



UNDERWEIGHT AND OVERWEIGHT IN SCHOOL CHILDREN FROM RIO BRANCO, ACRE STATE, BRAZIL

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ABSTRACT:

A cross-sectional study investigating the prevalence of underweight and overweight in school-aged children from Rio Branco, Acre State, based on the 2007 WHO growth reference, was carried out. A total of 706 children between 8 and 14 years of age, enrolled in public primary schools at 3rd and 4th grades were assessed. For the assessment, the school children were stratified into age bands of 8 to 9 years, 10 to 11 years, and 12 to 14 years. The overall prevalence of overweight was 17.6% (17.3% boys and 17.8% girls) while prevalence of underweight was less than 3.0%, a level within normal limits for this population. The study results showed that overweight is becoming a major public health problem among children at state primary schools in urban areas of Rio Branco, Acre.

Key words: Nutritional status; body mass index; child.

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INTRODUCTION

Major shifts in the nutrition profile of the population have been characterized by a reduction in the prevalence of malnourishment coupled with a marked increase in overweight among children, adolescents and adults, a process referred to as the nutrition transition. These shifts stem from changes in life style and dietary patterns of the population, physical inactivity and a combination of economic, demographic and cultural factors in society¹.

Until the 1980s, malnutrition in Brazilian children represented one of the biggest challenges faced in public health². Recent information from the 2006 National Demographic Health Survey revealed a fall in the prevalence of malnutrition in Brazilian children³. However, this reduction was uneven throughout the different regions of Brazil. In contrast to other regions of Brazil, a high level of pediatric malnutrition was found to persist in the North of the country.

Currently, the prevalence of overweight exceeds that of underweight in Brazil⁴. Overweight is a nutritional disorder whose onset can occur at any age^{5,6} and which has multifactorial characteristics. In addition, there is evidence that overweight continues from infancy and adolescence through to adulthood. The condition elevates morbi-mortality secondary to excess body weight while also shortens life expectancy⁷.

Information on underweight and overweight status in children and adolescents from the Rio Branco municipality, Acre^{8,9} is currently lacking. Consequently, limits the implementation of public prevention and intervention policies in schools to control the nutritional status of children and adolescents. Therefore, the aim of this study was to determine the prevalence of underweight and overweight in primary school children from 3rd and 4th grades from the city of Rio Branco, Acre State.

METHODS

A school population-based cross-sectional study in children and adolescents from 3rd and 4th grades of public

primary schools in an urban area of Rio Branco, Acre was carried out during the second semester of 2004. The study was previously approved by the Research Ethics Committee of the State Hospital Foundation of Acre (project no. 01/2004).

An expected prevalence of 18% was adopted for the determination of minimum sample size according to the prevalence previously identified for Brazil by Wang, Monteiro and Popkin⁴. Precision was set for a sampling error of 4% at a 95% level of confidence and sample delineation effect 2 to attenuate the sample design effect¹⁰. The minimum sample size was 708 school-aged children.

Single-stage cluster sampling was used to select the school children with schools as the primary units. Of a total of 70 municipal and state primary schools offering 3rd and 4th grade education, a subset of 7 schools was selected using simple random sampling (due to operational restrictions including number of researchers and time available to conduct interviews) for inclusion in the study. All 3rd and 4th grade classes from each primary school elected (744 pupils) were invited to take part in the data collection process. The exclusion criterion was an individual manifesting any general disease preventing anthropometric measurements from being taken.

Body mass was determined using a portable electronic digital balance, accurate to the nearest 50 grams with a maximum capacity of 150 kg; height was measured using a portable stadiometer with a scale subdivided into increments of 0.1 cm extending to a maximum of 2 meters. Measurements of weight and height were made during class time using the procedures described by Lohman, Roche and Martorell¹¹

Body mass index for age (BMI/age) Z-score was calculated according to the recommendations contained in the new 2007 World Health Organization (WHO) growth reference¹². Based on the cut-off points proposed in the 2007 WHO growth reference, BMI/age was classified into underweight (< -2 Z-scores), overweight (> +1 and < +2 Z-scores) or obese (> +2 Z-scores). For the purposes

of data analysis, the classifications of overweight and obesity were pooled into a single overweight group.

Table 1: Distribution of primary school children from Rio Branco, Acre, 2004

	N	%
All	706	100.0
Gender		
Male	329	46.6
Female	377	53.4
Age		
8 - 9 years	287	40.6
10 - 11 years	343	48.6
12 - 14 years	76	10.8
Body Mass Index		
Underweight	18	2.5
Eutrophic	564	79.9
Overweight	124	17.6

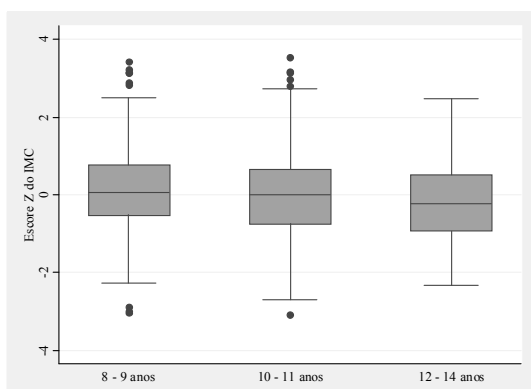


Figure 1: Distribution of Body Mass Index (BMI) Z-scores by age group in primary school children from Rio Branco, Acre, 2004

Table 2: Prevalence of underweight, eutrophic and overweight by gender and age group in primary school children from Rio Branco, Acre, 2004

	Underweight % (95% CI)	Eutrophic % (95% CI)	Overweight % (95% CI)
Gender			
Male	1,8 (0,7; 4,1)	80,9 (76,5; 85,1)	17,3 (10,6; 27,0)
Female	3,2 (1,1; 8,4)	79,0 (74,9; 83,1)	17,8 (10,6; 28,1)
Age			
8 - 9 anos	2,1 (0,6; 6,5)	78,4 (73,6; 83,1)	19,5 (12,8; 28,5)
10 - 11 anos	3,2 (1,1; 8,5)	79,8 (75,6; 84,1)	16,9 (9,8; 27,5)
12 - 14 anos	1,3 (0,2; 6,4)	85,5 (77,5; 93,5)	13,2 (4,6; 31,8)

Data were keyed into the Excel program® and subsequently input to the Stata™ 9.2 statistics program for statistical analysis by the Survey module. For data analysis, frequencies, prevalences and respective 95% confidence intervals were computed.

RESULTS

Of a total of 744 pupils identified at 3rd and 4th grades in state primary schools in the urban area of Rio Branco, 8 subjects were excluded because of health problems that prevented anthropometric measurements from being taken. Also, a class of 30 students from one school was excluded due to administrative issues. Thus, a final sample of 706 school children, 46.6% male and 53.4% female, with ages ranging from 8 to 15 years, was analyzed (Table 1). BMI/age Z-scores of the schools had a magnitude of between 4.0 and +4 (Figure 1).

Overall, a relatively high prevalence of overweight and low prevalence of underweight was found across all age groups (Table 2). The prevalence of overweight was similar for both genders but lower in older age groups. Although the prevalence of underweight found among girls (3.2%) was relatively low, this value was double the rate found in boys.

DISCUSSION

Analysis using the new 2007 WHO growth reference indicated that overweight was a growing public health problem among children and adolescents of both genders aged between 8 and 14 years enrolled at public primary schools in the urban area of Rio Branco, Acre. At less than 3%, the general prevalence of underweight lay within normal limits for the population.

The 2007 WHO growth reference was used because it is the prevailing recommendation for tracking the nutrition status of children and adolescents worldwide. While the previous reference re-

commendation by the National Center for Health Statistics (NCHS) had been based solely on children from the United States of America, the new 2007 WHO reference was derived from data collected in six different countries spanning several continents, including Brazil in South America¹³.

Comparison of the results of the present study, based on the 2007 WHO reference, against data from previous national and local surveys is hampered by the use of different references for nutritional status. However, the prevalence of overweight and underweight found in school children from Rio Branco corroborates some national figures⁴ as well as data from the municipality of Porto Velho, Rondonia¹⁴ determined using the 1977 NCHS reference.

Information on underweight in Brazilian children aged younger than 10 is currently lacking, thereby limiting the assessment of the severity of this problem. In any event, the study prevalence of underweight seen in the school children belonging to the 8-9 year age bracket was low and did not represent a public health problem. Moreover, this prevalence is also low in comparison to the rates reported by a national survey conducted in 1997. The cited survey detected a prevalence of underweight of 7.7% (NCHS reference) among Brazilian urban children and adolescents⁴. Similarly, compared to the prevalence of underweight revealed by the 2003/2004 Pesquisa de Orçamentos Domiciliares (POF)⁹ for children over 10 years of age, the rates observed in Rio Branco school children were again lower.

The POF⁹ indicated a rise in the prevalence of overweight throughout Brazil. In the North of the country, overweight among boys increased substantially from 3.4% to 16.2% between 1974/1975 and 2003/2004, whereas for girls this rate rose from 7.4% to 13.2% over the same period. In terms of underweight prevalence, data for the Northern region in both genders showed a fluctuation and an overall prevalence of 4.3%. This information suggests the occurrence of a nutrition transition both in the Northern region and across Brazil as a whole.

However, the lack of earlier surveys collecting BMI/age data on children and adolescents for the state of Acre precludes the establishment of a historic pattern. Nevertheless, there is evidence that the school children surveyed in this study were heavier than those assessed in 1989. According to the observations of Muniz⁸ in 1989, 2.2% of school-aged children had a weight for age index above the 97th percentile (NCHS reference) versus the 17.6% overweight prevalence seen in the present study. Analysing the determinants of this decline is complex and involves socio-economic aspects, access of school-aged children to healthcare services, education and environmental health.

Scientific evidence confirms that overweight in children can continue through adolescence^{15,16} and trigger diseases in adulthood¹⁷. Another study found evidence that overweight in children and adolescents was a risk factor for chronic non-communicable diseases¹⁸. In this respect, overweight status impairs quality of life of the school children from Rio Branco and exposes them to diseases associated to overweight.

All BMI Z-scores by age group and gender had a magnitude of less than 4 Z-score units. Thus, according to 1997 WHO guidelines, no implausible values were identified while anthropometric measures were of satisfactory quality for data analysis.

The study design was devised for school children from 3rd and 4th grades. Expected age for this series was from 8 to 11 years. Nevertheless, 3rd and 4th grades of primary school often include pupils older than 11 years of age. There are many reasons behind this delay in schooling, including repeating the grade due to poor learning or to a history of illness which hinders learning or keeps the pupil out of school.

Thus, the present study contributed with the finding that overweight constitutes a nutrition problem in school-aged children at 3rd and 4th grades in Rio Branco. This situation points to an urgent need for actions to reverse the growing trend of overweight among school children in Rio Branco, Acre.

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