

Maternal perception of children's nutritional status from public schools in Porto Alegre, RS, Brazil

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Abstract

Objective: To evaluate maternal perception of children's nutritional status in elementary school at public schools in Porto Alegre, Rio Grande do Sul state, Brazil. *Methods:* A cross-sectional study carried out at the beginning of the first semester of 2013 with 495 schoolchildren of both genders, enrolled from first to fourth grades of elementary school in 12 schools in Porto Alegre, with their respective mothers. The agreement between the children's nutritional status and maternal perception has been assessed through the weighted Kappa test. Chi-squared test was used to assess the association between maternal perception of children's nutritional status by gender, maternal nutritional status and children's nutritional status. The results were considered significant when the P value was ≤ 0.05 . *Results:* As for the nutritional status, 0.2% of children were underweight, 61.0% were eutrophic, and 38.4% were overweight. About 51.6% of children with overweight had their nutritional status underestimated by their mothers (Kappa = 0.36; $P < 0.001$), being 59.1% among boys and 44.3% among girls with overweight (Kappa = 0.27; $P < 0.001$). *Conclusion:* The distorted maternal perception of the children's nutritional status may affect the adoption of healthier lifestyles and result in the development of chronic diseases. Public health strategies focused on understanding the severity of overweight as a health problem and the importance of the family environment are the first step in a campaign to prevent obesity.

Key words: Pediatric Obesity; Perception; Body Image; Nutritional Status; School Health; Perceptual Distortion.

Introduction

Obesity has been a global concern, including Brazil. The most current and nationwide data on Brazilian children population's nutritional status are the Household Budget Surveys (HBS) (Brazilian government *Pesquisas de Orçamentos Familiares* – POF) of 2008-2009 and of National Survey on Demography and Health (Brazilian government *Pesquisa Nacional de Demografia e Saúde* – PNDS) of 2006 for children up to five years of age.

HBS results have shown that overweight prevalence has ranged from 32% to 40% in five-to-nine-year children in the Brazilian Southeast, South and Midwest areas and 25% to 30% in the North and Northeast areas, an age range in which the increased obesity prevalence was more intense.¹ And PNDS has recorded a national overweight prevalence of 6.6%.² Within schools, overweight prevalence was of 23% among elementary school ninth graders in Brazilian schools, according to Student Health National Research (Brazilian government *Pesquisa Nacional de Saúde do Escolar* – PeNSE).³

Parents' understanding that obesity is a health problem should be the first step in promoting a healthy lifestyle, resulting in a healthier body weight among children.⁴ Parents who realize their children's overweight are more likely to make changes in their lifestyles, thus influencing children's health.⁵ Mothers' adequate perception about their children's nutritional status may result in searching for health professionals, which is of great importance for prevention, diagnosis and treatment of childhood obesity.⁶⁻⁹

It should be emphasized that the intervention in family bases, especially with the parents' involvement in promoting healthy habits, must be considered and encouraged during the treatment of obesity, since children are influenced by their parents' habits.¹⁰ Therefore, guidelines introduced by health professionals should be followed at home by positive examples from parents to children, with healthy eating and regular physical exercise. In addition, intervention programs have better results in controlling obesity when the strategies used include the family component.^{11,12}

With the current increase in childhood obesity prevalence in the world, the need for actions seeking its prevention and treatment is clear. Therefore, families' perception about their children's nutritional status is critical.

To add information to the literature, this study has aimed to evaluate mothers' perception about children's nutritional status in municipal elementary schools in the Brazilian city of Porto Alegre, RS.

Methodology

It is a cross-sectional study using data from the base stage assessment of the research entitled, "Effect of an intervention program with nutrition education and physical activity in preventing obesity in schoolchildren: a randomized controlled study." They are school-age children enrolled from first to fourth years of municipal elementary schools in the Brazilian city of Porto Alegre, RS, and their mothers.

Porto Alegre has the largest urban concentration of the country South area and is the fifth most populous in Brazil. Currently it houses more than 1.4 million inhabitants and its Human Development Index (HDI) of 0.805 is classified as very high.

The following inclusion criteria were considered: students of both genders who were enrolled between the first and fourth years in the afternoon shift of municipal elementary schools in Porto Alegre, RS, and the person responsible for completing the research questionnaire would be the mother. The study excluded students whose questionnaire respondent would not be the mother and those children with some disability to perform anthropometric measurements. Also students who did not agree to perform anthropometric measurements (weight and height) despite their mothers' consent.

The baseline study to calculate the initial sample size was the meta-analysis presented by Friedrich et al.,¹³ who have evaluated the effect of interventions with nutrition education and physical activity on the body mass index in children and adolescents in schools. The calculation of sample size was performed in software *Power and Sample Size*. For a significance level of 5% and a statistical power of 90% to detect a standardized difference of the means of 0.45 on body mass index, the calculated sample size was of 105 individuals for each group, considering losses of 15% and the design effect by clusters (2.0). The total sample size was increased to 250 in each group, totaling 500 individuals. However, after the end of the anthropometric data collection, the number of schoolchildren evaluated totaled 600 individuals, reduced to the final number of 495 students after grouping the questionnaires which the mother was the respondent to. To make up the study sample, 12 municipal schools were included, and only three classes of each school were randomly selected to participate in the study, totaling 1,041 students.

The study data were collected at the beginning of 2013 by a team of Nutrition Course students at Brazilian Universidade Federal do Rio Grande do Sul (UFRGS). The team was trained by the Nutritional Assessment Laboratory at UFRGS to perform standard anthropometric measurements and care in the use and calibration of equipment.

Data collection was carried out in two stages. In the first, the students' anthropometric data such as weight (kg) and height (cm) were collected in duplicate. The second step consisted in delivering a self-applicable questionnaire to the guardians, which contained questions relating to mothers' perception about the students' nutritional status.

Measuring weight and height followed the recommendations by the World Health Organization (WHO).¹⁴ Weight was measured with children barefoot and with little clothing as possible, positioned in the center of the scale platform, with feet together and arms along the body. Height was measured with the child barefoot in the standing position, arms extended along the body, ankles, calves, buttocks, shoulder blade and back of the head flat on the vertical stadiometer, and head positioned in the Frankfurt plane.

The average value of two measurements was adopted to calculate the body mass index (BMI) defined as the body mass divided by the square of the body height, universally expressed in units of kg/m², resulting from mass in kilograms and height in meters. For the nutritional status classification, the BMI was used with cutoff points based on Z-score for age and gender recommended by the Brazilian Ministry of Health, which adopts the criteria used by WHO^{15,16} and software *AnthroPlus* for children.

Maternal perception of students' nutritional status was evaluated by the verbal scale instrument consisting of the following closed question presented to the parents: "In view of the age and height, do you think your child is..." with three response options: underweight, normal weight or overweight. In addition, the mother's weight and height were self-reported.

The data were entered in software *EpiData* version 3.1 in double typing to check for consistency of the information. Continuous variables were described as means and standard deviation. As for categorical variables, they were described by absolute and relative frequencies.

To check the concordance between the children's nutritional status and maternal perception of it, the weighted Kappa test was used. Chi-squared test was used to assess the association between maternal perception of the children's nutritional status by gender, the mother's nutritional status and the children's nutritional status.

The analyses were considered significant when the P value was found as ≤ 0.05 . Data were analyzed by software *Statistical Package for Social Sciences* (SPSS) version 18.0.

The large study was registered in Brazilian government *Plataforma Brasil* (a national and unified basis of research records involving human subjects) and approved by the Ethics Committee of the Clinical Hospital of Porto Alegre (HCPA/UFRGS). Brazilian Certificate of Presentation for Ethical Consideration (CAAE): 12406713.6.0000.5327 and legal opinion number: 215661 and registered at the Brazilian Registry of Clinical Trials (ReBEC – *Registro Brasileiro de Ensaio Clínicos*) number RBR-2xx2z4.

Results

This study consisted of a sample of 495 students with an average age of 7.8 years, with a slight predominance of females (53.7%), whose distribution was homogeneous. The sample characteristics are described in Table 1.

Regarding nutritional status, most of them had their weight within the normal range, but the ratio of children diagnosed as overweight was 38.4%, as shown in Table 1.

Table 1. General characteristics of the sample of children of the Brazilian city of Porto Alegre, RS, 2013.

Variables	N = (495)
Age (years) Mean (SD)	7.8 (1.4)
Gender, n (%)	
Males	229 (46.3)
Females	266 (53.7)
Education, n (%)	
1 st year	115 (23.2)
2 nd year	116 (23.4)
3 rd year	143 (28.9)
4 th year	121 (24.4)
Anthropometry	
Mean (SD) of the weight, <i>Kg</i>	31.08 (9.7)
Mean (SD) of the height, <i>cm</i>	129.60 (9.6)
Nutritional status	
Underweight	1 (0.2)
Eutrophic	304 (61.4)
Overweight	88 (17.8)
Obesity	102 (20.6)

Regarding maternal perception of nutritional status, 51.6% of overweight children had their nutritional status underestimated by their mothers. However, 2% of children who were considered eutrophic had their nutritional status overestimated by their mothers, who would consider them as overweight. Moreover, although weak, a correlation was observed between maternal perception and the children’s nutritional status determined in an anthropometric evaluation (Kappa = 0.36 P < 0.001) (Table 2).

Table 2. Students distribution according to nutritional status and maternal perception. Porto Alegre, RS, 2013.

Maternal perception	Nutritional status N = 495		
	Underweight n (%)	Normal weight n (%)	Overweight n (%)
Underweight	0	48 (15.8)	2 (1.1)
Normal weight	1 (100)	250 (82.2)	98 (51.6)
Overweight	0	6 (2.0)	90 (47.4)
Total	1 (100)	304 (100)	190 (100.0)

Kappa = 0.36; P < 0.001

When stratified by the children’s gender, the results on maternal perception about nutritional status showed that 59.1% of overweight boys and 44.3% of overweight girls had their nutritional status underestimated by the mothers, showing a trend of more boys’ mothers underestimating their children’s overweight. It was also observed that 19.3% of children with normal weight were classified as underweight by their mothers. Regarding overestimation of weight, both boys’ and girls’ mothers overestimated their children’s nutritional status, similarly wrongly classifying 2.2% of boys and 1.8% of girls with normal weight as being overweight, as shown in Table 3.

Table 3. Students distribution according to gender and nutritional status, and maternal perception. Porto Alegre, RS, 2013.

Maternal perception	Nutritional status of children N = 495					
	Males n = 229			Females n = 266		
	Underweight	Normal weight	Overweight	Underweight	Normal weight	Overweight
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Underweight	0	26 (19.3)	0	0	22 (13)	2 (2.1)
Normal weight	1 (100.0)	106 (78.5)	55 (59.1)	0	144 (85.2)	43 (44.3)
Overweight	0	3 (2.2)	38 (40.9)	0	3 (1.8)	52 (53.6)
Total	1	135 (100.0)	93 (100.0)	0	169 (100.0)	97 (100.0)

Kappa = 0.27; P < 0.001

Discussion

The larger proportion of children evaluated was classified as having an adequate nutritional status (61.4%) and this result is consistent with the majority of studies published, whose values lie between 55.1% and 65%, as well as for overweight (38.4%), which is also similar to the results found in other studies, with values ranging from 20% to 40%.¹⁷⁻²¹ The distortion between maternal perception of the child's nutritional status evaluated in this study shows is similar to the results found by Boa-Sorte et al.⁶ who have found Kappa equal to 0.434 and by Molina et al.²² who have found Kappa equal to 0.217 in studies carried out in Brazil.

In another study, published by Wake et al.,²³ the authors have concluded that much of the parent sample has not acknowledged that their children were overweight or obese. And also 22% have classified as underweight children with normal weight and 63% as overweight children with obesity.

Flores-Peña et al.⁹ have also found similar values in relation to maternal perception distortions, whose evaluation was given by the similar questioning used in this study. An association between an inadequate maternal perception of the child's weight and the high prevalence of childhood obesity was found, suggesting that public health strategies to raise parents' awareness about their children's actual nutritional status is the first step in the effort to prevent childhood obesity.

The literature review study focused on items that mainly evaluated the maternal perception has identified, in five of the eight studies analyzed, the mistaken maternal perception of their children's nutritional status, tending to underestimate the weight through body image when the child was overweight.²⁴

The relationship between maternal perception and their overweight children was also examined in another cross-sectional study carried out in Argentina by Hirschler et al.,²⁵ where 321 preschool children aged on average 4.39 years of both genders were assessed. The analysis of maternal perception has identified significant differences in body image perception distortion among mothers of children with normal weight (17%) and mothers of children overweight or at risk of being overweight (87.5%). Among mothers of overweight children, 23.7% believed that their children were really overweight and only 1.6% of mothers felt that the risk for overweight was real.

Giacomossi et al.⁸ describe that extreme nutritional status such as obesity and malnutrition raise distortions in parents' perception whereas they should be more easily diagnosed by those responsible for the children because clinical signs become visually more perceptible. However, mothers of children with obesity or malnutrition had prevalence almost five times more of misidentifying children's nutritional status, classifying them as eutrophic.

In this study, maternal perception was associated with the children's gender and mothers underestimated the males' nutritional status more than mothers of female children. Several other studies have also shown this relationship.^{26,27-30} Some authors suggest that this is due to the increased attention that mothers give to the daughters' nutritional status because of the importance that society gives to girls' body image.^{6,22}

The difficulty in recognizing the children's nutritional status by mothers may be related to personal and family beliefs and cultural values, being barriers to the adoption of healthier behaviors.^{24,31,32}

Other factors that influence maternal perception of the children's body weight have been widely discussed in the literature on the subject and parental characteristics such as weight, socioeconomic status, maternal education, maternal age, maternal BMI and children's characteristics such as weight, body mass index, age and gender have shown to be potential predictors of perception.³³

An adequate perception of children's nutritional status should be a paramount element in treating obesity in childhood, mainly because of the construction of eating habits taking place in households, being influenced by the environment and families' attitudes. Thus, a proper perception by both the family and the child possibly promotes better adherence and is also a requirement for seeking treatment.³⁴

Recognition of overweight children may possibly promote improved adherence to care. Furthermore, it may be a necessary requirement for seeking professional assistance. However, mothers tend to consider their children's obesity as an individual problem rather than realizing that it is a multifactorial problem on which the home environment has great influence on the generation and maintenance of obesity.²⁴ Thus, families have a key role in the development and promotion of children's health.^{9,24} Therefore, therapeutic practices should involve the family and support the relationship between parents and children and not focus only on the child or the mother-child relationship.

As for the limitations, including a small number of variables in our research has not allowed to explore the factors involved in the maternal perception error of children's nutritional status. Also, studies indicate that the use of a verbal scale can lead to a high underestimation of overweight and obese children, compared to a visual scale.^{34,35} Therefore, further research using a larger number of variables, including maternal education and age, besides the mother and family cultural issues, the child's weight at birth, and assessments using qualitative techniques may help clarify other aspects of this topic.

Conclusion

The results show that maternal perception of their children's body weight tends to be distorted, especially when the child is overweight. Mothers underestimate more overweight boys compared to girls.

For a health promotion strategy with the adoption of a healthier lifestyle it is important for parents to recognize the children's nutritional status within clinical criteria. For this, the appropriate

topic approach by health professionals with families stands out as critical. However, further studies aimed at better understanding the relation between obesity in childhood and maternal perception and the interaction with other factors already identified in the literature are necessary for the prevention and treatment of obesity to be effective.

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References

1. Instituto Brasileiro de Geografia e Estatística. Pesquisa de orçamentos familiares 2008-2009: antropometria e estado nutricional de crianças, adolescentes e adultos no Brasil. Rio de Janeiro: IBGE; 2010.
2. Brasil. Ministério da Saúde. Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher – PNDS 2006: dimensões do processo reprodutivo e da saúde da criança. Brasília: Ministério da Saúde; 2009.
3. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar 2009. Rio de Janeiro: IBGE; 2009.
4. Stanton B, Cole M, Galbraith J, Li X, Pendleton S, Cottrel L, et al. Randomized trial of a parent intervention: parents can make a difference in long-term adolescent risk behaviors, perceptions, and knowledge. *Arch. Pediatr. Adolesc. Med.* 2004; 158(10):947-55.
5. Rhee KE, Lago CW, Arscott-Mills T, Mehta SD. Factors associated with parental readiness to make changes for overweight children. *Pediatrics* 2005; 116(1):e94-e101.
6. Boa-Sorte N, Neri LA, Leite MEQ, Brito SM, Meirelles AR, Ludovice FB, et al. Percepção materna e autopercepção do estado nutricional de crianças e adolescentes de escolas privadas. *J. Pediatr.* 2007; 83(4):349-56.

7. Chuproski P, Mello DFd. Percepção materna do estado nutricional de seus filhos. *Rev. Nutr.* 2009; 22(6):929-36.
8. Giacomossi MC, Zanella T, Höfelmann DA. Percepção materna do estado nutricional de crianças de creches de cidade do Sul do Brasil. *Rev. Nutr.* 2011; 24(5):689-702.
9. Flores-Peña Y, Cárdenas-Villarreal VM, Trejo-Ortiz PM, Ávila-Alpírez H, Ugarte-Esquivel A, Gallegos-Martínez J. Acciones y problemas maternos para manejar el peso del hijo de acuerdo a la percepción materna del peso y edad del hijo. *Nutrición Hospitalaria* 2014; 29(4):822-828.
10. Arpini LSB, Barbosa GC, Justo GF, Salaroli LB, Molina MCB. Associação entre a percepção materna do estado nutricional do filho e a qualidade da dieta de escolares. *DEMETRA: Alimentação, Nutrição & Saúde* 2015; 10(2):299-314.
11. Epstein LH. Family-based behavioural intervention for obese children. *Int. J. Obes. Relat. Metab. Disord.* 1996; 20(Suppl 1):S14-S21.
12. Katz DL, O'Connell M, Njike VY, Yeh MC, Nawaz H. Strategies for the prevention and control of obesity in the school setting: systematic review and meta-analysis. *Int. J. Obes. (Lond).* 2008; 32(12):1780-1789.
13. Friedrich RR, Schuch I, Wagner MB. Effect of interventions on the body mass index of school-age students. *Rev. Saúde Pública* 2012; 46(3):551-60.
14. World Health Organization. Physical status: the use and interpretation of anthropometry: report of a WHO Expert Committee. Geneva: World Health Organization; 1995.
15. Onis M, Onyango AW, Borghi E, Siyam A. Development of a WHO growth reference for school-aged children and adolescents. Geneva: Bulletin of the World Health Organization; 2007.
16. World Health Organization. WHO Child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development. Geneva: WHO; 2006.
17. Schommer VA, Barbiero SM, Cesa CC, Oliveira R, Silva AD, Pellanda LC. Excesso de peso, variáveis antropométricas e pressão arterial em escolares de 10 a 18 anos. *Arq. Bras. Cardiol.* 2014; 102(4):312-318.
18. Ribas SA, Silva LCSd. Fatores de risco cardiovascular e fatores associados em escolares do Município de Belém, Pará, Brasil. *Cad. Saúde Pública* 2014; 30(3):577-586.
19. Azambuja APO, Netto-Oliveira ER, Oliveira AAB, Azambuja MA, Rinaldi W. Prevalência de sobrepeso/obesidade e nível econômico de escolares. *Rev. Paul. Pediatr.* 2013; 31(2):166-71.

20. Rosaneli CF, Auler F, Manfrinato CB, Rosaneli CF, Sganzerla C, Bonatto MG, et al. Avaliação da prevalência e de determinantes nutricionais e sociais do excesso de peso em uma população de escolares: análise transversal em 5.037 crianças. *Rev. Assoc. Med. Bras.* 2012; 58(4):472-476.
21. Reuter CP, Burgos LT, Camargo MD, Possuelo LG, Reckziegel MB, Reuter EM, et al. Prevalence of obesity and cardiovascular risk among children and adolescents in the municipality of Santa Cruz do Sul, Rio Grande do Sul. *São Paulo Med. J.* 2013; 131(5):323-30.
22. Molina MC, Faria CP, Montero P, Cade NV. Correspondence between children's nutritional status and mothers' perceptions: a population-based study. *Cad. Saúde Pública* 2009; 25(10):2285-90.
23. Wake M, Nicholson JM, Hardy P, Smith K. Preschooler obesity and parenting styles of mothers and fathers: Australian National Population Study. *Pediatrics* 2007; 120(6):e1520-e1527.
24. Camargo APPM, Barros Filho AA, Antonio MARGM, Giglio JS. A não percepção da obesidade pode ser um obstáculo no papel das mães de cuidar de seus filhos. *Ciênc. Saúde Coletiva* 2013; 18(2):323-333.
25. Hirschler V, González C, Cemente G, Talgham S, Petticnichio H, Jadzinsky M. Cómo perciben las madres de niños de jardín de infantes a sus hijos con sobrepeso? *Arch. Argent. Pediatr.* 2006; 104(3):221-6.
26. Tenorio A, Cobayashi F. Obesidade infantil na percepção dos pais: perception of childhood obesity by parents. *Rev. Paul. Pediatr.* 2011; 29(4):634-9.
27. Hudson E, McGloin A, McConnon A. Parental weight (mis) perceptions: factors influencing parents' ability to correctly categorise their child's weight status. *Matern. Child Health J.* 2012; 16(9):1801-1809.
28. Vuorela N, Saha MT, Salo MK. Parents underestimate their child's overweight. *Acta Paediatr.* 2010; 99(9):1374-1379.
29. De La O A, Jordan KC, Ortiz K, Moyer-Mileur LJ, Stoddard G, Friedrichs M, et al. Do parents accurately perceive their child's weight status? *J. Pediatr. Health Care* 2009; 23(4):216-221.
30. He M, Evans A. Are parents aware that their children are overweight or obese? Do they care? *Can. Fam. Physician* 2007; 53(9):1493-1499.
31. Aparício G, Cunha M, Duarte J, Pereira A. Olhar dos pais sobre o estado nutricional das crianças pré-escolares. *Millenium* 2011; 40:99-113.
32. Crawford PB, Gosliner W, Anderson C, Strode P, Becerra-Jones Y, Samuels S, et al. Counseling latina mothers of preschool children about weight issues: suggestions for a new framework. *J. Am. Diet Assoc.* 2004; 104(3):387-394.

33. Al-Qaoud NM, Al-Shami E, Prakash P. Kuwaiti mothers' perception of their preschool children's weight status. *J. Dev. Behav. Pediatr.* 2010; 31(6):505-10.
34. Lazzeri G, Casorelli A, Giallombardo D, Grasso A, Guidoni C, Menoni E, et al. Nutritional surveillance in Tuscany: maternal perception of nutritional status of 8-9 y-old school-children. *J. Prev. Med. Hyg.* 2006; 47(1):16-21.
35. Eckstein KC, Mikhail LM, Ariza AJ, Thomson JS, Millard SC, Binns HJ. Parents' perceptions of their child's weight and health. *Pediatrics* 2006; 117(3):681-90.

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