Nutritional status of the adult population in Niterói, Rio de Janeiro, Brazil: the Nutrition, Physical Activity, and Health Survey

Estado nutricional da população adulta de Niterói, Rio de Janeiro, Brasil: resultados da Pesquisa de Nutrição, Atividade Física e Saúde

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Abstract

A household survey was conducted to assess the nutritional status of the adult population in Niterói, Rio de Janeiro, Brazil. In the selected households, all adults (≥ 20 years) had their body mass and stature measured. Body mass index (BMI) was used to determine the nutritional status according to the World Health Organization classification. The population estimates showed low prevalence of underweight (BMI < 18.5kg/m²), while 45.8% of women and 49.6% of men were overweight/obese (BMI ≥ 25kg/m²). Obesity prevalence varied from 5.6% to 19.3% in men and from 9.6% to 21.3% in women, according to age. The prevalence of overweight/obesity was not associated with income (in either men and women) or schooling (in men), but there was an inverse relationship between schooling and overweight/obesity in women. The prevalence of underweight decreased with increasing mean income in the census enumeration area. The authors conclude that overweight/obesity is the most prevalent nutritional disorder in both men and women in Niterói. This pattern resembles recent results for the adult population in Southeast Brazil as a whole, where Niterói is located.

Nutritional Status; Anthropometry; Adult; Population Studies in Public Health; Nutrition Surveys

Introduction

Excess body mass (pre-obesity and obesity) is now one of the most serious public health problems in various countries, especially the developed ones, where obesity prevalence varies from 10% to 50% of the adult population [1]. Obesity is a risk factor for several chronic diseases such as systemic arterial hypertension, type 2 diabetes, and dyslipidemias, among others, the treatment of which greatly increases health sector expenditures [1]. Increased obesity prevalence in various countries has mainly accompanied socioeconomic development, population growth, internal migration, technological development, and cultural changes leading to a significant increase in energy intake associated with a possible decrease in physical activity level by the population [2]. Thus, the decreased prevalence of underweight and increased obesity prevalence in these countries has been referred to as nutrition transition, now characterizing not only the developed countries, but also many societies that view themselves as mirroring the development of the Northern Hemispheric countries, particularly the United States culture [3].

The Brazilian Institute of Geography and Statistics (Fundação Instituto Brasileiro de Geografia e Estatística – IBGE), conducted four major nationwide surveys on the population's nutritional profile. These surveys allowed monitoring the nutritional status of Brazilians from 1974 to

2003, in addition to revealing the principal aspects leading to the modification of the population's nutritional profile over time. At the beginning of the study period the population showed a high prevalence of undernutrition, especially among children in the Northeast region. However, over the years, the prevalence of undernutrition decreased, while there was a progressive increase in the prevalence of excess body mass, especially among men in the Southeast and also in the poorest areas of the country, thus characterizing a nutrition transition in the national population [4]. In 15 years (1974-1989), the prevalence of underweight in children decreased by 60% and the low prevalence of obesity remained stable in this same age bracket. During this same period, underweight in adults also decreased, while obesity prevalence nearly doubled. For the population of the Northeast and Southeast of Brazil, from 1989 to 1997 there was an increase in obesity prevalence that was greatest among the poor population, particularly women [5]. More recent data show that from 1989 to 2003 the prevalence of excess body mass (pre-obesity and obesity) stabilized among women. Among men, the prevalence of both pre-obesity and obesity continued to increase, especially in the South, Southeast, and Central West of the country in all age brackets and all income fifths [6].

Despite the lack of historical data, the nutrition transition in the Brazilian population has been explained by changes in the dietary model, which has become rich in fat, processed foods, and sugar, with low fiber intake, in addition to a possible association with decreased physical activity [6]. Knowing that obesity is due to an imbalance between food intake and energy expenditure, resulting in positive energy balance, knowledge of individual daily physical activity and food intake is important to prevent and control obesity [5]. Meanwhile, despite the high prevalence of excess body mass in the Brazilian population, undernutrition is still observed (although at low rates), especially among women and children in the poorest areas [7]. Both excess body fat and lack of fat pose risks to individual health, so that knowing the population's nutritional status is important not only to characterize it but also to plan the prevention and treatment of nutritional disorders and detect the diseases associated with them.

The current study aimed to evaluate anthropometric nutritional status and analyze it according to gender, age, and census enumeration area (CEA) mean income in the adult population in Niterói, Rio de Janeiro, Brazil, to determine this population's nutritional profile and compare it to data for Brazil as a whole and particularly the Southeast Region of the country, based on data from the Nutrition, Physical Activity, and Health Survey (PNAFS).

Material and methods

The PNAFS was a household survey conducted from January to December 2003, based on a three-stage probabilistic sample of households and adults (≥ 20 years). In the first stage, 110 CEAs in Niterói were systematically selected, with probability proportional to the number of permanent private households observed in the 2000 Population Census [8]. Prior to selection, the CEAs were ordered from lowest to highest according to the head-of-household's mean nominal monthly income, thus implicitly stratifying the CEA by mean income and ensuring the selection of CEA from all income levels.

In the second stage, 16 households were selected in each CEA with equal probability, using an inverse sampling procedure analogous to that applied in the World Health Survey in Brazil [9], leading to a sample size of 1,760 households. The CEA listing from the 2000 Population Census [8] served as a frame for selection of households in the 110 CEA selected in the first stage, and the ordinal numbers for the households in the lists were selected to establish the order of the visits. The households were then visited in the order pre-established in the selection, the results of each visit were recorded in an appropriate data collection instrument, and the visits ended when the 16th interview had been obtained in the given CEA, obeying the eligibility criteria set for the PNAFS, which included agreement to answer the interview by an eligible resident adult (≥ 20 years), as described below.

In the third stage, one adult was selected in each household interviewed, assigning equal probability to all the adult residents in that household. The present analysis used second-stage data from the sample selection, i.e., data obtained from the household interview. However, the third stage is mentioned here because the household had to have at least one eligible adult (healthy in the sense of not presenting any disease that might interfere in metabolism, not on a diet, and not on any medication that could alter the heart rate). Thus, the third stage represents a household selection bias, since households could only participate in the survey if they had at least one eligible (healthy) adult. While the household selection bias with healthy adults could not be corrected, the distribution bias by gender and age in Niterói's population, common in any household survey, could indeed be

corrected by calibrating the sample weights. The sample weight was calculated as the product of inverse selection probabilities in each stage and was calibrated according to the technique known as the Integrated Household Weighting System, which ensures the consistency of the estimates for population totals available for post-strata, in this case comprised according to gender and age bracket [10].

On the day of the interview, the head-of-household signed a free informed consent form and answered a standardized questionnaire prepared to collect both coded information on the survey area and household as well as individual and family data. All residents were survey targets *vis-à-vis* the head-of-household (for the family composition), gender, age, and education as expressed by the number of complete years of schooling, which was grouped in five levels (0; ≤ 4; 4-8; 8-12; ≥ 12). For each household adult, the survey obtained: body mass (kg), stature (cm), physiological condition (if pregnant or nursing), and basic demographic data. The Institutional Review Board of the Sergio Arouca National School of Public Health, Oswaldo Cruz Foundation, approved all the research procedures.

In the household, body mass (accurate to 0.1kg) was measured once using a previously calibrated electronic scale (Soehnle, Murrhardt, Germany; Seca, Birmingham, UK). Individuals were weighed barefoot and with as little clothing as possible, usually in the morning. Stature was measured twice as per Lohman et al. [11], with a portable stadiometer (Seca) attached to a wall. Subjects were positioned against the wall barefoot, with their feet together, arms hanging at their sides, and head, heels, and buttocks leaning against the wall. Subjects were asked to fix their gaze on a horizontal plane (Frankfort line) and breathe in, then breathe out and hold their breath. The stadiometer ruler was slid up to the top of the subject's head and the reading was done at the same level. Various attempts were made to obtain data from all the household residents, returning to the household at different times and on different days whenever necessary. Data from pregnant or nursing women, individuals with missing limbs or limbs in casts, or who were wearing shoes at the time of the measurement were not computed in the current study's analysis.

Based on the resulting body mass and stature measurements, we calculated the body mass index (BMI) by dividing body mass (kg) by stature squared (m^2), with stature based on the mean of the two measurements, to determine nutritional status according to the classification proposed by the expert committee of the World Health Organization (WHO) in 2000 [1]. The nomenclature of this classification differs from that previously suggested by the WHO itself [12], since it classifies BMI from 25 to 30kg/m^2 as pre-obesity. Under the new nomenclature, BMI ≥ 30kg/m^2 is called obesity with three different levels. The current study refers to "excess body mass" as BMI ≥ 25kg/m^2, thus including pre-obesity and obesity.

The data analysis was descriptive (means, standard errors of the means – SEM, minimum and maximum values, 95% confidence intervals – 95%CI) for all the continuous variables. Prevalence of nutritional status according to gender, age, and income was based on the WHO classifications of BMI. All analyses used SAS (SAS Institute, Cary, USA) version 8.1 for PC. All the results in this study are estimates of means, SEM, and 95%CI, using the SAS *surveymeans* procedure, based on sample weights and the structural information in the sample design.

Results

While obtaining 16 interviews per CEA, 7,527 addresses were visited, selected from the 2000 population CEA listing [8], of which 465 households no longer existed (demolished or only in occasional usage), 1,835 could not be visited (locations with access closed off either by the drug traffic or by building superintendents who did not allow entry into gated housing areas, in addition to households under construction), 378 were vacant, and 4,849 were occupied and accessible. Of the latter, 675 did not have any eligible adults, 24 refused to participate in the study before it was possible to determine whether there were adults residing in the household, and 2,402 households with adult residents refused to participate. Thus, 1,748 households were interviewed, so that there was a loss of 12 households among the planned total of 1,760 households. In a traditional sample design, to obtain the 16 interviews, a sample size of 69 households would need to be defined (≈ 7,527 households/110 CEAs). However, the number of households interviewed here per CEA varied from 17 to 188: fewer than 50 interviews each were done in 68 CEAs, 50 to 67 interviews in 30 tracts, and 71 to 188 interviews in only 12 CEAs.

The 1,748 interviewed households had 5,745 current residents, with a mean of 3.3 individuals per household. Of the 4,180 adults interviewed, several visits to the households allowed locating 3,096 adults and measuring their body mass and stature (1,941 women and 1,155 men), corresponding to a loss of anthropometric infor-

mation for some 34% of the adults, which was corrected by the sample weight calibration procedure, such that the observed sub-sample was representative of the 324,671 adults residing in Niterói.

Participants' age varied from 20.0 to 96.7 years, and mean body mass (± SEM) was 63.1kg (± 0.42kg) for women and 75.3kg (± 0.54kg) for men (Table 1). Mean BMI for men and women was slightly above the cutoff point for pre-obesity. In fact, 30.4% of women and 35.5% of men were classified as pre-obese ($25 \leq BMI < 30kg/m^2$) and 15.4 and 14.1%, respectively, as obese ($BMI \geq 30kg/m^2$; Tables 2 and 3).

When separating the data by age bracket, 12.5% of women in their twenties were underweight, but this rate decreased over the decades and increased slightly again after 70 years of age (Table 2). For pre-obesity, prevalence increased with age until leveling off around 60. Obesity prevalence also showed an important increase over the years, leveling off around 50-60 years and decreasing slightly in the 60-70-year group (Table 2). Men of all ages showed a low prevalence of underweight, with a downward trend beginning in the twenties (Table 3). Pre-obesity increased markedly with increasing age, with a slight decrease in the 60-70-year bracket, increasing again above 70. Obesity prevalence increased in the twenties and thirties and remained stable until 70, when it showed a slight decrease (Table 3).

Women showed a decrease in the prevalence of underweight with increasing mean income, while excess body mass did not display any evident trend (Table 4). For men, the prevalence

Table 1

Means, standards errors of the means (SEM), minimums, maximums, and 95% confidence intervals (95%CI) for body measurements in the adult female and male population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil.

	Mean	SEM	Minimum	Maximum	95%CI
Women					
Body mass (kg)	63.1	0.42	34.2	135.8	62.3-64.0
Stature (cm)	158.1	0.22	131.9	183.5	157.7-158.6
Body mass index (kg/m²)	25.3	0.15	15.5	51.6	25.0-25.6
Men					
Body mass (kg)	75.3	0.54	36.5	159.9	74.2-76.4
Stature (cm)	171.7	0.27	145.9	200.0	171.1-172.2
Body mass index (kg/m²)	25.5	0.15	16.9	45.8	25.2-25.8

Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

Table 2

Percent distribution of the adult female population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by age bracket.

Age bracket (years)	N	Body mass index (kg/m²)					
		< 18.5 Underweight	18.5-24.9 Adequate	25.0-29.9 Pre-obesity	30.0-34.9 Obesity I	35.0-39.9 Obesity II	40.0 Obesity III
20-30	39,564	12.5	62.8	15.2	6.3	2.4	0.9
30-40	37,939	3.0	59.1	23.7	9.0	4.5	0.8
40-50	36,603	1.7	48.5	31.2	10.1	6.8	1.6
50-60	26,205	1.0	36.8	40.8	14.8	4.3	2.1
60-70	19,294	0.2	35.9	45.6	17.2	1.0	0.0
≥ 70	19,180	4.8	37.4	44.5	10.3	3.0	0.0
Total	178,785	4.4	49.7	30.4	10.5	3.9	1.0

Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

Table 3

Percent distribution of the adult male population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by age bracket.

Age bracket (years)	N	Body mass index (kg/m²)					
		< 18.5 Underweight	18.5-24.9 Adequate	25.0-29.9 Pre-obesity	30.0-34.9 Obesity I	35.0-39.9 Obesity II	40.0 Obesity III
20-30	36,609	5.3	62.9	26.2	4.7	0.7	0.2
30-40	33,309	1.1	45.8	37.0	13.3	1.4	1.4
40-50	30,313	1.0	42.6	38.1	13.1	4.4	0.8
50-60	21,043	0.8	37.6	45.5	13.3	2.6	0.3
60-70	14,083	2.1	44.4	34.2	16.4	1.7	1.2
≥ 70	10,529	1.1	47.8	37.4	13.6	0.0	0.0
Total	145,886	2.2	48.2	35.5	11.4	2.0	0.7

Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

Table 4

Percent distribution of the adult female population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by mean income fifths of the census enumeration areas (CEA).

CEA mean income fifths*	N	Body mass index (kg/m²)					
		< 18.5 Underweight	18.5-24.9 Adequate	25.0-29.9 Pre-obesity	30.0-34.9 Obesity I	35.0-39.9 Obesity II	40.0 Obesity III
1	36,205	7.1	47.7	32.1	9.2	3.3	0.6
2	39,015	4.4	46.6	27.6	13.6	6.9	0.9
3	38,863	3.9	43.7	32.3	13.1	5.3	1.7
4	34,697	5.1	55.6	27.3	8.9	2.3	0.8
5	30,005	1.1	57.0	33.4	6.7	0.9	1.0
Total	178,785	4.4	49.7	30.4	10.5	3.9	1.0

Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

* According to the aggregate file by CEA in the 2000 Population Census [8], the four quintiles that demarcate the CEA mean income fifths were: R$ 577.62; R$ 1,118.21; R$ 1,750.99; and R$ 2,771.37. The mean income in each fifth corresponds, respectively, to: R$ 495.54; R$ 937.34; R$ 1,582.74; R$ 2,594.56; and R$ 3,386.77.

of underweight was low and tended to decrease even further with increasing mean income (Table 5). Prevalence of excess body mass tended to increase with the increase in mean income, but leveled off in the third income fifth, with a slight drop in the fourth and highest fifths.

As for schooling, women showed an important decrease in the prevalence of excess body mass as their schooling increased, from nearly 60% for those with primary education to some 32% at the university level (Figure 1). Data for men did not vary strikingly according to schooling, except for higher excess body mass in men with more schooling (Figure 2).

Discussion

Two points contributed to the increase in non-interviews in the PNAFS: (1) the increasing difficulty in conducting household surveys in large Brazilian cities, especially for studies adhering to ethical principles and requiring free informed consent by interviewees and (2) the use of the 2000 Population Census lists [8], which were somewhat outdated at the time of the PNAFS but made the project feasible to the extent that they reduced the costs (one fewer step prior to data collection) and allowed inverse sampling. Use of this procedure to select households reduced the losses to interviews to only 12 households out of

Table 5

Percent distribution of the adult male population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by mean income fifths of the census enumeration ares (CEA).

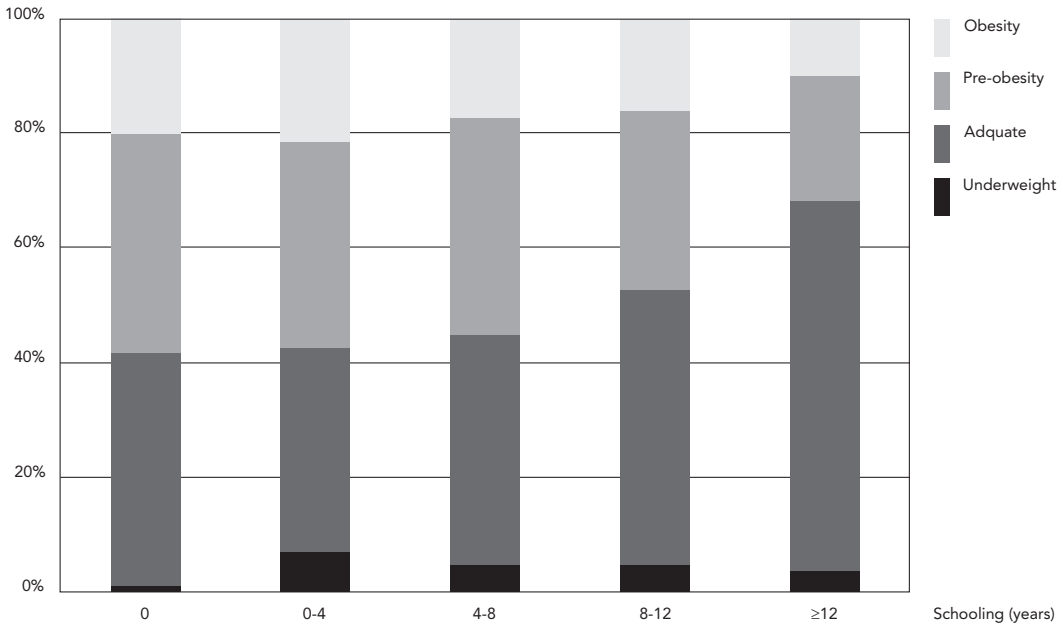
CEA mean income fifths *	N	Body mass index (kg/m²)					
		< 18.5 Underweight	18.5-24.9 Adequate	25.0-29.9 Pre-obesity	30.0-34.9 Obesity I	35.0-39.9 Obesity II	40.0 Obesity III
1	30,713	4.2	53.9	28.8	10.4	2.2	0.5
2	31,192	3.9	50.4	35.7	8.6	1.2	0.2
3	30,122	0.8	40.5	4.02	14.0	3.5	1.1
4	29,891	1.0	48.7	37.0	11.0	1.9	0.5
5	23,968	0.8	47.4	36.1	13.6	0.8	1.3
Total	145,886	2.2	48.2	35.5	11.4	2.0	0.7

Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

* According to the aggregate file by CEA in the 2000 Population Census [8], the four quintiles that demarcate the CEA mean income fifths were: R$ 577.62; R$ 1,118.21; R$ 1,750.99; and R$ 2,771.37. The mean income in each fifth corresponds, respectively, to: R$ 495.54; R$ 937.34; R$ 1,582.74; R$ 2,594.56; and R$ 3,386.77.

Figure 1

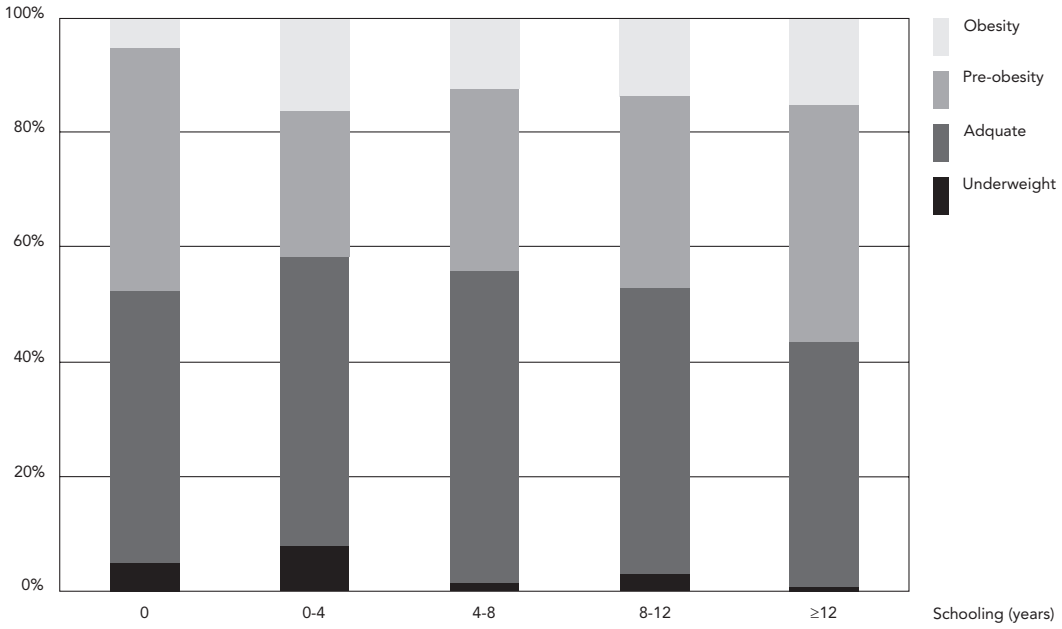
Percent distribution of the adult female population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by level of schooling.



Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

Figure 2

Percent distribution of the adult male population (≥ 20 years) in Niterói, Rio de Janeiro, Brazil, according to the classification of nutritional status proposed by the World Health Organization in 2000 [1], by level of schooling.



Source: The Nutrition, Physical Activity, and Health Survey (PNAFS).

a planned total of 1,760, in addition to ensuring that all the substitutions (implicit in the selection mechanism) were made in the same CEA. This also saved data collection costs, given that a traditional sampling procedure would have generated too many interviews in 98 of the 110 CEA and too few in 12.

The nutritional status of the adult population in Niterói, evaluated according to the BMI classification recommended by the WHO in 2000 [1], showed nearly 50% of the women and men in the city with at least pre-obesity. Obesity prevalence per se was high (15.4% in women and 14% in men).

According to the Family Budget Survey (POF) conducted by the IBGE from 2002 to 2003 [6], pre-obesity was present in 41% of men and 39.2% of women in the Brazilian population as a whole, higher values than those found here in the Niterói population (30.5% for women and 35.5% for men). However, the national obesity levels were lower than for Niterói (8.9% and 13.1%, for men and women, respectively). Both surveys showed an increase in the prevalence of both pre-obesity and obesity with increasing age, and at a faster rate among men. For men in Niterói, prevalence of pre-obesity began to decrease in the 60 to 69.9-year bracket and increased again after 70 years, while obesity prevalence decreased starting at 70. Separating the national Family Budget Survey (2002-2003) [6] by regions, in the urban Southeast the prevalence rates were closer to those in Niterói. Prevalence of pre-obesity in the national survey in the urban Southeast was high (45.7% and 40.5% for men and women, respectively), as was obesity prevalence (10.3% and 13.9% for men and women, respectively) [6].

In relation to income, excess body mass increased with increasing CEA mean income up to the third income fifth, after which there was a slight drop in the prevalence rates. The most recent Family Budget Survey showed the same increase in prevalence, but without the drop in prevalence for higher income levels as found in the Niterói population. For women in Niterói, prevalence of pre-obesity was some 30% for all income levels, but for obesity prevalence there was a steady increase up to the second income fifth (21.4%), with a drop from the third fifth upward, reaching a prevalence of 8.6%

in the highest fifth. Women evaluated in the Family Budget Survey showed this same characteristic, whereby obesity prevalence began to decrease starting at an income of twice the monthly minimum wage [6]. Comparing the other Brazilian population studies (conducted from 1975 to 1997), obesity increased in all income fourths among women in the Northeast, but decreased in the highest three fourths among women in the Southeast, which also appears to have occurred with women in Niterói. Obesity prevalence also increased in the poorest 25% of women in the Southeast, reaching 15% in 1997 [2]. For male residents of Niterói with mean income in the third fifth, pre-obesity prevalence was 40.2% and obesity 18.6%. The prevalence decreased from this fifth upward, reaching 36.1% and 15.7%, respectively, in the highest income fifth. From 1975 to 1997 the various Brazilian studies (National Family Expenditure Survey, National Survey on Health and Nutrition, and Survey on Living Standards) showed that obesity increased in all income fourths. In the Family Budget Survey or POF (2002-2003), the prevalence of both pre-obesity and obesity increased progressively with income, reaching 56.2% pre-obesity and 13.5% obesity in the highest income bracket [6]. This confirms the notion that women tend to be more concerned about excess body mass, a concern that is directly related to their income and schooling, which would explain the important decrease in prevalence of pre-obesity and obesity in women with higher incomes and more schooling. In addition, in Niterói, as in the Southeast of Brazil as a whole according to the most recent Family Budget Survey, men of all age brackets and income fifths showed a high prevalence of excess body mass. The increase in the prevalence of excess body mass from 1975 to 2002 was much greater among men in the Southeast, a trend also evident in the current study [2,6].

Schooling showed a similar trend to that of other studies in Brazilian adults, both men and women. There were no striking differences or clear trends for men, but among women there was an important inverse relationship between prevalence of pre-obesity/obesity and schooling. In Brazil (Northeast and Southeast), men showed a positive relationship between excess body mass and schooling from 1975 to 1997. From 1975 to 1989, women showed an increase in obesity prevalence for all levels of schooling, but from the latter year onward, the increase in prevalence only occurred in the lowest third of schooling (0-4 years) [13]. In 1996, the city of Rio de Janeiro showed higher prevalence rates for excess body mass in women with low and medium schooling (up to the second year of secondary school) [14]. Data from the first phase of the Pró-Saúde Study (1999) among employees at a public university in the city of Rio de Janeiro also showed a strong inverse association between obesity prevalence and schooling for women, with no apparent trend for men [15].

Another important aspect was the prevalence of underweight in Niterói, which was not only low but also decreased with age. In men, the prevalence dropped systematically, from 5.3% in the 20-29.9-year bracket to 1.1% after 70 years of age. According to the most recent Family Budget Survey (POF), prevalence of underweight in women from 20 to 24 years of age was 12.2%, practically the same as for women in Niterói (12.5%). The same was true for men, with less than 5% prevalence of underweight, with the exception of those living in rural areas in the POF, where there was a slight increase. As for the prevalence of underweight according to mean income in the CEA, both men and women showed an important decrease with increasing income (7.1% in the lowest fifth and 1.1% in the highest fifth for women; 4.2% in the lowest fifth and 0.8% in the highest fifth for men). The Family Budget Survey showed similar results, with men showing a drop from 4.5% to 1.3%, but the opposite occurring in women, with an increase from 5.0% to 8.5%, probably due to the concern over aesthetics among higher-income women.

Brazil is known to be undergoing nutrition transition, characterized by a decrease in the prevalence of underweight and an increase in the prevalence of excess body mass in the adult population, and the current study showed similar prevalence rates in the adult population in Niterói as compared to nationwide studies in Brazil, both for underweight and excess body mass. In this sense Brazil is now experiencing the same reality as in developed countries that are facing serious public health problems, with extremely high prevalence rates for overweight, greater than 50% in some cases. In the United States in 2002, 28% of men and 34% of women were obese [16].

According to the database for 141 countries maintained by the International Obesity Taskforce (IOTF), excess body mass in adults varies greatly between countries, from 5% in India to nearly 80% in Papua New Guinea for men and women [17]. There are few national or regional data in Latin America, and the existing data come mainly from health and demographic surveys, basically in women [18]. In a representative sample of adults in Valparaiso, Chile, in 1996, 15.7% of men and 23% of women were obese, with higher levels among the elderly and lower socioeco-

nomic strata [19]. In a population study in Spanish Town, Jamaica (2,100 adults from 25 to 74 years of age), among women of all age brackets the mean BMI was greater than 25kg/m^2 (pre-obesity) [20]. However, this population still showed a prevalence of greater than 20% in underweight among women 70 to 74 years of age, showing that excess body mass coexisted with underweight in the same population, a reality that was also observed in Brazil as a whole and in the city of Niterói. Thus, increased prevalence of excess body mass is no longer exclusive to economically developed populations, but is a fact observed in many countries, especially those that mirror lifestyles from the Northern Hemisphere, particularly the United States. Knowing that children of obese mothers have a higher risk of being obese [21] and subsequently have higher odds of becoming obese adults themselves [22], one can speculate that the high prevalence rates for overweight and obesity in Brazil, in this specific case in the city of Niterói, have high odds of continuing to increase and persist as one of the country's most serious public health problems.

Resumo

A avaliação do estado nutricional antropométrico, através do índice de massa corporal (IMC), foi realizada a partir de inquérito domiciliar com amostra probabilística da população adulta de Niterói, Rio de Janeiro, Brasil. Nos domicílios selecionados, moradores com idade ≥ 20 anos tiveram a massa corporal e a estatura medidas no próprio domicílio. As estimativas para a população mostraram baixa prevalência de baixo peso (IMC < 18,5kg/m^2) enquanto 45,8% das mulheres e 49,6% dos homens tinham excesso de massa corporal (IMC ≥ 25kg/m^2). Houve tendência a um gradiente na prevalência de baixo peso dos setores censitários de menor para os de maior renda. A prevalência do excesso de massa corporal não apresentou tendência evidente em função da renda ou escolaridade nos homens, mas houve relação inversa com a escolaridade entre as mulheres. A prevalência de obesidade (IMC ≥ 30kg/m^2) variou de 5,6 a 19,3% entre os homens e de 9,6 a 21,3% entre as mulheres em função da faixa etária. Conclui-se que o excesso de massa corporal é o agravo nutricional mais prevalente na população de Niterói.

Estado Nutricional; Antropometria; Adulto; Estudos Populacionais em Saúde Pública; Inquéritos Nutricionais

Contributors

L. A. Anjos, M. T. L. Vasconcellos, and V. Wahrlich planned the research. M. T. L. Vasconcellos designed the sample and calculated the natural and calibrated sampling weights. L. A. Anjos, F. M. Bossan, and V. Wahrlich supervised the field data collection and were in charge of the data analyses. F. M. Bossan wrote the first draft of the paper, which was revised and approved by the other authors.

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