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GROWTH AND MALNUTRITION IN AFRICAN ECUADORIAN CHILDREN AND YOUTH

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Abstract: *This article focuses on anthropometric parameters as height for age, weight for age and weight for height which are among the most used tools for assessing well-being of infants and children. Such data have been collected between 1993 and 1994 from samples of infants, children and adolescents aged between 1 and 18 years of African ancestry from downtown and suburbs of Esmeraldas, the main city of the same named province of Ecuador with a population of mainly African origin. The socio-economic status, mainly assessed in function of attendance to public and private schools appears to affect growth patterns. Thus heavy height deficiency was observed in 23% of males of low socio-economic status as compared to 8.6% of medium and high socio-economic status and the same trend occurred in females; Similar patterns are observed with weight. The extent of differences between the socio-economic groups is highest for infants and young children and tends to decrease afterwards. This finding is discussed in view of greater vulnerability to nutritional and environmental deprivation at these ages.*

Keywords: *Growth; Nutrition; Ecuador.*

Introduction

Esmeraldas is located in the Northwest of Ecuador, it has 358.223 inhabitants and is the main city of the province of the same name which has 157.792 inhabitants (INEC 2000). The province is one of the poorest of the country and the city of Esmeraldas has frequent water shortage problems. About eighty percent of the population is Afro-Ecuadorian besides there are some ethnic groups as Chachis and Awa. European feet touched Ecuadorian soil when the Spanish landed on the Pacific coast in 1526. The "*conquistatores*" were astounded to find Indians bedecked in emeralds awaiting them on shore. Convinced that the region was abundant in brilliant gems they named it Esmeraldas. Local tradition says that the city was founded in 1553 by ten males and seven females from Africa, who had escaped from the wreck of a slave trading ship on its way to Lima in Peru (Diaz 1978, Alcina Franch and Pena 1980, Jurado Noboa 1992). Since then the black population has always lived in freedom in this area giving refuge to the slaves who had escaped from surrounding areas via wrecked slave ships or escape from Columbian sugar plantations (Savoia 1988). The isolation of Esmeraldas (roads did not reach the North coast until almost 30 years ago) has helped these people retain their African roots.

The city grew, slowly at first, then in the years 1950 to 1974 thanks to a flourishing trade in the export of bananas, which attracted many immigrants seeking work, the urban

population grew by 365%. According to (INEC 1999) 98,558 people lived in the city of Esmeraldas in the period of this investigation.

However during this phase of rapid economic and demographic growth development of the city's social and health services failed to keep pace, and are today totally inadequate. This situation has indeed become critical for in recent years the export of bananas has declined with a corresponding decline in the formerly rich economy based on the banana plantations. There are thousands of unemployed or underpaid people living in areas devoid of services and administrative infrastructures. The absence of health and hygienic services allows high incidences of malaria, dengue, typhoid fever, cholera and parasitoses and there is widespread undernourishment. However there was no evidence of this distressing health situation in the majority of the schools in which our samples were taken, possibly the children from the worst affected families cannot attend these schools.

During growth rapid and highly significant changes of body dimensions are observed at all stages from the neonatal to adolescence and adulthood. Most studies on these growth differences relate to children who are European or are of European derivation, and there is relatively little information on Non-European populations. The study reported here concerns growth in Ecuadorian children and adolescents of African ancestry.

Material and Methods

The study was carried out in 1993–1994 in the city of Esmeraldas, north-western coast of Ecuador (00°59′N, 79°42′W) on school children. Samples were taken (Table 1) consisting of similar numbers of each sex in each of the age groups.

Table 1. Distribution of males and females of the town of Esmeraldas (North-Western Ecuador) from 1 to 18 years.

Age*	Males	Females	Together
1.00–1.99	103	99	202
2.00–2.99	100	95	195
3.00–3.99	98	99	197
4.00–4.99	92	102	194
5.00–5.99	97	100	197
6.00–6.99	100	100	200
7.00–7.99	107	99	206
8.00–8.99	105	95	200
9.00–9.99	99	101	200
10.00–10.99	102	99	201
11.00–11.99	96	100	196
12.00–12.99	99	97	196
13.00–13.99	99	94	193
14.00–14.99	99	99	198
15.00–15.99	97	94	191
16.00–16.99	91	98	189
17.00–17.99	101	97	198
18.00–18.99	96	98	194
Total	1781	1766	3547

* In decimal years; 12 months classes.

The birth date for each child was ascertained directly from the school register. All the children were of African ancestry, were apparently healthy without any obvious or reported pathologies, and were of good nutritional status.

For each subject were collected personal information on the type of school attended (private or state), on the level of education of the parents and their occupations, the number of members in the family etc. These data were used to assign the child to one of two socioeconomic classes (low or high; Table 2).

Table 2. Distribution of the sample by social class.

Social Classes	Males n	Females n
Lower	128	363
Higher	1520	1294
Together	1648	1657

Stature was measured with an anthropometer to the nearest millimeter. The technique was that of Martin and Saller (1959), Weiner and Lourie (1981), the subject standing on a horizontal platform, heels flat and together, the body stretched upward to the fullest extent but relaxed, and the head oriented in the horizontal Frankfurt plane.

Weight was measured to the nearest 500 grams on a balance calibrated at the beginning of each day's work. The subjects wore minimal light weight clothing (less than 500 g, and so no adjustment for weight of clothing had to be made.

The reference values for comparison with Esmeraldas children were those proposed by the National Center for Health Statistics (NCHS 1977) as proposed by WHO (1995 a,b, 1977).

Results

All the auxometric parameters were normally distributed. Tables 3 (a, b) and 4 (a, b) show the means and standard deviations for stature and weight by age, while Table 5 shows the distribution of underweghted, middleweighted and overweighted children and youts among, sex and socio-economic class. As expected the means within social class increase with age in both sexes, and the boys are taller and heavier than the girls. Differences in stature between the two social classes as tested by the non-parametric Mann-Whitney test were significant in males in all three age groups, and in females in the first two. For weight the differences between social classes were only significant in both sexes at age four and in males at age six. In all three age groups however whether or not the differences were significant the children from the higher social class tended to be taller and heavier. The sex difference in height and weight appears to be more marked in the higher social class.

Table 3. Statistical parameters of height and weight for age in the town of Esmeraldas (North–Western) Ecuador – Females.

Age (yrs)	n	M	SD	Me	Vmin	Vmax	w
			H E I G H T (cm)				
1	73	78.8	4.5	79.0	68.5	87.0	18.5
2	84	86.7	4.0	86.3	78.8	95.5	16.7
3	82	94.3	3.7	94.0	87.0	106.5	19.5
4	72	102.4	5.3	102.8	92.8	114.5	21.7
5	71	109.1	5.1	109.0	98.2	118.0	19.8
6	62	113.9	5.0	113.9	103.0	128.0	25.0
7	70	120.7	5.0	121.5	109.2	132.0	22.8
8	55	126.5	5.7	126.8	116.2	138.0	21.8
9	60	131.6	5.6	131.8	119.8	146.5	26.7
10	74	138.0	6.8	138.4	122.0	151.0	29.0
11	83	142.8	7.2	142.3	124.5	158.0	33.5
12	75	149.8	6.3	149.8	134.0	168.0	34.0
13	74	153.4	5.2	153.4	142.5	164.0	21.5
14	73	156.2	5.5	156.0	143.5	166.5	23.0
15	78	154.7	5.5	154.5	143.2	172.5	29.3
16	83	156.5	6.0	156.5	144.0	171.8	27.8
17	73	156.5	4.9	156.0	144.0	167.0	23.0
18	86	155.6	5.1	155.9	143.3	167.3	24.0
			W E I G H T (kg)				
1	73	10.1	1.2	10.0	7.8	12.8	5.0
2	84	11.5	1.0	11.5	9.5	14.5	5.0
3	82	13.3	1.2	13.0	11.4	17.0	5.6
4	72	15.5	1.9	15.5	12.0	19.5	7.5
5	71	17.5	1.9	17.5	14.0	21.5	7.5
6	62	19.1	2.2	19.0	14.5	24.0	9.5
7	70	21.9	2.8	21.5	16.5	28.0	11.5
8	55	26.3	3.8	26.0	20.0	36.5	16:5
9	60	29.6	4.9	29.0	21.5	41.0	19.5
10	74	32.8	5.7	32.0	24.0	44.5	20.5
11	83	35.4	6.1	35.0	25.0	50.0	25.0
12	75	41.4	6.0	41.0	30.0	58.0	28.0
13	74	45.0	5.9	44.0	34.3	60.0	25.7
14	73	47.0	5.5	46.5	34.5	64.0	29.5
15	78	49.4	5.7	49.5	38.0	64.0	26.0
16	83	50.0	5.0	50.0	40.0	63.5	23.5
17	73	51.2	5.3	50.5	40.5	64.0	23.5
18	86	50.3	5.4	50.0	39.0	63.0	24.0

Table 4. Statistical parameters of height and weight for age in the town of Esmeraldas (North-Western) Ecuador – Males.

Age (yrs)	n	M	SD	Me	V_{min}	V_{max}	w
			H E I G H T (cm)				
1	65	80.1	4.7	80.0	70.0	90.0	20.0
2	85	88.2	3.8	88.5	81.0	101.0	20.0
3	80	95.5	4.3	95.5	85.8	105.0	19.2
4	72	103.2	4.0	103.0	95.0	113.0	18.0
5	70	109.7	4.4	109.1	100.0	118.8	18.8
6	81	114.2	5.0	113.8	104.0	126.0	22.0
7	46	119.9	4.2	121.0	110.3	128.0	17.7
8	62	126.7	5.7	127.5	112.5	140.0	27.5
9	54	131.6	4.6	130.8	123.5	142.5	19.0
10	75	136.0	6.4	136.5	122.5	148.5	26.0
11	75	141.7	6.8	142.0	126.0	157.5	31.5
12	85	145.6	8.1	145.3	126.8	163.5	36.7
13	73	153.5	8.4	154.4	133.7	173.0	39.3
14	85	158.5	8.0	160.5	133.3	176.0	42.7
15	84	164.0	6.2	164.3	150.0	179.0	29.0
16	71	167.2	5.4	167.5	155.5	180.5	25.0
17	85	167.7	6.2	167.0	152.2	181.0	28.8
18	90	167.3	5.9	167.3	155.8	182.0	26.2
			W E I G H T (kg)				
1	65	10.5	1.3	10.4	8.2	13.5	5.3
2	85	12.1	1.2	12.0	10.1	15.5	5.4
3	80	13.7	1.3	13.5	11.2	17.0	5.8
4	72	15.7	1.6	15.8	12.5	21.0	8.5
5	70	17.7	1.8	17.5	14.0	22.0	8.0
6	81	19.2	2.5	19.0	15.0	27.0	12.0
7	46	22.3	1.8	22.5	18.0	26.5	8.5
8	62	26.0	3.3	26.3	18.5	33.0	14.5
9	54	28.4	3.7	27.8	22.5	39.0	16.5
10	75	30.6	4.8	30.0	22.0	44.5	22.5
11	75	34.4	6.2	33.5	23.5	52.5	29.0
12	85	36.7	6.5	35.0	23.5	52.0	28.5
13	73	41.6	6.6	41.5	28.0	56.0	28.0
14	85	46.1	6.8	46.0	29.0	63.5	34.5
15	84	50.6	6.2	50.0	37.5	68.0	30.5
16	71	55.2	5.3	55.0	45.0	70.0	25.0
17	85	56.6	6.0	56.0	45.0	71.0	26.0
18	90	56.4	6.0	55.5	44.0	71.0	27.0

Table 5. Distribution of children and youth by social class and nutritional status.

Social Class	Sex	Underweight n	Underweight %	Middleweight n	Middleweight %	Overweight n	Overweight %	Together
Higher	Males	828	54.4	570	37.5	122	8.0	1520
Lower		67	52.3	40	31.3	21	6.4	128
Higher	Females	563	43.5	539	43.2	172	13.2	1294
Lower		153	42.2	159	43.8	51	14.0	363

Discussion

The anthropometric measurements used in this study are usually recommended to assess growth patterns, maturation and state of nutrition. Thus low height for age is considered an indicator for stunting, a marker for chronic undernutrition; low weight for height indicates wasting or temporary undernutrition; and weigh for age indicates underweight, a combination of the former two (Johnston 1986). In accordance with the census data the situation of poverty in Esmeraldas is ongoing and preoccupying. According to projections in the year 2005, 64.467 children between ages 6 and 11 are poor, it means three out of ten approximately; only 18.3% of children under the age of 17 had water in their homes and 19.2% had access to the sewer system. Within the school year 2000–2001 many children dropped out, reflecting the educational system discontinuity. 20% dropped out in first grade, 18.7% in sixth grade. Only 53.6% of the population is older than 12 finished elementary school. According to the last Census in 2000, 33.4% of children in Esmeraldas suffer from total undernourishment and 57% from chronic undernourishment. The data reported in this paper seem to reflect the above depicted discomfort situation. In spite of the numerical differences of the two social classes it shall be stressed the high percentage of underweight in both sexes and social classes, being the percentage greater among males (Table 5). Furthermore the comparison of height for age and weight for age of children and youths of Esmeraldas with the published data of the corresponding US afroamericans (Eveleth and Tanner 1990) shows lower values especially evident starting from the age of 5 years in both sexes. Only very few data are available for other afroamericans in Ecuador. Comparison with data by Stinson (1996) and Leonard and colleagues (2000) on the afro-ecuadorians settled in the rain forests and rural and highland areas North-Western Esmeraldas for ages between 1 to 5 years shows however that in spite of the evident growth retardation of children and girls of Esmeraldas they are taller and heavier than the corresponding boys and girls living in non urban environment.

In conclusion the present study shows how much information is obtained from anthropometry, not only for comparison of subsamples of population but also for screening large numbers of individuals to identify those potentially at risk with respect to nutrition and other factors causing disturbance of normal growth.

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