REGION										
ch-ch	44.2	52.2	60.2	26	86.7	0	0	4	13.3	NS
EAR										
sa-sba	47.4	56.2	65.0	25	83.3	5	16.7	0	0	NS

Table 26a. Afro-American Males (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	56.6	72.0	87.4	27	90.0	0	0	3	10.0	NS
FACE										
tr-gn	173.4	194.6	215.2	23	76.7	0	0	7	23.3	NS
n-gn	109.5	125.9	142.3	27	90.0	0	0	3	10.0	NS
sn-gn	65.5	78.9	92.4	21	70.0	1	3.3	8	26.7	0.04
zy-zy	127.5	138.7	149.9	26	86.7	0	0	4	13.3	NS
go-go	92.2	104.2	116.2	23	76.7	0	0	7	23.3	NS
ORBITS										
en-en	30.2	35.8	41.4	23	76.7	0	0	7	23.3	NS
en-ex	29.7	32.9	36.1	22	73.3	1	3.3	7	23.3	NS
ex-ex	87.6	96.8	106.0	14	46.7	0	0	16	53.3	0.00008
NOSE										
n-sn	45.9	51.9	57.5	29	96.7	0	0	1	3.3	NS
al-al	37.3	44.1	50.9	4	13.3	0	0	26	86.7	<0.00001
nasal bridge inclination	22.2	32.2	42.2	27	90.0	2	6.7	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	46.4	54.6	62.8	26	86.7	2	6.7	2	6.7	NS
EAR										
sa-sba	51.8	59.8	67.8	25	83.3	5	16.7	0	0	NS

Table 26b. Afro-American Females (n = 30)

	Normal Range of Facial Measurements			Relationship of the Nation's Craniofacial Measurement Data to the NAW Normal Range						Goodness of Fit
				Normal Range		Smaller		Greater		Chi-Square
	-2 SD	Mean	+2 SD	N	%	N	%	N	%	p-value
HEAD										
tr-n	55.3	67.1	78.9	28	93.3	0	0	2	6.7	NS
FACE										
tr-gn	165.1	180.1	195.1	23	76.7	0	0	7	23.3	NS
n-gn	104.3	116.5	128.7	26	86.7	0	0	4	13.3	NS
sn-gn	61.6	71.5	81.9	26	86.7	0	0	4	13.3	NS
zy-zy	120.9	130.5	140.1	29	96.7	0	0	1	3.3	NS
go-go	86.7	96.7	106.7	24	80.0	0	0	6	20.0	NS
ORBITS										
en-en	27.6	34.4	41.2	26	86.7	0	0	4	13.3	NS
en-ex	28.2	32.2	36.2	26	86.7	0	0	4	13.3	NS
ex-ex	82.3	92.9	103.5	19	63.3	0	0	11	36.7	0.004
NOSE										
n-sn	41.4	48.8	56.2	28	93.3	0	0	2	6.7	NS
al-al	33.7	40.1	46.5	2	6.7	0	0	28	93.3	<0.0001
nasal bridge inclination	22.0	33.4	44.8	29	96.7	0	0	1	3.3	NS
LABIO-ORAL REGION										
ch-ch	45.6	53.6	61.6	24	80.0	1	3.3	5	16.7	NS
EAR										
sa-sba	50.4	57.0	63.6	29	96.7	0	0	1	3.3	NS

In females the three vertical measurements were identical with NAW in Turks only (Table 16). Face height (n-gn) in Iranian females was very significantly greater (Table 15), while both face height and lower face height (sn-gn) were very significantly smaller in Egyptian females (Table 17). In the horizontal measurements, both the face (zy-zy) and mandible (go-go) widths of Egyptians were identical with NAW in both sexes. The face width of Iranians and Turks was identical with NAW in males only. Extremely significantly greater mandible width was present in male Turks and Iranian females.

In almost all Asian male and female ethnic groups (Tables 17–22) the vertical measurements were identical to NAW. Both the face and mandible width were extremely or very significantly greater in male Thais and in both sexes of Japanese. An extremely significantly wide mandible was seen in both sexes of Singaporean Chinese, Vietnamese and Thais. Face width was identical to NAW in Singaporean Chinese and Thai females and in both sexes of Vietnamese. In Singaporean Chinese males the face width was very significantly wider. Of the four African ethnic groups, the Zulus and Afro-Americans showed identical vertical facial measurements compared with NAWs in both sexes (Tables 23–26). Extremely and very significantly reduced vertical measurements (tr-n, n-gn, sn-gn) were common in other ethnic groups. Identical face and mandible width measurements were seen in both sexes of Angolans, Afro-Americans, Tonga males and Zulu females. The face width of Zulu males was very significantly smaller (Table 25).

Orbits

Intercanthal widths (en-en) identical to those of the NAW were observed in 12 of 13 (92.3%) Caucasian groups (Tables 2–14). Eye fissure length (en-ex) identical to NAW was seen in 8 of 13 (61.5%) ethnic groups in females and in 4 groups of males (30.8%), very significantly smaller in 2 females (Tables 4,5) and extremely significantly wider in 3 females (Tables 8,11,12) and 8 males (Tables 2,7–12,14). The biocular width (ex-ex) showed identical values to NAW in 7 males and 7 females out of the 13 groups (53.8%). Extremely significantly greater biocular width measurements were present in 6 males (46.2%) and 5 females (38.5%), and one female had a very significantly wide biocular width.

Among the Middle Eastern ethnic groups (Tables 15–17) all orbital measurements in Egyptian males and females were identical to NAW. In Turkish males and females both intercanthal width (en-en) and eye fissure length (en-ex) were identical with NAW, but

biocular width (ex-ex) was extremely significantly greater. In Iranians the intercanthal width and eye fissure length were extremely significantly smaller in both sexes, while the biocular width (ex-ex) in males was very significantly greater and in females extremely significantly smaller.

In three of five Asian ethnic groups (Tables 18, 21,22) the eye fissure length (en-ex) was identical with NAW in both sexes, differing only among female Singaporean Chinese and Vietnamese males (very significantly smaller). Identical intercanthal width (en-en) to NAW was present in three ethnic groups: in both sexes of Indians and in Vietnamese and Thai males. The measurement was extremely significantly greater in both sexes of Singaporean Chinese and Vietnamese females, and very significantly greater in Thai and Japanese males. Identical biocular width (ex-ex) to NAW was observed in males of India and Singaporean Chinese and in both sexes of Vietnamese and Thais. The measurement was extremely significantly wider in Indian females and in both sexes of Japanese.

In three of four African ethnic groups the intercanthal width (en-en) was identical in both sexes to NAW (Tables 23,25,26), as well as in Tonga males. The measurement was extremely significantly greater among Angolan females only. Eye fissure length (en-ex) was identical to NAW in Zulu females and in both sexes of Afro-Americans but extremely significantly smaller in Tonga males and in Angolans of both sexes and extremely significantly greater in Zulu males. The biocular width (ex-ex) showed identical values to NAW in Angolan and Tonga males. It was extremely significantly greater in both sexes of Zulus and Afro-American males and very significantly greater in Angola and Afro-American females.

Nose

Nose height (n-sn) was identical with those of the normal range in NAW in 92.3% of Caucasian males and in 76.9% of females. It was very significantly greater in Greek females (33.3%) and Portuguese males (36.7%), extremely significantly shorter in Hungarian females, and extremely significantly greater in Portuguese females (Tables 7,8,11). The morphological width of the nose (al-al) in both sexes of Caucasians was identical to that of the NAW normal range. The nasal bridge inclination in Caucasian males was identical to NAW in 12 (92.3%) and in females 11 (84.6%) of 13 groups. Very significantly greater inclination was observed in male Azerbaijanis (Table 2) and female Russians (Table 12), and extremely significantly greater inclination in Slovenian females (Table 14).

Nose width and the inclination of the nasal bridge in all Middle Eastern groups were identical to NAW in both sexes. Nose height was extremely significantly greater in both sexes of Iranians and of Turkish females.

In Asian ethnic groups the nose width (al-al) was extremely significantly wider in both sexes of Singaporean Chinese, Vietnamese, and Thais and in Japanese females, and very significantly greater in Japanese males. Nose height (n-sn) was identical to NAW in four of five ethnic groups (Tables 19–22), very significantly smaller in Indian males, and extremely significantly smaller in Indian females. The nasal bridge inclination was identical to NAW in all female ethnic groups (100%) and in four out of five male groups (Tables 18,19,21,22).

The nose height (n-sn) was identical to NAW in all of African male ethnic groups and in female Angolans and Afro-Americans. (No female measurements were available from Tongans.) In Zulu females the nose height was extremely significantly greater (Table 25). Nose width was extremely significantly greater in both sexes of three African ethnic groups and in male Tongans. The inclination of the nasal bridge was identical to NAW in both sexes in all African ethnic groups.

DISCUSSION

The measurements selected for the study were intended to develop a satisfactory image of the morphological structure of the craniofacial complex, consisting of six regions with 14 measurements. These measurements were taken in an attempt to establish the main facial characteristics of 25 national groups belonging to four races and thereby differentiate the morphological complex between one group and another.

Determination of the differences between the craniofacial norms of North American whites and the measurements of other ethnic groups depended on linear and angular anthropometric data. Differences had to be visually striking, statistically defined as differing very or extremely significantly from those of NAW. As expected, the Caucasian groups of Europe showed the smallest differences from the reference group, since they closely approximated the mixture of Caucasian nationalities of today's North American white population.

While the regions with single measurements (head, mouth, ear) showed almost no differences between the ethnic groups/races studied and NAW, in those with multiple measurements certain differences were observed between vertical and horizontal

measurements. A significantly greater bizygomatic width was found most frequently in Caucasian males (11.3%) and Asians (10.3%). The highest frequency of significantly greater mandible widths was seen in Asian (14%) and Caucasian females (6.8%). In the African groups, significantly greater facial or mandibular widths were not observed. The orbits, situated as they are between forehead and face, and with three horizontal measurements (en-en, en-ex, ex-ex) are one of the craniofacial areas most exposed to visual judgment. The fact that the intercanthal width (en-en) was identical to NAW in all Caucasian males and in 92.3% females greatly contributed to the quality of the mutual relationship between the intercanthal, nose, and mouth widths. In four of five African male ethnic groups the intercanthal width was identical to NAW. In Middle Eastern and Asian groups most intercanthal and biocular widths were significantly greater than those in NAW, and eye fissure length was significantly smaller. Although nose width was significantly greater in both the Asian and African groups than in NAW, the width was more conspicuous among the Africans because their mandible and face widths were the same as NAW. In three of the five Asian groups, both face and mandible widths of males and mandible width in females were also significantly greater than in NAW, thus obscuring visual judgment of nose width.

Nose height of Caucasians of both sexes seldom differed from that of NAW, and nose width was totally identical to it. However, the inclination of the nasal bridge influences the shape of the profile: a significantly reduced inclination makes a short nose look higher than it is. For example, the normal nose height of Vietnamese males may appear significantly greater in the presence of a significantly smaller nasal bridge inclination, simultaneously increasing the flatness of the facial profile. The opposite is also true: the nose height of Azerbaijani males and Russian and Slovenian females is normal, but their significantly greater nasal bridge inclination might make the nose look shorter. When the inclination is identical to NAW, a significantly larger nose, such as is found in Portuguese, Iranians and Greek of both sexes and in Hungarian and Turkish females, remains visually apparent.

Studies identifying the factors influencing the variations in facial morphology refer chiefly to the environmental conditions, socioeconomic status, and nutritional habits of the populations.^{14–19} Theories that in hot, moist climates the nasal aperture becomes much wider, present in all African and Asian ethnic groups in both sexes, remains unproven.²⁰ Afro-Americans who have lived for centuries in the same

climate as the North American white population have retained their greatly wider nose, unaffected even in cases of white and American Indian ancestry²¹. The great similarities between the NAW and the European Caucasians, together with the stable characteristics of Asians and Africans maintained throughout their ethnic groups, can be explained only by inherited genetic factors – an explanation widely accepted by scientists.^{21–24}

This study required 5 years to complete and could not have been done without the collaboration of many anthropologists and medical scientists, researchers, clinicians who willingly joined the international team for this “mega-project”, without any financial support. They deserve our deepest gratitude. It is hoped that this study will encourage scientists to establish a more detailed anthropometric databases for the benefit of patients. Establishment of these facial databases for various ethnic groups/races, whose members are potential immigrants to North America, is essential to determine the differences between them and the normative data of the North American white population when planning quantitative evaluation of morphological aberrations or surgical correction of facial disfigurements.

Data Tables

Table 1 represents the normal range of the North American white young adult males and females. The linear measurements are given in millimeters, the angular one (inclination) in degrees. The following 25 tables show the data of the various ethnic/racial groups. The left side exhibits the normal range of the 14 craniofacial measurements of the ethnic group, the right side the relationship between the findings of the ethnic group and the North American white population. Data for European Caucasians are reported in Tables 2–14, for Middle Eastern groups in Tables 15–17, for Asian groups in Tables 18–22, and in ethnic groups of African origin in Tables 23–26. Each ethnic group table has two parts, one for males, the other for females, with the exception of Table 24 (Tonga), which provides data for males only. The abbreviation NAW, found in each table, stands for North American whites.

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