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# Anthropometric measurements in the elderly of Havana, Cuba: Age and sex differences

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**Abstract**

**Objective:** We present selected anthropometric data, specific for sex and age group, from a representative sample of elderly subjects living in Havana, Cuba.

**Methods:** This was a cross-sectional, population-based household survey. A total of 1905 subjects (1197 women and 708 men, ≥60 y of age) were examined between 1999 and 2000 as selected by probabilistic sampling. Data were presented as means and percentiles for body mass; height or stature; body mass index; waist, arm, and calf circumferences; triceps skinfold thickness; and arm muscle circumference; and differences were described according to age (all variables) and sex (body mass index).

**Results:** All anthropometric variables showed a decrease in average values with aging in men and women. The age of 70 y appeared to be the decisive moment for the main anthropometric differences observed. The values in the female group were higher than those in the male group for body mass index and triceps skinfold thickness. An important segment of the population studied had a body mass index lower than normal values. Reductions in subcutaneous fat (indicated by triceps skinfold thickness) and muscle mass (verified by arm, arm muscle, and calf circumferences) with advancing age appeared to be greater among women than among men.

**Conclusion:** The present study provides information that can be used for anthropometric evaluation of elderly people in Havana and other urban areas in Cuba. The observations suggest that there is loss of muscle mass and redistribution and reduction of fat mass with age (that is more severe in women). 

*Keywords:* Anthropometry; Aged; Nutritional status; Sectional studies; Body mass index

## Introduction

In Latin American and Caribbean countries, recent age structure changes indicate a reduction of younger segments and an expressive growth of the elderly population [1]. However, information concerning health conditions of the elderly is still scarce in developing countries.

Anthropometric indicators are useful to assess health conditions of the elderly, because many disorders, at this point in life, are associated with dietary and nutritional problems [2–5]. Anthropometric measurements, although limited, are the most practical way for a nutritional assessment of individuals and populations, through nutritional risk monitoring, prognosis of acute and chronic diseases, or clinical actions [6–9].

How useful these indicators are depends on the availability of reference data related to age, sex, and age group, specific to each population. The World Health Organization [10] recommends the development of specific reference values for each country, with availability of means, standard deviations, and percentiles for every measurement or index.

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There is some anthropometric information available on the elderly from developed countries, including data of representative samples [6,7,11,12]. Recently, in Latin America, information about the elderly of Mexico City (Mexico) [13], Santiago (Chile) [8], and São Paulo (Brazil) [9] were presented. In Cuba, there are no data that provide anthropometric parameters for the ≥60-y population, whose proportion, in 2007, was 18.7% (approximately 2 107 116 individuals) [14].

The objectives of the present study were 1) to present distribution values for anthropometric characteristics based on a cross-sectional (representative) sample for non-institutionalized older adults residing in the city of Havana, Cuba, and 2) to describe the age and sex differences to identify variations in anthropometric characteristics of the elderly.

## Materials and methods

For this epidemiologic cross-sectional, household-based study, data were extracted from the Survey on Health, Aging, and Well-Being in Latin America and the Caribbean (SABE), a multicenter study co-ordinated by the Pan-American Health Organization conducted in seven countries (Argentina, Brazil, Chile, Cuba, Mexico, Uruguay, and Barbados). The SABE is the first survey of its kind in the region and was simultaneously and rigorously comparable for the purpose of compiling information. In Cuba the study was conducted in the city of Havana and co-ordinated by members at the Center of Population and Development Studies, National Statistics Office (Centro de Estudios de Población y Desarrollo, Oficina Nacional de Estadística) [15].

The study population consisted of individuals ≥60 y of age (non-institutionalized), of both sexes, residing in the city of Havana between December 1999 and June 2000. The sample was generated through a multistage process by conglomerates, with stratification of the units at the highest levels of aggregation. Three selection stages were used in Havana. The primary-stage units were conglomerates of independent households within the predetermined geographic areas. Each conglomerate was selected with a probability proportional to the distribution of the households within each stratum. The primary-stage units were, in turn, divided into secondary-stage units, each made up of a conglomerate of households. The secondary-stage units then were divided into third-stage units. The stages of this design make it possible for the researcher to calculate the probability of each individual to be selected. Five thousand households were chosen, of which 4816 were visited. In this process, 1998 eligible persons were identified and complete information was collected from 1905 participants [15,16].

### *Anthropometry*

Anthropometric data were obtained by health professionals who received special training, including a video prepared by the National Institute of Nutrition of the University of Chile, for standardization and better visual presentation of the anthropometric techniques to be used in all countries participating in the SABE [15].

Anthropometric measurements used in this study were body mass (BM); height or stature (ST); circumferences of the waist (WC), arm (AC), and calf (CC); and triceps skinfold thickness (TSF). All measurements (BM, ST, WC, AC, CC, and TSF) were taken three times (at the same visit), and the mean values were used in the analyses.

Body mass index (BMI; kilograms per meter square) was calculated, as was arm muscle circumference (AMC = AC − $p \times$ TSF).

The instruments and procedures used for measuring have been previously published [8,9].

### *Statistical procedure*

Discordant values were individually evaluated by verifying consistency in comparison with other measurements. The occurrence of inconsistency was regarded as a possible error in measuring, compiling, or tabulating, and such values were excluded (e.g., extremely large WC with normal or low BMI and BM).

Data analysis used means, standard deviations, and percentiles (5th, 10th, 25th, 50th, 75th, 90th, and 95th), in accordance with sex and age group (60–64, 65–69, 70–74, 75–79, ≥80 y).

Age group effect was investigated by analysis of variance and Tukey's test for multiple comparisons. Differences between means were determined by Student's *t* test for comparison of sexes in relation to BMI. Statistical significance was defined with 5% confidence intervals ($P < 0.05$). All statistical analyses used SPSS 11.5 (SPSS, Inc., Chicago, IL, USA).

## Results

The study sample consisted of 1197 women (62.8%) and 708 men (37.2%). Age varied from 60 to 102 y, with a mean ± SD of 71.0 ± 8.7. Mean ages were 70.5 ± 8.4 y (range 60–96) in men and 72.3 ± 8.7 y in women ($P = 0.000$).

Among the elderly in this study (1882), 98.8% were born in Cuba, with the 1.2% of foreign-born subjects coming mainly from Spain. Although all individuals in the SABE (Havana) were non-institutionalized, they were not necessarily free of comorbidities [16] (not analyzed in the present study).

### *Anthropometry*

All measurements were taken in subjects who were able to stand and walk. The bedridden subjects were excluded ($n = 56$), as were those with conflicting values ($n = 23$). A few measurements were not taken in some of the elderly ($n = 150$) due to their refusal.

Tables 1 and 2 show BM, height, and BMI values (means, standard deviations, and percentiles) distributed by age group for women and men, respectively.