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ORIGINAL ARTICLE

Influence of the *Bolsa Família* program on nutritional status and food frequency of schoolchildren☆

Ariene Silva do Carmo[a,*], **Lorena Magalhães de Almeida**[a], **Daniela Rodrigues de Oliveira**[a], **Luana Caroline dos Santos**[b]

[a] *Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil*
[b] *Department of Nutrition, Escola de Enfermagem, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil*

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Abstract
Objective: To evaluate the food frequency and nutritional status among students according to participation in the *Bolsa Família* program funded by the government.
Methods: Cross-sectional study carried out with students from the fourth grade of elementary school in the municipal capital of the southeastern region of Brazil. Food consumption and anthropometry were investigated by a questionnaire administered in school, while participation in the *Bolsa Família* program and other socio-economic information was obtained through a protocol applied to mothers/guardians. Statistical analysis included the Mann–Whitney test, the chi-squared test, and Poisson regression with robust variance, and the 5% significance level was adopted.
Results: There were 319 children evaluated; 56.4% were male, with a median of 9.4 (8.6–11.9) years, and 37.0% were beneficiaries of *Bolsa Família* program. Between the two groups, there was high prevalence of regular soda consumption (34.3%), artificial juice (49.5%), and sweets (40.3%), while only 54.3% and 51.7% consumed fruits and vegetables regularly, respectively. Among participants of *Bolsa Família* program, a prevalence 1.24 times higher in the regular consumption of soft drinks (95% CI: 1.10–1.39) was identified compared to non-beneficiaries. The prevalence of overweight was higher in the sample (32.9%), with no difference according to participation in the program.
Conclusion: The study found increased consumption of soft drinks among BFP participants. The high rate of overweight and poor eating habits denote the need to develop actions to promote healthy eating, especially for the beneficiaries of the *Bolsa Família* program, to promote improvements in nutritional status and prevent chronic diseases throughout life.

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* Corresponding author.
E-mail: arienecarmo@gmail.com (A.S. do Carmo).

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PALAVRAS-CHAVE
Consumo alimentar;
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Influência do programa Bolsa Família no estado nutricional e frequência alimentar de escolares

Resumo
Objetivo: Avaliar a frequência alimentar e estado nutricional entre escolares segundo a participação no programa governamental Bolsa Família (PBF).
Metodologia: Estudo de delineamento transversal realizado com alunos do 4° ano do ensino fundamental da rede municipal de uma capital da região sudeste do Brasil. O consumo alimentar e antropometria foram investigados mediante formulário aplicado com os escolares, enquanto a participação no PBF e outras informações socioeconômicas foram obtidas por meio de protocolo aplicado às mães/responsáveis. A análise estatística contemplou os testes Mann–Whitney, Qui-quadrado e Regressão de Poisson com variância robusta, sendo adotado o valor de significância de 5%.
Resultados: Foram avaliadas 319 crianças, 56,4% do sexo masculino, com mediana de 9,4 (8,6–11,9) anos, sendo 37,0% beneficiários do PBF. Entre os dois grupos avaliados (participantes e não-participantes do PBF), observou-se elevada prevalência de consumo regular de refrigerante (34,3%), suco artificial (49,5%), e guloseimas (40,3%), enquanto apenas 54,3% e 51,7% consumiram frutas e hortaliças regularmente, respectivamente. Entre os participantes do PBF, identificou-se prevalência de 1,24 vezes maior no consumo regular de refrigerantes (IC 95%: 1,10–1,39), comparado aos não beneficiários. A prevalência de excesso de peso foi elevada na amostra (32,9%), sem diferença segundo a participação no programa.
Conclusão: O estudo revelou maior consumo de refrigerantes entre participantes do PBF. A alta taxa de excesso de peso e hábitos alimentares inadequados denota a necessidade de desenvolver ações de promoção da alimentação saudável, em especial com os beneficiários do PBF, a fim de promover melhorias nas condições nutricionais e prevenir doenças crônicas ao longo da vida.

Introduction

In Brazil, the right to food as a human right is a recent achievement. In 2010, a legal determination that ensures food as a right to the entire population was added to the Brazilian Constitution through Constitutional Amendment No. 64.[1]

The Human Right to Adequate Food (HRAF) must be guaranteed through public policies of Food and Nutrition Security (FNS).[2] The *Bolsa Família* Program (BFP) is inserted in this context, which, in addition to providing income transfer, aims to guarantee access to basic social rights. This program was established by Law No. 10.836 of 2004[3] and consists of the monthly payment of cash benefits to enrolled families, aiming to benefit those in situations of food deprivation and extreme poverty. The BFP is part of the ''Brazil without Poverty Plan'' and benefits approximately 14 million families in all Brazilian municipalities.[4]

In this program, the monitoring of the conditions, which are commitments made by the families and by the government, occurs in three areas: education, social security, and health. The latter includes the monitoring of children's immunization schedule and nutritional status.[5] To achieve the objectives proposed by the program, it must be integrated with other types of governmental interventions and be carried out intersectorally.[2] These practices aim to empower families regarding the use of the money received from the government by providing access to food in a safe and healthy manner, considering that this access should be sanitary, nutritional, culturally appropriate and sustainable.[2]

Although the income transfer programs include disputes as to how families use the resources, there is evidence that the income transfer is used primarily for the acquisition of foods[6] that are not always adequate. A study conducted with BFP beneficiaries from Maceio (State of Alagoas) showed that most of the purchased food consisted of processed items, at the expense of fruits, vegetables, and dairy products, which may have a negative impact on the children's food intake and nutritional status.[6]

In this sense, it is important to assess the influence of participating in this program on schoolchildren's food intake and nutritional status.[7] There are still few studies in Brazil on this issue; many of them were not carried out with a representative sample and did not adjust their analyses for confounding factors.[7]

Given the above, this study aimed to evaluate the food frequency and nutritional status of schoolchildren according to participation in a government assistance program.

Methods

Study design

This was a cross-sectional study conducted with students in the fourth grade of municipal elementary schools of Belo Horizonte, state of Minas Gerais, Brazil. The research uses

data from a larger project entitled ''Integrated actions of food and nutrition education in municipal educational units: promotion of health and food security and nutrition.''

In the present study, for the sample size calculation, the criteria proposed by Hulley et al.[8] for a descriptive study of a dichotomous variable were used, considering the value of 35.0% as the expected proportion for the BFP beneficiaries, as identified in a study carried out with children in Belo Horizonte, MG[9] and with the population of the city of Viçosa, MG,[10] an amplitude of 10%, significance level of 5%, and a study power of 80%. Moreover, the sample weight was considered as 1.48, calculated based on the data of the number of classes and schools, due to the sampling design used. Thus, the sample size was estimated at 230 students.

Two-stage cluster sampling was used. In the first stage, the stratification was performed according to the regional districts of the municipality. Thus, with the aid of a list of all public schools in Belo Horizonte with fourth-year classes, made available by the Municipal Secretariat of Education of Belo Horizonte, one school from each of the nine regions was selected by drawing lots. It is noteworthy that the selected schools were located in areas with different classifications of Urban Quality of Life Index: very low, low, medium, high, and very high.[11,12] At the second stage, the classes were selected in every school, with a probability proportional to the number of fourth-year students enrolled in the school belonging to each regional district. Thus, all students from the selected classes were invited to participate in the study ($n = 724$). Of these, those who missed the assessment day ($n = 101$) or had mental health impairment according to the teachers' reports ($n = 12$) were excluded.

Throughout the study, there was a loss of 47.7% due to refusal to participate in the study ($n = 1$) and failure to apply the socioeconomic questionnaire through telephone contact with the children's mothers or guardians ($n = 291$). The latter losses were caused by wrong or inexistent phone numbers or absence of the respondent at the time of the call as the main reasons for the missed interview ($n = 261$), refusal to participate in the study ($n = 16$), and no telephone contact ($n = 14$). It is worth mentioning that at least three attempts of telephone contact with parents/guardians were made, including the three periods of the day.

Therefore, the final sample consisted of 319 students. Children that had their evaluations excluded from the study showed no statistically significant differences when compared those who remained regarding gender, age, and nutritional status ($p > 0.05$).

Data collection

An in-person form was applied to the schoolchildren in their own schools and another was applied to their mothers or guardians through telephone contact. It is noteworthy that such assessment tools were developed for the study, and were previously tested and coded. Data collection was performed by student nutritionists of Universidade Federal de Minas Gerais (UFMG) and previously trained nutritionists, supervised by the main investigator.

Information such as date of birth, gender, and the student's phone contact were provided by school documentation.

The form applied to the mother or guardian included sociodemographic and economic data. The latter included the mother's and/or guardian's age, level of schooling, marital status and employment status, participation in the BFP, family income, and number of household residents. Based on the family income and the number of residents, the *per capita* income was calculated.

The schoolchildren's food consumption was evaluated through the Food Frequency Questionnaire (FFQ) and anthropometric measurements were performed.

Regarding the FFQ, it was a simplified qualitative questionnaire, related to the intake of nine types of foods in the last six months (soft drinks, artificial juices, snacks, cream-filled biscuits, candies/sweets, fruits, vegetables, milk, and beans). The FFQ was adapted from a tool proposed for adults in the city of Belo Horizonte.[13] The frequency of consumption of these foods was classified into regular ($\geq$5 times a week) and irregular (<5 times a week) according to the categorization used by the National Survey of Students' Health (Pesquisa Nacional de Saúde do Escolar [PeNSE]).[14]

Anthropometric assessment of the students consisted of weight and height measurements, which allowed the calculation of the height-for-age index and body mass index-for-age (BMI = weight [kg]/height [m]^2), both classified according to the criteria proposed by the Food and Nutrition Surveillance System[15] based on the growth curves of the World Health Organization (WHO).[16]

Data analysis

Descriptive analysis of the data was carried out based on the calculation of the frequency distribution, and central tendency and dispersion measures. The Kolmogorov–Smirnov normality test was applied, and as the quantitative variables did not show a normal distribution, it was decided to present them as median (minimum – maximum) values.

At the bivariate analysis, the Mann–Whitney and chi-squared tests were applied to compare the sociodemographic, nutritional status, and food intake variables between beneficiaries and non-beneficiaries of the *Bolsa Família* program.

For the variables of nutritional status/food consumption that were significant in the bivariate analysis, Poisson regression models with robust variance were used. Participation in the BFP was used as the explanatory variable, and was adjusted for sociodemographic and economic indicators that showed p-values equal to or less than 0.20 in the bivariate analyses.

The data were processed using the Epi Info program, version 3.4.5 (Centers for Disease Control and Prevention, USA) and, analyzed using the software Stata, version 11.0 (StataCorp. 2009. *Stata Statistical Software*, College Station, USA). A 5% significance level was used in all analyses.

Ethical aspects

Respecting the integrity and dignity of all study subjects, all mothers or guardians of schoolchildren in this study received and signed the informed consent agreeing with the participation of their children in the project. This study was

Table 1 Socioeconomic characteristics of schoolchildren beneficiaries and non-beneficiaries of the *Bolsa Família* Program, Belo Horizonte (MG), Brazil.

Variables	Total	Beneficiary of *Bolsa Família* program		*p*-value[a]
		No	Yes	
Characteristic of the student				
Age (years) (median)	9.4 (8.6–11.9)	9.4 (8.6–11.9)	9.5 (8.7–11.6)	0.121
Student's gender (%)				
Female	43.6	45.3	42.1	0.586
Male	56.4	54.7	57.9	
Characteristics of the parent/guardian responsible for the student's care/family environment				
Age of the parent/guardian (years) (median)	36 (24–83)	36 (25–83)	35 (24–62)	0.336
Level of schooling of the parent/guardian responsible for the student's care (%)				
<9 years of schooling	53.0	43.7	68.4	<0.001
≥9 years of schooling	47.0	56.3	31.6	
Per capita income *(classification) (%)*[b]				
≤½ minimum wage	52.5	33.7	85.2	<0.001
>½ minimum wage	47.5	66.3	14.8	
Employment status (%)				
Unemployed	36.5	31.8	43.0	0.048
Employed	63.5	68.2	57.0	
Marital status (%)				0.001
Married	62.1	68.5	50.0	
Single, divorced, or widowed	37.9	31.5	50.0	

[a] Mann–Whitney and chi-squared tests.
[b] Minimum wage in 2013: R$ 678.00.

approved by the Research Ethics Committee of UFMG (CAAE 00734412.0.0000.5149).

Results

A total of 319 children were evaluated, of whom 56.4% were males, with a median age of 9.4 years (8.6–11.9), and 37.0% were BFP beneficiaries (Table 1). In relation to the respondent for the child, 88.5% were represented by the mother, 2.7% by the father, and 8.8% by others (grandparents, stepmother, aunt, or great-grandmother).

Regarding the sociodemographic and economic data, the proportion of individuals with a *per capita* income < 1/2 a minimum wage (85.2% *vs.* 33.7%, $p < 0.001$) and mother's/guardian's level of schooling <9 years of study (68.4% *vs.* 43.7% $p < 0.001$) was higher among those who were beneficiaries of the BFP. Also among these families, there was a higher prevalence of unmarried/divorced/widowed marital status (50.0% *vs.* 31.5%, $p = 0.001$) and unemployment rate (43.0% *vs.* 31.8, $p = 0.048$) among mothers or guardians (Table 1).

Regarding the nutritional status, there was a high prevalence of overweight among children that were beneficiaries (30.7%) and non-beneficiaries (36.3%) of the program. The proportion of children with low or very low height-for-age was 1.8% and 0.5% among the beneficiaries and non-beneficiaries of the BFP, respectively. There were no statistically significant differences regarding the anthropometric parameters assessed between these individuals (Table 2). Regarding food consumption, it was observed that both schoolchildren who were beneficiaries and those who were non-beneficiaries of the BFP showed a high prevalence of regular soda consumption (34.3%), artificial juices (49.5%), and candies/sweets (40.3%), whereas only 54.3% and 51.7% of them regularly consumed fruits and vegetables, respectively (Table 3).

At the bivariate analysis, a higher frequency of regular consumption of candies/sweets (49.1% *vs.* 35.3%, $p = 0.016$) and soft drinks (42.1% *vs.* 29.9%, $p = 0.028$) among the program beneficiaries was observed, when compared to non-beneficiaries (Table 3). The results of the Poisson regression models, adjusted for categorical indicators of income, schooling, employment status, and marital status, having as dependent variables the binary indicators of consumption of soft drinks and candies/sweets, and as predictive variable the participation in BFP, showed that children that were beneficiaries of the program had a 1.24-fold higher prevalence of regular soft drink consumption (95% CI: 1.10–1.39, $p < 0.001$). As for the consumption of candies/sweets, no difference was observed in the adjusted model according to participation in the BFP (PR: 1.01; 95% CI: 0.83–1.25, $p = 0.850$).

Discussion

The results of this study showed a high prevalence of overweight and food consumption inadequacies, as well as differences between the beneficiaries and non-beneficiaries of the BFP regarding the socioeconomic aspects and the consumption of soft drinks.

Table 2 Anthropometric profile of schoolchildren beneficiaries and non-beneficiaries of the *Bolsa Família* Program, Belo Horizonte (MG), Brazil.

Variables	Total	*Bolsa Família* program beneficiary		*p*-value[a]
		No	Yes	
Body mass index for age (%)				
Malnutrition	1.9	2.0	1.8	
Normal weight	65.2	67.3	61.9	0.594
Excess weight	32.9	30.7	36.3	
Stature for age (%)				
Short or very short	0.9	0.5	1.8	0.270
Adequate	99.1	99.5	98.2	

[a] Chi-squared test.

Table 3 Frequency of food consumption by schoolchildren beneficiaries and non-beneficiaries of the *Bolsa Família* program, Belo Horizonte (MG), Brazil.

Variables	Total	*Bolsa Família* program beneficiary (%)		*p*-value[a]
		No	Yes	
Soft drinks				
Irregular	65.7	70.1	57.9	**0.028**
Regular	34.3	29.9	42.1	
Artificial juice				
Irregular	50.5	50.7	50.0	0.899
Regular	49.5	49.3	50.0	
Snacks				
Irregular	84.1	84.1	84.2	0.976
Regular	15.9	15.9	15.8	
Cream-filled biscuits				
Irregular	67.3	69.7	63.2	0.238
Regular	32.7	30.3	36.8	
Candies/sweets				
Irregular	59.7	64.7	50.9	**0.016**
Regular	40.3	35.3	49.1	
Fruits				
Irregular	45.7	43.8	49.1	0.360
Regular	54.3	56.2	50.9	
Vegetables				
Irregular	48.3	47.8	49.1	0.816
Regular	51.7	52.2	50.9	
Milk				
Irregular	33.3	31.8	36.0	0.456
Regular	66.7	68.2	64.0	
Beans				
Irregular	11.7	10.9	13.2	0.558
Regular	88.3	89.1	86.8	

[a] Chi-squared test.

It was observed that the families participating in the program had lower socioeconomic status, confirming the high social vulnerability of the program beneficiaries. The problems experienced by families in poverty are not limited to monetary income shortage and are, mostly, associated with reduced ability to exercise their rights as citizens and the few opportunities they have to improve their quality of life.[5] In Brazil, over 80% of the adults (older than 25 years) that comprise the family beneficiaries of the BFP have a low level of schooling (16.7% are illiterate and 65.4% did not finish

elementary school), which greatly hinders access to better employment opportunities or income generation.[5]

Regarding nutritional status, the study results showed a high rate of overweight among the students, whether or not they were BFP beneficiaries, corroborating the findings of other studies.[6,17] In Brazil, according to the Household Budget Survey 2008–2009, there has been a significant increase in excess weight rates among children in the last 34 years (10.9–34.8% and from 8.6% to 32.0% in boys and girls aged 5–9-years old, respectively).[17] The increase in the prevalence of childhood excess weight is also a reality in low-income classes, possibly due to increased consumption of foods rich in fat and carbohydrates, either due to lack of knowledge of what would be a healthy diet, as well as the lower price of these foods.[18]

No significant height deficits were observed, as only 1.8% of the BFP beneficiaries and 0.5% of non-beneficiaries had this condition. These values are within the expected proportion of children with this deficit when there are optimal food, health, and nutritional conditions in the population,[19] and are in accordance with the proportions observed in the Brazilian population regarding this age group.[17]

The guarantee of food and nutrition security requires programs that encompass both the fight against malnutrition as well as overweight and obesity.[20] Income distribution programs such as BFP can more effectively contribute to the nutritional well-being of the beneficiaries when combined with other types interventions, such as those that promote healthy eating.[20]

As for the food, excessive consumption – identified among the beneficiaries and non-beneficiaries of the BFP – of foods known to comprise an unhealthy diet, characterized by the group of ultraprocessed foods and insufficient intake of minimally-processed foods, corroborates the results of other studies of school-aged children in Brazil and other countries.[21–23] Such inadequacies may contribute to the increased risk of developing obesity and other chronic diseases, indicating the need for nutritional interventions in this population.

Interventions become even more important for BFP beneficiaries when one considers the increased consumption of soft drinks compared to non-beneficiaries of the program, even after adjusting for socio-demographic and economic factors. Other authors had similar findings.[24,25] In a study carried out with children under 5 years of age in the semi-arid northeast region of Brazil, it was observed that the participants of the BFP had a three-fold higher risk of consuming candies/sweets (OR: 3.06, 95% CI: 1.35–6.95).[24] The level of income dependency on the BFP benefit and the increased consumption of sugar have also been highlighted.[25]

The increase in income provided by program has generated greater access to food for the beneficiary families. However, this income transfer does not guarantee that the supply is adequate in terms of quality.[26] According to the Brazilian Institute of Social and Economic Analyses (Instituto Brasileiro de Análises Sociais e Econômicas – IBASE), which evaluated the changes in food consumption of the BFP beneficiary families, increased consumption of food regarding quantity and variety was observed among the program beneficiaries.[26] However, the choice of higher caloric density and lower nutritional value food prevailed. Among the most often mentioned foods were industrialized ones, rich in energy, sugar, saturated fat, and sodium.[26]

Although intriguing, the results obtained in this study do not allow establishing a causal association, considering its cross-sectional design. Thus, longitudinal studies that take into account how long the families have received the benefit are indicated.[7] However, the potential of this study to supplement the limited studies carried out in Brazil on this topic is noteworthy, with sample representativeness and adjustments for possible confounding factors.

The high rate of excess weight and the intake of high-energy density and lower nutritional value beverages among the children participating in the BFP, as demonstrated in this study, indicate the need to promote healthy eating actions directed towards these families. Healthy food choices should be encouraged in order to promote improvements in the nutritional status of these children and prevent chronic diseases throughout life.

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Conflicts of interest

The authors declare no conflicts of interest.

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