DOI 10.18471/rbe.v31i2.20583
Original Article

FOOD CONSUMPTION OF CHILDREN OF FUNDAMENTAL EDUCATION IN A PUBLIC INSTITUTION

CONSUMO ALIMENTAR DE CRIANÇAS DO ENSINO FUNDAMENTAL EM UMA INSTITUIÇÃO PÚBLICA

CONSUMO ALIMENTARIO DE NIÑOS DE LA EDUCACIÓN PRIMARIA EN UNA INSTITUCIÓN PÚBLICA

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Objective: To verify the food consumption and the economic class of primary and secondary schoolchildren from a public institution. Method: It was a quantitative and qualitative cross-sectional study conducted with 43 students aged between 6 and 11 years, of both sexes, from the municipal network of Manaus, Amazonas, Brazil. Data collection occurred through a semi-structured questionnaire on food consumption and socioeconomic information and participant observation. Results: High intake of industrialized food, sources of animal protein, fats, and refined sugars, and low intake of fiber and fish were observed, as well as low adherence to the school meals, regardless of economic class. Conclusion: Reduced fruit and vegetable intake in all socioeconomic classes and the frequent consumption of cookies, sweets, and industrialized food reflect the poor quality of the children's diet.

Descriptors: Food Consumption. Industrialized Foods. Socioeconomic Factors. Education, Primary and Secondary.

Objetivo: verificar o consumo alimentar e a classe econômica de escolares de ensino fundamental em uma instituição pública. Método: estudo transversal quantitativo e qualitativo com 43 escolares entre 6 e 11 anos, de ambos os sexos, da rede municipal de Manaus, Amazonas, Brasil. Os dados foram obtidos mediante questionário semiestruturado com informações de consumo alimentar e socioeconômicas e pela observação participante. Resultados: foi verificado alto consumo de produtos industrializados, fontes de proteína de origem animal, gorduras e açúcares refinados, e baixo consumo de fibras e pescados, bem como pouca aderência aos alimentos oferecidos pela escola, independente de classe econômica. Conclusão: o reduzido consumo de vegetais e frutas em todas as classes socioeconômicas e o frequente consumo de biscoitos, doces e produtos de processamento industrial refletem a baixa qualidade da dieta das crianças.

Descritores: Consumo de Alimentos. Alimentos Industrializados. Fatores Socioeconômicos. Ensino Fundamental.

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Objetivo: verificar el consumo alimentario y la clase económica de escolares de educación primaria en una institución pública. Método: estudio transversal cuantitativo y cualitativo, con 43 escolares entre 6 y 11 años, de ambos sexos, de la red municipal de Manaus, Amazonas, Brasil. Datos obtenidos mediante cuestionario semiestructurado con informaciones de consumo alimentario y socioeconómico y por la observación participante. Resultados: se verificó alto consumo de productos industrializados, fuentes de proteína de origen animal, grasas y azúcares refinados, y bajo consumo de fibras y pescados, así como poca adherencia los alimentos ofrecidos por la escuela, independiente de clase económica. Conclusión: el reducido consumo de vegetales y frutas en todas las clases socioeconómicas y el frecuente consumo de galletas, dulces y productos de procesamiento industrial reflejan la baja calidad de la dieta de los niños.

Descriptores: Consumo de Alimentos. Alimentos Industrializados. Factores Socioeconómicos. Educación Primaria y Secundaria.

Introduction

Childhood is the stage of human development that presents major hormonal, structural, and physiological changes. For this reason, a proper nutrition during this period is essential for a healthy growth and development and a greater intellectual and productive capacity, and may represent an important factor for preventing some diseases in adulthood[1-4].

Currently, the continuous monitoring of food in Brazil was generally presented by the 2010 Household Budget Survey (HBS) and the National Family Expenditure Survey (ENDEF) that took place over 30 years ago. In the last decades, Brazil has presented several changes in its socioeconomic and demographic profile, with improvements in the purchasing power of lower income families, the schooling of mothers, and the coverage of basic health and sanitation services. This led to changes in dietary habits, characterized by the increasing substitution of foods such as rice, beans, and vegetables for processed foods and beverages, such as soft drinks, cookies, processed meats, and ready-to-eat meals, contributing to reduce infant malnutrition and increase obesity rates. More recent studies on food consumption are required, especially in school age, in which overweight and obesity have presented high prevalence in Brazil[5-7].

When addressing food consumption, studies[8] describe that the nutritional transition is taking place in all regions of the country, where the intake of high-fat foods, mainly of animal origin, sugar, and refined foods is more significant, with decreasing intake of complex carbohydrates, as well as vegetables and fruits. Such exposures contribute to increase chronic diseases, like obesity, cardiovascular diseases, hypertension, and diabetes mellitus, being directly or indirectly associated with both sedentary lifestyle and food inadequacy[9].

In this perspective, the National School Feeding Program (PNAE) implemented in 1955 emerged as an important governmental strategy to combat nutritional disorders in Brazilian children. Furthermore, it contributes to the growth, development, and school performance of students and to the creation of healthy eating habits by providing school meals and food and nutrition education actions in public schools, philanthropic schools, and community organizations. The criteria defined by this program regarding the nutritional composition of meals provided in educational institutions, if respected, makes it possible to ensure food security and higher quality of food, especially for children.

Food consumption assessment allows to observe the characteristics and eating habits of a population in study, since such factors can define the food profile of a population, especially of children. In this context, this study aimed to verify the food consumption and the economic

class of primary and secondary schoolchildren from a municipal public institution.

Method

This is a quantitative and qualitative cross-sectional study with a non-probabilistic convenience sample composed of 43 schoolchildren aged from 6 to 11 years, of both sexes, from a public primary and secondary school in a community on the outskirts of Manaus, Amazonas, Brazil. The sample represented 30% of the total number of students from the institution where the research took place. Students diagnosed with chronic degenerative diseases that influenced daily eating habits, such as diabetes, atherosclerosis, and hypertension, or those who did not perform extracurricular activities in the school were excluded from the study.

For the quantitative approach, dietary assessment instruments were used, such as food consumption frequency, alternate day recall, and socioeconomic evaluation. In order to construct the food consumption frequency instrument, the study questionnaire was adapted for children[12]. Instrument validation occurred after the application of the first version of the instrument with five parents/guardians of students from the same school and the same cycles, from first to fourth grade. After verifying the consistency of the answers and the clarity of the questionnaire, the necessary adaptations were made, resulting in the second and definitive version of the instrument: a questionnaire with twelve closed-ended questions.

This instrument was sent to the children's home and answered by their parents, given the memory limitations of children, especially the younger ones, who often do not describe details, as well as confuse imaginary events with real ones[13].

For the socioeconomic evaluation of the subjects, the Social and Economic Level Survey Questionnaire of the Brazilian Association of Market Research Companies (ABEP) based on the Brazilian Criteria of Economic Classification was applied. This criterion is used for economic classification by estimating the purchasing power of the urban population, without attempting to classify the population into "social classes", adhering to the market division defined in decreasing purchasing power classes A1, A2, B1, B2, C, D, and E[14].

For qualitative data collection, participant observation of children's eating habits was carried out[11] by nutritionists during break periods, focusing on the quality of food consumed by children. Data analysis was based on the content analysis of the observations described in field diaries.

For quantitative data analysis, the chi-square and Kruskal-Wallis statistical tests were applied, considering $p<0.05$, using the Statistical Package for the Social Sciences (SPSS) software version 20.0 for Windows (IBM Corp. Released, NY, USA).

All the parents/guardians of the participating students signed the Free and Informed Consent Form (TCLE). This study followed all the ethical and legal precepts for research involving human subjects, as well as ensured the participants anonymity. Research Ethics Committee of the Nilton Lins University Center in Manaus, Amazonas, approved the project under protocol number 057-2010 (GRAD-PRPG-CEP).

Results

Study results revealed that 51.2% of the students evaluated were male, 48.8% were female, and 27.9% were seven-year-olds (Table 1). Regarding the socioeconomic classification, 69.8% of the children belonged to class C, 25.6% to class D, and only 4.7% to class B, no student belonged to class A.

Table 1 – Distribution of schoolchildren from a public educational institution according to age, sex, and socioeconomic class. Manaus, Amazonas, Brazil, 2016. (N=43)

Variables	n	%
Age		
6	5	11.6
7	12	27.9
8	6	14.0
9	10	23.3
10	8	18.6
11	2	4.7
Total	43	100.0
Sex		
Male	22	51.2
Female	21	48.8
Total	43	100.0
Socioeconomic class		
A	0	0.0
B	2	4.7
C	30	69.8
D	11	25.6
Total	43	100.0

Source: Created by the authors.

Table 2 presents the food profile distribution of the students by sex, with proportionality in the average daily fruit intake between males and females (p=0.46). In the average daily vegetable intake, 79.06% of the sample consumed three or less tablespoons or did not consume this type of food. Nevertheless, 38.09% of the boys consumed fried food, savories, and sausages 2 to 3 times a week, while 40.9% of the girls rarely or never consumed this type of product (p=0.534).

Table 2 – Consumption frequency of fruits, vegetables, legumes, milk, yogurt, meat, eggs, and fish by children from a public educational institution according to sex. Manaus, Amazonas, Brazil, 2016. (N=43)

(to be continued)

Variables	Male (n=21)		Female (n= 22)		p-value
	n	%	n	%	
Average daily fruit intake					0.460
No consumption	4	19.0	7	31.8	
3 or more unities	4	19.0	5	22.7	
2 unities	6	28.6	7	31.8	
1 unity	7	33.3	3	13.6	
Total	21	100.0	22	100.0	
Average daily vegetable intake					0.989
No consumption	9	42.9	9	40.9	
3 or less tablespoons	8	38.1	8	36.4	
4 to 5 tablespoons	3	14.3	4	18.2	
8 tablespoons	1	4.8	1	4.5	
Total	21	100.0	22	100.0	
Average daily legume intake					0.623
Did not answer	1	4.8	0	0.0	
No consumption	3	14.3	5	22.7	
2 tablespoons	9	42.9	7	31.8	

Table 2 – Consumption frequency of fruits, vegetables, legumes, milk, yogurt, meat, eggs, and fish by children from a public educational institution according to sex. Manaus, Amazonas, Brazil, 2016. (N=43) (conclusion)

Variables	Male (n=21)		Female (n= 22)		p-value
	n	%	n	%	
Less than 5 times a week	5	23.8	8	36.4	
1 or less tablespoon	3	14.3	2	9.1	
Total	21	100.0	22	100.0	
Consumption frequency of milk and yogurt					0.532
Yes	17	81.0	17	77.3	
Sometimes	4	19.0	5	22.7	
Total	21	100.0	22	100.0	
Daily intake of meat and eggs					0.584
1 piece	10	47.6	10	45.5	
2 pieces	6	28.6	9	40.9	
More than 2 pieces	5	23.8	3	13.6	
Total	21	100.0	22	100.0	
Consumption of fish					0.750
Did not answer	0	0.0	1	4.5	
No consumption	3	14.3	4	18.2	
2 or more times a week	6	28.6	5	22.7	
1 to 4 times a month	12	57.1	12	54.5	
Total	21	100.0	22	100.0	

Source: Created by the authors.

Table 3 shows that the consumption of fried foods, savories, and sausages was present in all classes and that, although the quantitative results identified a median consumption of sweets, cakes, cookies, and processed juices, the content analysis of participant observation demonstrated a high consumption pattern of these foods.

Table 3 – Consumption frequency of fried foods, savories, sausages, sweets, cakes, cookies, processed juices, and water by children from a public educational institution according to sex. Manaus, Amazonas, Brazil, 2016 (to be continued)

Variables	Male (n=21)		Female (n=22)		p-value
	n	%	n	%	
Consumption frequency of fried foods, savories, and sausages					0.534
Rarely or never	5	23.8	9	40.9	
Less than 2 times a week	1	4.8	2	9.1	
2 to 3 times a week	8	38.1	5	22.7	
4 to 5 times a week	1	4.8	0	0.0	
Everyday	6	28.6	6	27.3	
Total	21	100.0	22	100.0	
Consumption frequency of sweets, cakes, cookies, and processed juices					0.005
Rarely or never	3	14.3	7	31.8	
Less than 2 times a week	5	23.8	3	13.6	
2 to 3 times a week	8	38.1	2	9.1	
4 to 5 times a week	0	0.0	8	36.4	
Everyday	5	23.8	2	9.1	
Total	21	100.0	22	100.0	

Table 3 – Consumption frequency of fried foods, savories, sausages, sweets, cakes, cookies, processed juices, and water by children from a public educational institution according to sex. Manaus, Amazonas, Brazil, 2016 (conclusion)

Variables	Male (n=21)		Female (n=22)		p-value
	n	%	n	%	
Water daily intake					0.029
Less than 4 glasses	1	4.8	9	40.9	
8 glasses or more	12	57.1	10	45.5	
4 to 5 glasses	4	19.0	2	9.1	
6 to 8 glasses	4	19.0	1	4.5	
Total	21	100.0	22	100.0	

Source: Created by the authors.

When analyzing food consumption according to the economic situation (Table 4), it was observed that, in terms of the average daily fruit intake, 54.5% of class D participants did not eat fruits, and 53.3% of class C and 100% of class B ate from 1 to 2 units (p=0.207). On the average daily vegetable intake, it was verified that 100% of class B participants and 72.8% of class D consumed less than three tablespoons and/or did not consume vegetables and 43.3% of class C did not consume vegetables (p=0.811).

Table 4 – Consumption frequency of fruits, vegetables, legumes, milk, yogurt, meat, eggs, and fish by children from a public educational institution in the outskirts of Manaus according to socioeconomic class. Manaus, Amazonas, Brazil, 2016. (N=43) (to be continued)

Variables	Class B (n=2)		Class C (n=30)		Class D (n=11)		p-value
	n	%	n	%	n	%	
Average daily fruit intake							0.207
No consumption	0	0.0	5	16.7	6	54.5	
3 or more unities	0	0.0	9	30.0	0	0.0	
2 unities	1	50.0	9	30.0	3	27.3	
1 unity	1	50.0	7	23.3	2	18.2	
Total	2	100.0	30	100.0	11	100.0	
Average daily vegetable intake							0.811
No consumption	1	50.0	13	43.3	4	36.4	
3 or less tablespoons	1	50.0	11	36.7	4	36.4	
4 to 5 tablespoons	0	0.0	4	13.3	3	27.3	
8 tablespoons	0	0.0	2	6.7	0	0.0	
Total	2	100.0	30	100.0	11	100.0	
Average daily legume intake							0.223
Did not answer	0	0.0	1	3.3	0	0.0	
No consumption	0	0.0	6	20.0	2	18.2	
2 tablespoons	2	100.0	14	46.7	2	18.2	
Less than 5 times a week	0	0.0	5	16.7	6	54,5	
1 tablespoon or less	0	0.0	4	13.3	1	9.1	
Total	2	100.0	30	100.0	11	100.0	
Consumption frequency of milk and yogurt							0.303
Yes	2	100.0	25	83.3	7	63.6	
Sometimes	0	0.0	5	16.7	4	36.4	
Total	2	100.0	30	100.0	11	100.0	

Table 4 – Consumption frequency of fruits, vegetables, legumes, milk, yogurt, meat, eggs, and fish by children from a public educational institution in the outskirts of Manaus according to socioeconomic class. Manaus, Amazonas, Brazil, 2016. (N=43) (conclusion)

Variables	Class B (n=2)		Class C (n=30)		Class D (n=11)		p-value
	n	%	n	%	n	%	
Daily intake of meat and eggs							0.058
1 piece	2	100.0	11	36.7	7	63.6	
2 pieces	0	0.0	11	36.7	4	36.4	
More than 2 pieces	0	0.0	8	26.7	0	0.0	
Consumption of fish							0.063
Did not answer	0	0.0	0	0.0	1	9.1	
No consumption	0	0.0	4	13.3	3	27.3	
2 or more times a week	1	50.0	6	20.0	4	36.4	
1 to 4 times a month	1	50.0	20	66.7	3	27.3	
Total	2	100.0	30	100.0	11	100.0	

Source: Created by the authors.

Data demonstrate that children consume food of animal origin at least four times a week, with non-statistically significant differences between socioeconomic classes. Nonetheless, results of participant observation indicated the low acceptance of fish consumption among the students.

Table 5 presents data on the consumption frequency of fried foods, savories, sausages, sweets, cakes, cookies, processed juices, and water by the schoolchildren.

Table 5 – Consumption frequency of fried foods, savories, sausages, sweets, cakes, cookies, processed juices, and water by children from a public institution in the outskirts of Manaus according to socioeconomic class. Manaus, Amazonas, Brazil, 2016. (N=43)

Variables	Class B (n=2)		Class C (n=30)		Class D (n=11)		p-value
	n	%	n	%	n	%	
Consumption frequency of fried foods, savories, and sausages							0.480
Rarely or never	0	0.0	10	33.3	4	36.4	
Less than 2 times a week	0	0.0	2	6.7	1	9.1	
2 to 3 times a week	1	50.0	8	26.7	4	36.4	
4 to 5 times a week	0	0.0	1	3.3	0	0.0	
Everyday	1	50.0	9	30.0	2	18.2	
Total	2	100.0	30	100.0	11	100.0	
Consumption frequency of sweets, cakes, cookies, and processed juices							0.822
Rarely or never	0	0.0	6	20.0	4	36.4	
Less than 2 times a week	1	50.0	6	20.0	1	9.1	
2 to 3 times a week	0	0.0	8	26.7	2	18.2	
4 to 5 times a week	0	0.0	7	23.3	1	9.1	
Everyday	1	50.0	3	10.0	3	27.3	
Total	2	100.0	30	100.0	11	100.0	
Water daily intake							0.276
Less than 4 glasses	0	0.0	6	20.0	4	36.4	
8 glasses or more	1	50.0	16	53.3	5	45.5	
4 to 5 glasses	0	0.0	4	13.3	2	18.2	
6 to 8 glasses	1	50.0	4	13.3	0	0.0	
Total	2	100.0	30	99.9	11	100.0	

Source: Created by the authors.

Discussion

Results demonstrate that a large percentage of children consume industrialized products, being significant not only in the lower socioeconomic classes but also in the intermediate ones (class C), which can be explained by the economy opening and the Brazilian monetary stabilization that have expanded the consumer market in recent years. Simultaneously to the increased purchasing power, the declining real price of industrialized foods favored mainly the greater share of the lower-income social strata. Overall, as a country's per capita income increases, the level of sophistication in food consumption rises, opting for the more elaborate ones, such as industrialized foods[15-16].

These findings enabled to notice that the economic environment and the situation of choosing are not directly associated to a healthy diet. Recent study conducted in nursery schools in Manaus, with children aged between 24 and 72 months, identified that food consumption did not differ between public and private nurseries. Higher socioeconomic classes did not present greater access to adequate food than the others, because according to other studies, parents' schooling and attendance of children in both types of nursery school have the greatest impact on access to food[1,17].

Another finding in this research was the low consumption of raw products and a frequent choice to consume cookies, cakes, and sweets; sources of refined carbohydrates and trans fats; and low-fiber industrial processing products. However, when cross-referencing these food choices, a significant difference was observed between genders, with $p>0.05$, in which boys were estimated to consume more sources of trans fats than girls; nonetheless, this data was not found by other authors. This is a matter of most concern, since it can strongly impact the nutritional status of these children. This result is similar in both sexes in the same age group in several regions of Brazil[1]. Studies review on food consumption and nutritional adequacy in Brazilian children aged up to 10 years, between 2003 and 2013, verified a high consumption of industrialized products rich in sugars, fat, and salt, reflecting the low quality and low variety of dietary habits[6].

Participant observation performed by nutritionists in each nursery school revealed the low adherence to school meals and frequent use of snacks brought from home, usually with low supply of important nutrients for the growth and development of children. It is assumed that students are not in the habit of eating at home the same foods offered by the school, which may evidence underreporting of information by parents. This may be associated with the erroneous information transmitted by media about food, stimulating the consumption of industrialized foods with low nutritional value and strongly influencing the transformations of food behavior from childhood in the socioeconomic and cultural context[18-19].

A reflection on children's food consumption in public places, such as schools and nurseries, and the mobilization of sectors of Brazilian society to regulate this consumption have shown that the wide discussion about this subject implies the redefinition of relationships that adults establish with children and among themselves. This issue affects the politics and daily life in our society, with the family, school, and nutritionists who work with school meals as fundamental support in creating habits[18,20].

Children participating in this study showed a significant decline in the fruit and vegetable intake in all socioeconomic classes, which represents lower consumption of important fibers and micronutrients, especially iron, vitamins A and C, and zinc. Other studies with similar results indicate that the deficiency of these micronutrients leads to a higher frequency and duration of infections, among other things, and may compromise physical, cognitive, and intellectual development[17,21-23].

Consumption assessment of milk and dairy products, meat, and eggs as sources of animal protein indicated that all children had access to them and consumed at least one to two portions of these protein sources throughout the day, even

those with lower purchasing power, without significant differentiation between genders. This result is similar to that found by the Household Budget Survey (HBS) in other States of Brazil[8]. Studies with children of different age groups also identified a high intake of protein-rich foods, which is presented as a marker of diet quality given the role of this macronutrient in providing energy in cases of dietary imbalance[24-25].

North Region of Brazil has the highest average per capita consumption of fresh fish and preparations. Fish consumption is higher in rural areas and more frequent in the lower-income range per household in the general population, which might justify the low consumption of fish in this study carried out in the urban area and only with children, but sharing family meals[6].

Conclusion

This study enabled to conclude that the reduced fruit and vegetable intake in all socioeconomic classes and the frequent consumption of cookies, cakes, and sweets, as well as industrial processing products, reflect the poor diet quality of children participating in this study.

It also revealed the children's resistance to eat the school meals, hence suggesting the need to promote educational practices with children, family members, and lunch ladies to combat incorrect eating practices in childhood, improve eating habits in school and at home, as well as prevent nutritional deficiencies, chronic diseases, and other life-long injuries. After all, parents' schooling, correct information about the nutritional quality of foods, and the school environment of the child are factors that directly contribute to create the students' eating habits.

Therefore, interventions should be taken early, seeking appropriate approaches, rescuing the consumption of regional foods, providing positive changes, and consequently a healthy growth and development and a better quality of life, besides including the practice of physical activities to improve the health conditions of schoolchildren.

Collaborations

1. conception, design, data analysis and interpretation: Celsa da Silva Moura Souza, Fernanda Figueroa Sanchez and Thaize Maria Silva Lima;

2. drafting of the article, relevant critical review of intellectual content: Erika Barbosa Camargo, Mauro Leno Rodrigues de Souza and Gilberto Tadeu Reis da Silva;

3. final approval of the version to be published: Celsa da Silva Moura Souza.

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Received: December 25, 2016

Approved: May 29, 2017

Published: July 13, 2017