

THE ANTHROPOMETRIC CHARACTERISTICS OF INDIAN AND URBAN GUATEMALANS ¹

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ARTISTS of all ages have recorded man on stone, wood and canvas, but it has been only in recent centuries that the study of the growth and development of man and his physical profile has been subjected to scientific study and classification. Marked interest has been placed on the patterns of growth and development of man, and how these growth patterns can be altered by such factors as nutrition, racial admixture, climate, geography and the like.

There have been few anthropometric studies of the Mayan Indians of Guatemala, and those studies included only groups of adults. Goff (1948) and Byers and La Farge (1931) reported anthropometric measurements on groups of Mam Indians from the department of Huehuetenango. Crile and Quiring (1939) studied a group of Quichés from the department of Totonicapán. Girard (1942) studied the group Chortí in the department of Chimaltenango, and d'Aloja (1939) included several groups of Mayan Indians from Guatemala in his study of the variability of some anthropometric characteristics of the Central American Indians.

Although several nutritional studies have been carried out among Cakchiquel Mayan Indians, there has not been a systematic study of the anthropometric characteristics of this important Indian group. The present paper, therefore, compares a group of male Cakchiquel rural Indians with a non-Indian group from Guatemala City. It is hoped that the recording here of the physical profile of Cakchiquel Indians will add basic information needed in the evaluation of the nutritional status of the Indian population.

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MATERIAL AND METHODS

Three hundred and sixty-one male rural Cakchiquel Indians and 412 male urban non-Indian subjects in good health with ages between 7 and 20 years, and adults in both groups, were studied in June through August 1961.

The Cakchiquel Indian group live in the villages of San Andrés Itzapa, Patzicía, Patzún and Santo Domingo Xenacoj from the Departments of Chimaltenango and Sacatepéquez, located in the highland mountains of Guatemala at a general elevation of 6,000 feet above sea level. The criteria for establishing an individual as an Indian included the following: a person well recognized in his community as an Indian, who carries the surname of an Indian, and who speaks the Cakchiquel language. All of the Indians included in this study attended the literacy program sponsored by the government. The schools in these particular towns are for Indians only. Basically, their diet is one of corn, beans, a few vegetables and fruits, with little animal protein (Méndez *et al.*, 1962). These Indians almost without exception are agricultural workers who do a great amount of physical work.

In the group of Guatemala City, the children between the ages of 7 and 17 attended the "Liceo Javier," a private school for primary and secondary education. This group is from upper socio-economic Guatemalan families. Although there has been some admixing of the Spanish and Mayan races in Guatemala, this group is composed of individuals whose families are predominantly of Spanish backgrounds. The subjects in the urban group between the ages of 18 and 20 years were students from the University of San Carlos de Guatemala. The adult urban group from Guatemala City was made up of professionals and technicians from the Institute of Nutrition of Central America and Panama (INCAP) and from the Instituto Indigenista de Guatemala. Although the school group was very homogeneous in regard to their family socio-economic status, the university and adult groups did not fulfill this characteristic completely. The diet and general living of this urban group is what one would expect in any such socio-economic and professional group (Mann *et al.*, 1955).

The body measurements studied in the present survey included weight, height, sitting height, sternum height, arm and leg lengths, biacromial and bicristal diameters, chest circumference, arm circumference, arm skinfold thickness and grip strength. Most of the measurements follow the recommendations concerning body measurements for the char-

acterization of nutritional status (Brožek, 1956). Each individual was measured without shirt, undershirt, shoes and stockings, wearing only trousers and undergarments, with the trousers void of any weighty objects. Each measurement was taken two times and the reported values were an average of the two measurements. In the entire study, all of the measurements were taken by the same investigator, using the same technique.

Weight was determined by using a vertical platform scale, recorded in pounds to the nearest $\frac{1}{4}$ of a pound, with the pounds later being converted to kilos. Heights were recorded using a solid platform anthropometer. Sitting height was taken with the subject seated on a firm stool with horizontal surface, with knees flexed and trunk in contact with the anthropometer at both the scapular and sacral regions. Care was taken to have the thighs at right angles to the trunk. Sternal height was taken with the subject standing, from the upper border of the sternum at the suprasternal notch to the platform of the anthropometer. Arm length was measured from the acromion to the ulnar styloid process of the right arm, and leg length from the iliac crest to the lateral malleolus of the right leg. Chest circumference at the xyphoid level was measured at maximum inspiration and expiration and then mid inspiration chest circumference was calculated. A pelvimeter was used in measuring the biacromial and bicristal diameter. The Lange skinfold caliper³ was used in measuring the subcutaneous fat of the posterior aspect of the upper arm, midway between the acromion and the olecranon. Arm circumference was measured at the same level. Grip strength was recorded from both hands using a grip dynamometer⁴ and the highest value was used in the final tabulation. Head and neck lengths, as well as trunk length were calculated. The recording of heights, lengths, circumferences and diameters were made in centimeters to the nearest 0.1 cm, skinfold thickness in millimeters to the nearest 0.5 mm and grip strength in kilos to the nearest 0.1 kg.

RESULTS AND DISCUSSION

The means and standard deviation of the different measurements performed in this study are presented in Tables 1 and 2.

Although all measurements are highly significantly greater in the urban group, the measurements of linearity, leg and arm lengths when

³ The Wenner-Gren Aeronautical Research Laboratory, University of Kentucky.

⁴ C. H. Stoeling Company, Chicago, Illinois.

TABLE 1
Anthropometric measurements of rural Indian Guatemalans

	7	8	9	10	11	12	13	14	15	16	17	18	19	Adults
Weight in kg														
N	16	34	45	45	39	36	33	13	20	12	10	10	6	42
\bar{x}	18.8	20.4	22.1	23.9	25.3	27.8	31.3	37.0	39.5	42.6	47.7	52.4	52.6	54.2
s	1.6	1.8	2.1	2.6	2.7	2.8	4.2	6.5	6.8	5.7	4.7	6.4	4.3	5.6
Height in cm														
\bar{x}	108.0	110.8	116.1	120.7	124.3	129.4	133.8	142.6	142.7	147.5	151.8	156.3	156.4	156.8
s	4.7	3.8	5.2	4.9	5.1	4.3	5.8	6.8	5.8	7.2	3.2	5.2	6.9	4.7
Sitting height in cm														
\bar{x}	61.2	62.6	64.8	66.9	68.2	70.6	72.0	76.1	75.8	78.5	82.1	85.4	84.3	85.1
s	2.1	1.9	2.8	2.5	2.4	1.7	2.8	3.4	3.4	3.5	2.2	2.1	2.4	2.7
Sternum height in cm														
\bar{x}	84.9	87.8	91.9	95.8	99.0	103.5	107.7	115.5	116.1	120.2	124.0	127.2	127.6	127.4
s	4.3	3.4	4.7	4.4	4.7	3.6	5.2	6.4	5.2	6.1	2.7	4.3	6.4	4.2
Head and neck length in cm														
\bar{x}	23.1	23.1	24.1	24.9	25.3	25.9	26.1	27.1	26.6	27.2	27.8	29.2	28.8	29.4
s	1.0	1.4	1.0	1.2	0.9	1.1	1.1	1.3	1.3	1.6	1.5	1.0	1.0	1.1
Trunk length in cm														
\bar{x}	38.1	39.6	40.6	42.0	42.9	44.8	46.0	49.0	49.3	51.3	54.2	56.2	55.5	55.6
s	1.8	1.8	2.4	2.0	2.1	1.4	2.2	3.0	2.8	2.5	2.0	2.0	1.9	2.3
Leg length in cm														
\bar{x}	45.6	47.6	50.5	53.3	54.6	58.8	61.0	65.9	68.5	68.9	71.3	71.4	73.2	72.4
s	3.5	3.9	3.1	3.4	3.2	3.1	4.0	2.7	5.0	4.2	1.2	3.8	4.8	2.9

TABLE 1 (Continued)
Anthropometric measurements of rural Indian Guatemalans

	7	8	9	10	11	12	13	14	15	16	17	18	19	Adults
Arm length in cm														
\bar{x}	33.6	34.3	36.1	37.7	39.3	41.3	43.1	46.3	47.0	48.5	50.2	51.2	52.4	51.8
s	2.1	1.7	1.8	1.9	2.2	2.1	2.6	2.8	2.3	2.8	2.0	2.3	3.0	2.7
Biacromial diameter in cm														
\bar{x}	23.8	24.4	25.6	26.6	27.7	28.4	29.5	31.5	32.2	32.9	34.9	36.3	38.3	37.6
s	1.5	1.3	1.3	1.5	1.6	1.4	1.7	2.3	1.5	2.3	1.7	1.5	1.4	1.6
Bicristal diameter in cm														
\bar{x}	16.9	17.7	18.3	18.7	19.4	19.9	20.8	21.9	22.2	22.4	23.7	24.0	24.2	25.2
s	1.2	0.8	1.0	1.1	1.2	1.2	1.2	1.9	1.6	2.0	1.6	0.7	2.6	1.2
Chest circumference in cm														
\bar{x}	59.5	60.4	62.0	63.5	64.8	66.7	69.4	73.7	76.0	79.3	82.1	85.0	84.9	86.5
s	2.7	2.4	1.8	2.8	2.7	2.8	3.5	4.6	3.5	4.9	3.9	5.7	3.8	3.5
Skinfold thickness in mm														
\bar{x}	6.8	6.9	6.7	6.9	6.7	6.6	7.4	7.5	6.4	6.3	7.6	8.1	7.3	6.8
s	1.2	2.0	1.6	2.4	1.9	1.7	2.3	2.5	1.8	1.4	2.8	1.6	1.6	2.1
Arm circumference in cm														
\bar{x}	15.3	16.0	16.5	17.2	17.2	17.6	18.7	20.2	20.2	21.2	23.1	24.5	24.6	35.1
s	0.8	0.9	1.1	1.2	1.0	1.3	1.5	2.1	1.4	1.9	1.4	1.7	1.4	5.2
Grip strength in kg														
\bar{x}	6.9	8.3	10.4	12.1	13.3	15.2	17.5	20.9	22.6	25.2	31.8	36.5	36.8	24.9
s	2.0	2.3	2.6	2.5	2.8	2.1	3.5	4.4	4.8	6.7	3.9	5.8	2.5	1.5

TABLE 2
Anthropometric measurements of urban upper-income Guatemalans

	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Adults
Weight in kg															
N	29	30	29	30	33	31	30	29	30	23	21	17	29	19	32
\bar{x}	25.9	28.6	32.2	34.4	39.4	40.6	50.5	54.2	55.8	60.5	65.6	59.0	61.7	58.9	65.9
s	2.9	3.7	5.0	6.5	9.4	6.7	8.8	6.7	8.9	8.1	8.9	6.6	10.0	6.6	7.3
Height in cm															
\bar{x}	124.8	129.9	134.7	138.5	143.8	147.9	158.6	162.9	165.9	170.6	171.6	168.3	170.1	167.4	168.3
s	4.9	5.0	4.9	6.4	7.2	7.0	6.4	8.0	5.8	7.1	5.7	6.2	8.5	4.9	5.7
Sitting height in cm															
\bar{x}	68.2	70.0	72.4	73.5	75.9	77.2	82.2	84.9	86.5	89.2	90.5	88.9	91.1	89.4	89.9
s	2.7	2.8	2.6	2.7	3.8	3.7	4.2	4.1	3.7	4.5	2.8	3.4	4.4	2.5	2.8
Sternum height in cm															
\bar{x}	99.0	103.6	107.8	111.7	116.2	119.7	129.6	133.0	135.7	139.2	139.8	137.4	138.8	136.9	137.6
s	4.4	4.3	4.1	5.6	6.4	6.2	5.2	6.4	5.3	5.6	4.6	6.3	7.1	4.2	4.6
Head and neck length in cm															
\bar{x}	24.9	26.2	26.8	26.8	27.6	28.2	29.0	29.9	30.2	31.4	31.8	30.3	31.3	30.5	30.7
s	4.9	1.0	1.1	1.3	1.0	1.2	1.9	1.7	1.3	2.0	1.4	3.9	1.9	1.2	1.5
Trunk length in cm															
\bar{x}	40.9	43.8	45.6	46.6	48.3	49.1	53.2	55.0	56.4	57.7	58.6	59.8	59.8	58.9	59.2
s	8.2	2.2	2.0	2.0	3.2	3.0	2.9	2.8	3.2	3.1	1.9	4.8	3.0	2.2	2.4
Leg length in cm															
\bar{x}	57.4	60.3	63.0	66.6	68.8	71.3	77.3	79.4	79.8	82.3	82.3	79.9	73.3	78.7	79.3
s	3.1	3.2	3.1	4.0	4.1	3.9	3.4	4.4	3.7	3.8	3.4	4.4	4.9	3.5	4.8

TABLE 2 (Continued)
Anthropometric measurements of urban upper-income Guatemalans

	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Adults
Arm length in cm															
\bar{x}	39.4	41.7	43.3	45.0	47.6	49.0	52.5	53.9	55.2	57.7	57.6	56.0	56.2	54.5	56.0
s	1.9	2.0	1.8	2.5	2.7	2.6	2.4	3.1	2.1	3.9	2.2	2.7	3.1	2.9	2.4
Biacromial diameter in cm															
\bar{x}	26.9	27.8	28.9	29.6	31.1	32.0	34.0	35.1	36.0	37.8	38.9	38.4	38.8	38.0	38.4
s	1.2	1.6	1.7	1.8	1.9	1.9	1.9	2.5	2.6	1.7	2.4	2.5	2.5	1.9	1.6
Bicristal diameter in cm															
\bar{x}	18.2	18.7	19.8	20.2	21.3	22.1	23.3	24.2	24.2	25.5	26.0	25.9	25.6	25.6	26.8
s	1.1	1.1	1.7	1.8	2.4	1.6	1.6	1.7	1.9	1.4	1.3	1.1	1.8	1.2	2.0
Chest circumference in cm															
\bar{x}	62.4	64.1	67.1	68.7	70.6	71.4	77.8	80.3	81.0	83.7	88.5	84.7	86.0	83.6	90.6
s	2.8	2.9	4.5	5.3	6.2	4.6	6.2	4.7	4.8	4.3	6.1	5.2	5.4	4.4	5.2
Skinfold thickness in mm															
\bar{x}	11.1	11.2	13.6	13.9	16.7	13.5	15.4	13.3	12.4	10.9	11.8	8.2	10.1	11.2	12.3
s	3.0	3.0	5.7	5.7	7.1	3.7	6.0	5.3	6.5	3.4	6.6	2.7	5.0	4.5	4.8
Arm circumference in cm															
\bar{x}	18.4	19.2	20.4	20.9	22.1	21.9	24.0	24.9	24.9	25.8	27.4	26.3	27.5	43.7	43.5
s	1.0	1.4	2.0	2.5	2.9	2.2	2.5	2.0	2.5	2.3	2.6	1.6	2.4	6.1	6.0
Grip strength in kg															
\bar{x}	12.3	14.1	16.2	18.4	19.9	24.0	28.7	35.8	37.7	44.0	49.1	46.9	45.7	27.1	28.4
s	2.8	2.9	3.5	3.8	4.3	6.0	5.4	6.7	7.7	5.8	6.0	6.6	8.4	2.4	2.5

expressed as percent of the standing height, as shown in Table 3, are significantly higher in the urban group. Head and neck, and trunk lengths to standing height ratios, however, are greater in the Indian group studied. This shows that the Cakchiquel Indians have a proportionally longer trunk, head and neck lengths and shorter leg and arm lengths.

The laterality measurements, biacromial and bicristal diameters as well as chest circumference, when expressed in terms of body height are greater in the Indian group. Thus, the Cakchiquel Indians have a wider body in relation to their height. This data confirms Steggerda's study (1936) which reported that the Yucatan Mayan have a relatively larger trunk and a greater chest circumference than do members of the other racial groups. The biacromial to bicristal ratio was not different in both groups. Arm circumference to height ratio was significantly higher in the urban group.

When the height and weight values of the rural Indian and urban Guatemalans were plotted on the Wetzel grid, both groups demonstrated a normal rate of growth on the basis of height-weight proportions. The physical status of both population groups considered on this basis could be estimated as to being good and within normal limits. However, when the chronological age is taken into consideration, the development curves of the Indian group are well below the normal range and show a retardation of about two years, whereas the urban group is normal.

In Fig. 1, heights and weights are compared graphically with North American values (Falkner, 1962b). It can be seen again that the heights and weights of the Indian group are well below either the urban Guatemalan or North American data. The height and weight curves are parallel, showing the same difference through all ages up to 17 years; after this age, a great variability is seen. The height and weight curves for the urban group follow the 50 percentile curves of the North American standards. The variability observed after 17 years can be attributed to heterogeneity within the sample. As was explained under "Material and Methods," the children attending the private school were from upper socio-economic families, whereas the university students and the rest of the subjects in the urban group did not completely fulfill this characteristic. The height curve for the Indian group is below the 5 percentile curve of the North American standards. The weight curve is on the 5 percentile curve of the same standards.

The weight to height ratio is significantly lower in the Indian group and maintains a 20% deficit throughout all ages up to 17 years, then

TABLE 3
Comparison of body-measurement ratios of rural Indians and urban Guatemalans

		7	8	9	10	11	12	13	14	15	16	17	18	19	20	Adults
Head and neck length/height $\times 100$																
Indian	\bar{x}	21.4	20.8	20.8	20.6	20.4	20.0	19.5	19.0	18.6	18.5	18.3	18.7	18.4		18.8
	s	0.9	1.1	0.9	0.9	0.8	0.6	0.7	1.0	0.8	0.7	0.9	0.4	0.7		0.7
Urban	\bar{x}	20.6	20.2	19.9	19.4	19.2	19.0	18.3	18.3	18.2	18.4	18.5	18.0	18.4	18.2	18.2
	s	0.7	0.6	0.5	0.8	0.6	0.7	0.8	0.4	0.7	0.7	0.5	2.3	0.7	0.5	0.5
Trunk length/height $\times 100$																
Indian	\bar{x}	35.3	35.7	35.0	34.8	34.5	34.6	34.4	34.3	34.5	34.8	35.7	35.8	35.5		35.5
	s	1.3	1.4	1.1	0.9	0.9	0.8	1.2	1.0	1.3	1.1	1.0	1.3	0.8		1.0
Urban	\bar{x}	34.0	33.7	33.8	33.7	33.6	33.2	33.5	33.8	34.0	33.8	34.2	34.8	35.2	35.2	35.2
	s	1.2	1.0	1.0	0.9	1.2	1.2	1.1	1.1	1.2	1.4	1.0	2.6	1.0	1.2	1.5
Leg length/height $\times 100$																
Indian	\bar{x}	42.2	43.0	43.4	44.2	44.1	45.5	45.6	46.6	48.0	46.7	47.0	45.6	46.8		46.3
	s	1.8	1.5	1.2	1.5	1.6	1.7	1.6	0.9	3.0	1.0	1.1	1.2	1.2		1.2
Urban	\bar{x}	46.0	46.4	46.8	48.1	47.8	48.2	48.8	48.8	48.1	48.2	48.0	47.5	46.6	47.0	47.1
	s	1.3	1.2	1.3	1.6	1.0	1.8	1.2	1.1	1.5	1.2	1.2	1.7	1.1	1.0	1.7
Arm length/height $\times 100$																
Indian	\bar{x}	31.0	31.0	31.1	31.3	31.6	31.9	32.2	32.4	32.9	32.9	33.1	32.7	33.5		33.0
	s	0.9	1.0	0.8	1.0	0.9	1.6	1.1	0.8	0.7	0.9	0.9	0.8	1.1		1.5
Urban	\bar{x}	31.6	32.1	32.1	32.5	33.1	33.1	33.1	33.1	33.3	33.8	33.6	33.2	33.0	32.5	33.3
	s	0.8	0.8	0.7	0.9	0.8	1.0	0.9	0.7	0.7	1.4	1.1	0.9	0.9	0.9	0.8

TABLE 3 (Continued)
Comparison of body-measurement ratios of rural Indians and urban Guatemalans

		7	8	9	10	11	12	13	14	15	16	17	18	19	20	Adults
Biacromial diameter/height $\times 100$																
Indian	\bar{x}	22.0	22.0	22.1	22.0	22.3	22.0	22.0	22.1	22.5	22.3	23.0	23.2	24.6		24.0
	s	1.0	1.1	0.8	1.0	1.0	1.0	0.9	1.1	0.7	1.1	0.8	0.4	1.3		0.8
Urban	\bar{x}	21.6	21.4	21.2	21.3	21.6	21.7	21.4	21.5	21.7	22.2	22.7	22.8	22.8	22.7	22.8
	s	0.7	1.0	1.4	0.9	1.0	0.8	0.9	1.3	1.2	0.9	1.5	1.6	1.5	1.0	0.9
Bicristal diameter/height $\times 100$																
Indian	\bar{x}	15.6	16.0	15.8	15.5	15.7	15.4	15.6	15.4	15.6	15.2	15.6	15.4	15.4		16.1
	s	0.7	0.6	0.8	0.8	0.8	0.9	0.7	0.9	0.8	1.1	0.9	0.6	1.3		0.8
Urban	\bar{x}	14.6	14.4	14.7	14.6	14.8	14.9	14.7	14.9	14.6	15.0	15.1	15.4	15.1	15.3	16.0
	s	0.9	0.7	1.0	1.0	1.1	0.8	1.0	0.6	1.0	0.7	0.6	0.7	0.9	0.7	1.2
Chest circumference/height $\times 100$																
Indian	\bar{x}	55.1	54.5	53.5	52.6	52.2	51.6	51.9	51.7	53.3	53.8	54.1	54.4	54.4		55.0
	s	2.3	1.9	2.0	2.2	2.0	2.2	2.0	2.2	2.6	2.4	2.0	3.2	3.3		5.6
Urban	\bar{x}	50.0	49.4	49.7	49.6	49.0	48.3	49.1	49.4	48.8	49.1	51.6	50.4	50.3	50.0	53.9
	s	1.8	1.9	2.6	3.1	2.8	2.2	3.6	3.3	2.6	2.2	3.7	3.4	3.3	3.1	3.4
Arm circumference/height $\times 100$																
Indian	\bar{x}	14.2	14.5	14.2	14.3	13.8	13.6	13.9	14.1	14.1	14.4	15.2	15.7	15.8		15.9
	s	0.9	0.9	1.0	0.9	0.7	0.9	1.0	1.0	0.8	1.0	0.7	1.0	1.4		0.9
Urban	\bar{x}	14.7	14.8	15.2	15.1	15.4	14.8	15.2	15.3	15.0	15.1	17.7	15.6	16.2	16.2	16.9
	s	0.7	1.0	1.4	1.6	1.5	1.2	1.4	1.5	1.5	1.2	1.7	1.0	1.4	1.5	1.5
Biacromial/bicristal diameter $\times 100$																
Indian	\bar{x}	1.41	1.38	1.40	1.42	1.43	1.43	1.42	1.44	1.45	1.48	1.48	1.51	1.60		1.50
	s	0.08	0.08	0.09	0.09	0.09	0.10	0.08	0.06	0.10	0.13	0.11	0.07	0.17		0.09
Urban	\bar{x}	1.48	1.49	1.47	1.47	1.47	1.45	1.46	1.45	1.49	1.49	1.48	1.48	1.52	1.48	1.44
	s	0.08	0.09	0.10	0.09	0.11	0.07	0.09	0.09	0.09	0.09	0.13	0.10	0.09	0.07	0.09

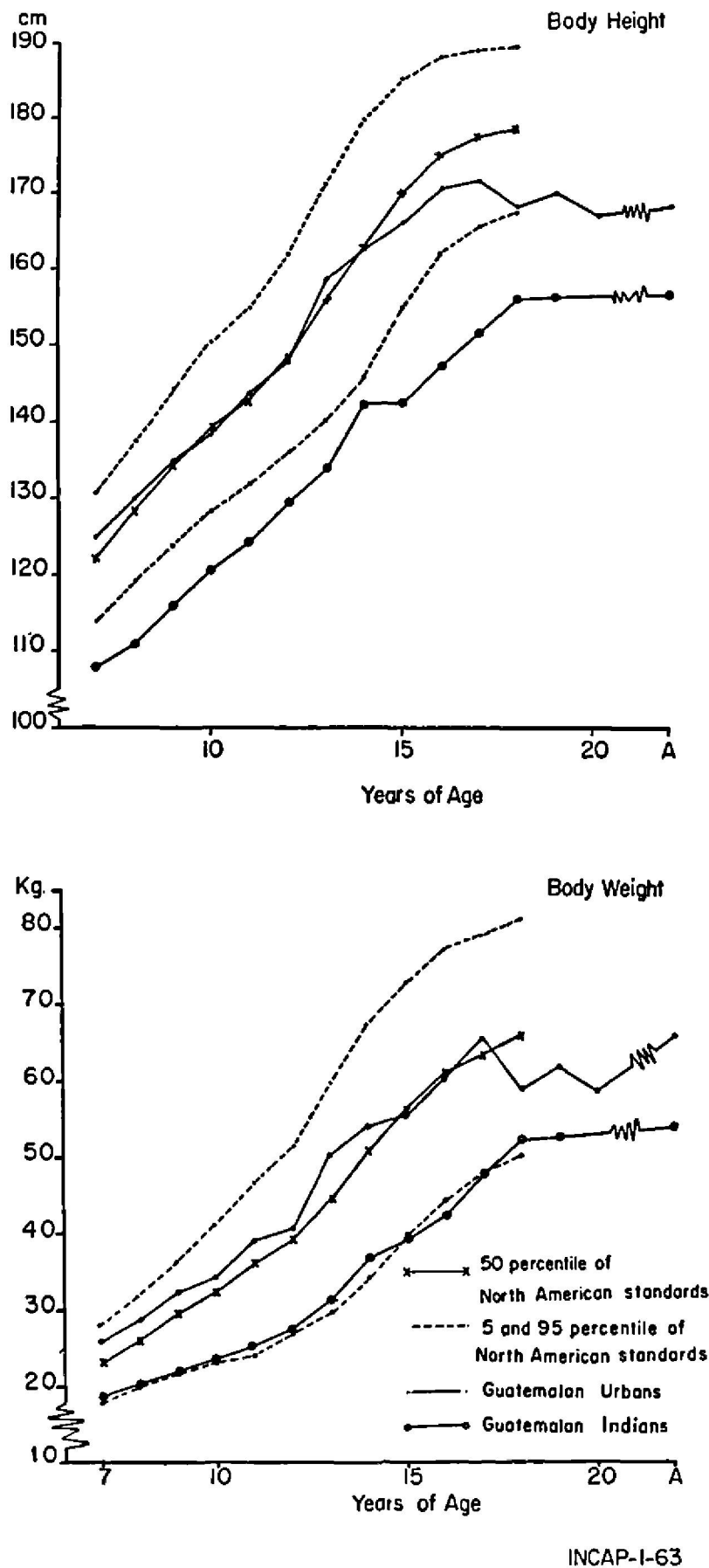


FIGURE 1. HEIGHT AND WEIGHT OF INDIAN AND URBAN GUATEMALANS.

the deficit remains about 5 to 10%. Body fat, as determined by the skin-fold thickness, is greater among the urban groups. This could be due in part to a lower caloric intake of the Indians as well as a greater physical activity. These findings are of particular interest because they may contribute to the understanding of the low serum cholesterol levels as well as the low prevalence of atherosclerotic heart disease observed among rural Guatemalan Indians (Mann *et al.*, 1955; Méndez *et al.*, 1962; Tejada *et al.*, 1958).

It is well recognized that growth, weight, and composition of the body depend, in part, upon the supply of nutrients available to the body. However, the genetic factors cannot be separated from the environmental factors and they interact constantly (Falkner, 1962a). This interaction of genetic potentials and environment results in the physical characteristics of the groups studied. The basic information presented in this report is needed in the interpretation of the nutritional studies carried out in this area, primarily as a useful criterion in determining at least one aspect of the nutritional status of the population.

SUMMARY

The anthropometric characteristics of 361 Guatemalan Cakchiquel Mayan Indian males, ages 7 to adulthood, and a comparative group of 412 urban, non-Indian Guatemalans were determined. The Cakchiquel Mayan can be characterized as shorter in stature, of less body weight and fat, with relatively longer trunks, shorter legs and arms, more robust chests, greater breadth of shoulders and hips, and with less hand grip-strength than their urban, non-Indian countrymen. The importance of this information as a useful criterion in determining the nutritional status of the Guatemalan population is stressed.

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