DOI: http://dx.doi.org/10.12957/demetra.2014.9693

Food consumption among adolescents from a Northeastern state of Brazil

Maylla Luanna Barbosa Martins[1]
Sueli Rosina Tonial[2]
Mônica Elinor Alves Gama[3]
Thaynara Helena Ribeiro e Silva[4]
Juliana Menezes Ribeiro[4]
Janaína Maiana Abreu Barbosa[5]

[1] Curso de Nutrição, Universidade Federal do Tocantins. Palmas, TO, Brasil.

[2] Departamento de Saúde Pública, Centro de Ciências da Saúde. Universidade Federal do Maranhão. São Luis, MA, Brasil.

[3] Departamento de Medicina III, Centro de Ciências da Saúde. Universidade Federal do Maranhão. São Luis, MA, Brasil.

[4] Curso de Nutrição, Centro de Ciências da Saúde. Universidade Federal do Maranhão. São Luis, MA, Brasil.

[5] Programa de Pós-graduação em Saúde Coletiva, Universidade Federal do Maranhão. São Luís, MA, Brasil

Correspondence
Maylla Luanna Barbosa Martins
e-mail: maylla@uft.edu.br

Abstract

Objective: Investigate food consumption by adolescents from the state of Maranhão, Brazil, particularly focusing on regional food consumption. *Methods***:** This is a descriptive study with data from a population-based research conducted in 2007/2008 in the state of Maranhão with a sample of 1,399 adolescents, who were demographically and nutritionally investigated and diagnosed by body mass index, using criteria of the World Health Organization (2007). Food intake was evaluated through a Food Frequency Questionnaire (validated to guarantee the inclusion of regional food). *Results***:** Most adolescents had low income (minimum wage or below - 42.5%). There were 12% overweight, 4.6% underweight, and 4.2% obese adolescents in the sample. Food types most frequently consumed by adolescents on a daily basis were coffee (82.3%), rice (77.2%), margarine and butter (50.8%), beans (50.6%), cassava flour (47.3%) and bread (40.1%). Fruits, vegetables, meats and eggs, and dairy products had low frequency of daily consumption, and so did foods that are usually preferred by teenagers, such as sugar, other sweets and fast food. There was also low consumption of regional foods, e.g. fruit (bacuri, cupuassu, jicara), vegetables (roselle, cuxá), tubers (cassava, tapioca) and meat (crab). *Conclusion***:** Food intake by adolescents in the state of Maranhão is considered to be dull, with lack of nutrients, possibly due to the low income of the population. Therefore, intervention is required to expand consumption of nutrient-rich regional foods, in order to avoid jeopardizing their health.

Keywords: Nutritional Status. Food Consumption. Adolescents.

Introduction

Adolescence is a particular evolutionary step for human beings, when intensive biopsychosocial maturation occurs and determines significant somatic, psychological and social changes in young people aged between ten and 19. In addition to such changes, there are also changes in lifestyle that may lead to inappropriate eating habits.[1]

Food consumption in adolescence is affected by several factors such as the influence by the media, social life, family's financial status, socio-cultural values and availability of food. Another factor of influence over food intake is the specific offer of foods across different Brazilian localities.[1,2]

Food intake by adolescents is sometimes inappropriate. The National Survey of School Health, conducted with adolescents, has shown high intake of sugary drinks, sweets, foods rich in fats and sugars, and low consumption of fruits, vegetables and fibers.[3] This increasingly common and inadequate intake, particularly in a period of nutritional risk as experienced in adolescence, has contributed to the nutritional transition currently observed in Brazil.[4,5]

It is known that inadequate food intake in adolescence can have negative consequences in adulthood, particularly obesity, heart disease, diabetes, osteoporosis and cancer.[6] Therefore, access to information and assessment of food intake and nutritional status of adolescents are important for identifying risk behaviors and defining intervention measures, thus ensuring full potential for growth and proper development of this age group[7]

In the state of Maranhão, this risk situation has been subject of research,[8] and further studies on this age group are certainly necessary. Thus, the objective of this research is to assess food intake by adolescents in Maranhão (regional food included), as well as describe their nutritional status and demographic characteristics.

Material and methods

Sample

This is a descriptive study with a quantitative approach. Data were collected from July 2007 to January 2008. The present study is part of a large population-based survey in the state of Maranhão, whose main objective was to assess the situation of maternal and child health. The focus of this study is the assessment of dietary intake and nutritional status of adolescents aged ten to 19 years.

Sample size calculation was based on the event "overweight", which included "overweight" and "obese" adolescents in Maranhão, who accounted for 10.5% in the Household Budget Survey.[9] A total of 1,339 adolescents were interviewed. It was found that the sample size of this study can evaluate the nutritional indicators of adolescents in Maranhão with a margin of error at 3%, 95% confidence interval, design effect of 2, 5% significance level and precision of estimates at 3%.

Multi-stage sampling was used; sampling was performed in three stages. In the first stage, the cities were randomly chosen; in the second, the census tracts were chosen within each municipality; and in the third stage, the starting point was randomly selected within each sector, for the purpose of households visits. This process began by preparing a cumulative listing of municipalities in Maranhão and their populations, according to the Census of the Brazilian Institute of Geography and Statistics (IBGE).[10] 30 clusters were chosen at random (for a normal distribution) by systematic sampling with probability proportional to size - that is, cities with a larger population had a higher probability of being selected, or even being randomly selected twice or more, so the sample could be similar to the population distribution of the state.

Data collection

Data were collected from July 2007 to January 2008. The questionnaire covered socioeconomic issues, and contained fields for anthropometric examination.

Anthropometric data were collected by measuring body weight and height twice, and the arithmetic mean of the two measures was calculated. Weight was measured with a *Lider* portable digital precision scale with minimum capacity of 2 kg and 100g, maximum capacity of 180 kg, and 100 gram graduation. Height was measured with a portable stadiometer with a measuring range of 0 to 200 cm and 0.1 cm graduation. For weight measurement, the adolescents took off their shoes and wore light clothing; for height measurement, they kept their feet together in a standing position and looked at the horizon.

A Food Frequency Questionnaire (FFQ) was used for collecting data on food intake. The initial food list was gathered from the FFQ validated by Sichieri.[11] The FFQ used in this study was adapted to the particular features of Maranhão as regards the eating habits of the target population. The food list was compiled with information from two 24-hour dietary recalls on different days were applied to 150 individuals in a neighborhood with heterogeneous socioeconomic status.

Foods mentioned in the recalls were analyzed according to energy and nutrient intake (carbohydrates, lipids, proteins, iron, ascorbic acid, retinol and thiamine). Foods that contributed up to 90% of the intake of these nutrients have been included in the FFQ list, according to the method of Block et al.[12]

Food portions were categorized as "small", "medium" and "large", and the percentiles were calculated for each food. P50 was considered the middle portion of intake for a certain food and corresponded to the middle portion of the FFQ, and the remaining portion sizes were equivalent to P25 (small) and P75 (large). The portions were based on household measures and the middle portion was used as a reference. The size distribution of food portions in percentile is shown in Table 1.

Table 1. Percentile distribution of sizes of food portions and preparations of the FFQ, Maranhão, 2007-2008.

FOODS/PREPARATIONS	P25	P50	P75
Avocado	1 piece (60g)	½ unit (185g)	1 unit (370g)
Pumpkin / Carrot	1 tbsp (30g)	2 tbsp (60g)	3 tbsp (90g)
Acerola	2 units (24g)	5 units (60g)	7 units (84g)
Lettuce	2 S leaves (10g)	4 S leaves (20g)	6 S leaves (40g)
White rice	1 serv. spoon (45g)	2 serv. spoons (90g)	3 serv. spoons (135g)
Maria-Izabel rice/ rice and vegetables	1 serv. spoon (45g)	2 serv. spoons (90g)	3 serv. spoons (135g)
Bacon	½ piece/slice (7.5g)	1 piece/slice(15g)	2 pieces/slices(30g)
Bacuri / Cupuassu	½ unit (30g)	1 unit (60g)	2 units (120g)
Banana	½ unit (47.5g)	1 unit (95g)	2 units (190g)
Baked sweet potato	½ piece (35g)	1 piece (70g)	2 pieces (140g)
Tapioca	½ unit (40g)	1 unit (80g)	2 units (160g)
Cookies	1½ unit without filling/ ½ unit with filling	3 units without filling / 1unit with filling	12 units without filling / 4 units with filling
Chocolate truffle	1 unit (15g)	2 units (30g)	3 units (45g)
Cake	½ piece (30g)	1 piece (60g)	2 pieces (120g)
Buriti	½ unit (15g)	1 unit (30g)	2 units (60g)
Hot dog	½ unit (62g)	1 unit (125g)	2 units (250g)
Coffee without sugar	1 S glass/cup (60ml)	½ glass/cup (90ml)	1 glass/cup (180ml)

FOODS/PREPARATIONS	P25	P50	P75
Coffee with sugar	1 S glass/cup (60ml)	½ glass/cup (90ml)	1 glass/cup (180ml)
Shrimp	1 serv. spoon (60g)	1 skimmer (120g)	3 serv. spoons (180g)
Crab	½ unit	1 unit	2 units
Beef	1 S portion (60g)	1 M portion (80g)	2 M portions (160g)
Pork	1 S portion (60g)	1 M portion (90g)	2 M portions (180g)
Onion	1 tsp	1 heaping tbsp	2 heaping tbsp
Chocolate	½ chocolate (9g)	1 chocolate(18g)	2 chocolates(36g)
Kale (leaf)	1 heaping dstspn (10g)	1 heaping tbsp (20g)	2 heaping tbsp (40g)
Stew	1 S ladle (140g)	1 M ladle (225g)	1 ½ M ladle (337g)
Rice couscous	½ slice (60g)	1 slice (120g)	2 slices (240g)
Corn couscous	½ slice (60g)	1 slice (120g)	2 slices (240g)
Cuxá /bobó	2 tbsp (40g)	1 serv. spoon (110g)	2 serv. spoons (220g)
Dulce de leche	1 tsp (15g)	1 heaping tbsp (40g)	1 ½ heaping tbsp (60g)
Jam	1 tsp (15g)	1 heaping tbsp (40g)	1 ½ heaping tbsp (60g)
Flour / Farofa	2 tbsp (32g)	4 tbsp (64g)	5 tbsp (72g)
Bean / Broad bean	1 level ladle (80g)	1 heaping ladle (140g)	1½ heaping ladle (210g)
Feijoada	1 level ladle (120g)	1 heaping ladle (225g)	1½ heaping ladle (337g)
Liver	½ M beefstake (40g)	1 M beefstake (80g)	2 M beefstakes (160g)
Skinless chicken	1 S portion (60g)	1 M portion (90g)	2 M portions (180g)
Skin-on chicken	1 S portion (60g)	1 M portion (90g)	2 M portions (180g)
Hamburguer	½ unit (62g)	1 unit (125g)	2 units (250g)
Yogurt	½ unit (60ml)	1 unit (120ml)	2 units (240ml)
Jewels of Opar/Roselle	1 heaping tbsp (5g)	1 heaping serv. spoon (10g)	2 heaping serv. spoon (20g)
Jicara	1 glass (180ml)	1 bowl (300 ml)	1 ½ bowl (450ml)
Orange / Mandarin orange	½ unit (45g)	1 unit (90g)	2 units (180g)
Milk and chocolate	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)
Skim milk powder	2 heaping dstspn (18g)	3 level tbsp (24g)	3 heaping tbsp (48g)
Skim milk	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)

FOODS/PREPARATIONS	P25	P50	P75
Whole milk powder	2 heaping dstspn (18g)	3 level tbsp (24g)	3 heaping tbsp (48g)
Whole milk	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)
Sausage	½ unit / 1 unit (30g)	1 unit / 1½ unit (60g)	2 units /3 units (90g)
Apple	½ unit (45g)	1 unit (90g)	1 ½ units (135g)
Mango	1 piece (50g)	1 unit (140g)	2 units (280g)
Common Margarine / Butter	1 tsp (2g)	2 srvg margarine (5g)	3 tbsp (7g)
Light margarine	1 tsp (2g)	2 srvg margarine (5g)	3 tbsp (7g)
Gherkin / okra	1 tbsp (25g)	2 tbsp (50g)	3 tbsp (75g)
Watermelon	1 small slice (50g)	1 medium slice (100g)	1 large slice (160g)
Milkshake, sundae	1 small glass	1 medium glass	1 ½ medium glass
Nuts	2 units (5g)	10 units (25g)	14 units (35g)
Boiled egg	½ unit (25g)	1 unit (50g)	2 units (100g)
Fried egg	½ unit (25g)	1 unit (50g)	2 units (100g)
Yellow cheese	½ slice (7.5g)	1 slice (15g)	2 slices (30g)
White cheese	½ slice (12.5 g)	1 slice (25g)	1 ½ slice (38g)
Bread	½ unit /1 slice (25g)	1 unit /2 slices (50g)	2 unit /4 slices (100g)
Fried fish	1/2 fish steak (60g)	1 fish steak (120g)	2 fish steaks (240g)
Baked and broiled fish	1/2 fish steak (60g)	1 fish steak (120g)	2 fish steaks (240g)
Popcorn	½ package (25g)	1 package (50g)	2 ½ packages (75g)
Low-sugar / Low-calorie soda	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)
Regular soft drink	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)
Snacks / Pastries	½ unit (55g)	1 unit (110g)	2 units (220g)
Ice cream	2 tbsp (40g)	1 scoop (80g)	2 scoops (160g)
Artificial fruit juice	½ glass (90ml)	1 glass (180ml)	1 L glass (260ml)
Fruit juice	1 small glass (120ml)	1 L glass (260 ml)	1½ L glass (390ml)
Tomato	1 slice	3 slices	5 slices
Pies / Creams	1 small slice (50g)	1 portion (85g)	2 portions (170g)

Abbreviations: **P25 –** 25th percentile; **P50 –** 50th percentile 50; **P75 –** 75th percentile; **S –** small; **M –** medium; **L –** large; . t**sp**. **–** teaspoon(s); **tbsp –** table spoon(s); **dstspn –** dessert spoon(s); **srvg** - serving.

Intake frequency of each food was categorized as "never", "daily", "weekly" and "monthly". The final version of the FFQ had 92 foods organized in groups according to their nutritional value, and it was validated with correlation coefficients between 0.40 and 0.70. The FFQ investigated food intake for the last 12 months in order to investigate the seasonality of fruits and vegetables.

Data processing and analysis

Data were processed and analyzed using *software* Stata 8.0. Anthropometric indicators were based on body mass index (BMI) for age and gender, using reference growth curves of the World Health Organization from 2007 for adolescents, which classify nutritional status as follows: low-weight when the percentile is less than 3; eutrophic when the percentile is greater than and equal to 3 and less than 85; overweight when the percentile is greater and equal to 85 and less than 97; and obesity when the percentile is higher than and equal to 97.[13]

Food intake was represented by the percentage of foods that were consumed daily by 1,399 adolescents. For this description, the percentage values of daily intake of some foods were added. Thus, the percentage of daily intake of 'milk' is the sum of the percentage of the daily intake of skim milk powder, liquid skim milk, whole milk powder, liquid whole milk; "cheese", the sum of the percentage of yellow cheese and white cheese; "rice", the sum of the percentage of white rice and maria-izabel rice/ rice with vegetables; "couscous", the sum of the percentage of rice couscous and corn couscous; "egg", the sum of the percentage of boiled eggs and fried eggs; "Chicken", the sum of the percentage of skin-on chicken and skinless chicken; "Fish", the sum of the percentage of baked / broiled fish and fried fish; "Beef", the sum of the percentage of stew and beef; "Coffee", the sum of the percentage of coffee with sugar and coffee without sugar; "Soft drink", the sum of the percentage of low-sugar/low-calorie soft drink and regular soft drink; "margarine / butter," the sum of the percentage of regular margarine / butter and low-fat margarine. Only foods whose daily intake was higher or equal to 0.1% for all adolescents have been described in the results. Thus, daily intake was described for 72 out of the 92 food items from the FFQ, in this study. They were described in the results in a total of 58 food items.

The Chi-square test was used to assess the association between nutritional status and gender, and the association between food intake and gender. A p-value <0.05 was considered significant.

Ethic and legal aspects

The study was approved by the Research Ethics Committee of the University Hospital of Maranhão, protocol 33104-747 / 2006, on October 20, 2006. The investigation complied with the provisions of Resolution No. 196/96 of the National Health Council and its complementary regulations. The respondents signed an Informed Consent form, as recommended by the above-mentioned resolution.

Results

A total of 1,399 adolescents aged ten to 19 years participated in the survey: 66.6% female and 33.4% male, similarly distributed across rural and urban areas. About 40% of the adolescents reported a family income of up to one minimum wage (Table 2).

Table 2. Demographic characteristics of adolescents, Maranhão, 2007-2008.

Variables	n	%
Type pf Housing		
Rural	672	48.0
Urban	727	52.0
Family Income		
up to 1 min. wage.*	594	42.5
1 - 1.9	479	34.2
2.0 to 4.9	287	20.5
Equal to or greater than 5.0	39	02.8
Total	1399	100

*Minimum wage in 2007: BRL 380.00

The classification of nutritional status has a considerable percentage of overweight adolescents (12%). In a comparison between genders, obesity was more frequent in males (Table 3).

Table 3. Nutritional status of adolescents by gender, Maranhão, 2007-2008.

Nutritional Status	Male		Female		Total	
	n	%	n	%	n	%
Low weight	28	6.0	36	3.9	64	4.6
Eutrophic	362	77.5	746	80.0	1108	79.2
Overweight	47	10.1	121	13.0	168	12.0
Obesity *	30	6.4	29	3.1	59	4.2
Total	467	100	932	100	1399	100

* P-value <0.01. Value of chi-square test is 7.68.

Table 4 describes the daily food intake of adolescents from Maranhão by food group. The most consumed foods were coffee (82.3%), rice (77.2%), butter and margarine (50.8%), bean (50.6%), flour (47.3%) and bread (40.14%). There is a high intake of foods rich in carbohydrates.

Foods that are a source of animal protein had percentages of daily intake below 26%, and milk and beef had the highest intake frequency (25.8% and 11.6%, respectively). The least frequently reported fruits and vegetables were: banana, orange / Mandarin orange, tomato and onion.

Fast food, sugar and sweets had low intake frequency: 15.2% for artificial juice; 5.4% for soft drinks; 4.1% for savory pastries and 2.5% for chocolate.

There was a low intake of regional foods such as corn couscous (5.2%), tapioca (1.9%) and baked sweet potato (0.7%). Fruits and vegetables typical of Maranhão, e.g. jicara, bacuri / cupuassu, buriti, Jewels of Opar, roselle, gherkin and okra also had low intake. Consumption of cuxá (regional food) and crab was reported by 0.8% and 0.1% of adolescents, respectively.

The analysis of significance, albeit with low percentages, showed that adolescent males consume more coffee, fresh milk, cuxá, avocado, snacks and liver, while females consume more yogurt, cheese and chocolate.

Table 4. Percentage and total food consumption by adolescents by gender in Maranhão, 2007-2008.

FOODS	MALE (%)	FEM. (%)	TOT (%)	FOODS	MALE (%)	FEM. (%)	TOT (%)
Cereals, breads and tubers				Sausage	2.7	1.7	2.2
Rice	78.7	75.8	77.2	Pork	0.4	0.3	0.3
Flour, farofa	47.9	46.7	47.3	Liver*[3]	0.6	0.0	0.3
Bread	41.1	39.1	40.1	Shrimp	0.4	0.1	0.2
Cookies	16.4	18.7	17.6	Crab	0.2	0.1	0.1
Cake	14.2	2.9	8.5	Milk and other dairy products			
Couscous	5.3	5.0	5.2	Milk	27.3	24.3	25.8
Tapioca	1.9	2.0	1.9	Yogurt*[4]	1.0	3.2	2.1
Baked sweet potato	0.6	0.8	0.7	Cheese*[5]	1.0	2.8	1.9
Fruit				Legumes			
Banana	15.6	14.7	15.1	Bean, broad bean	50.7	50.5	50.6
Orange, Mandarin orange	13.0	14.2	13.6	Feijoada	0.2	0.4	0.3
Apple	2.5	9.9	6.2	Fat			
Acerola	4.5	4.0	4.2	Margarine, butter	52,4	49.2	50.8
Mango	2.5	2.0	2.3	Bacon	0.6	0.1	0.3
Watermelon	1.7	1.5	1.6	Nuts	0.2	0.5	0.3
Avocado*[1]	1.0	0.1	0.5	Sugar and sweets			
Jicara	0.4	0.3	0.3	Ice cream	2.7	2.8	2.7
Bacuri, cupuassu	0.2	0.0	0.1	Chocolate*[6]	1.5	3.6	2.5
Buriti	0.2	0.0	0.1	Dulce de leche*[7]	1.2	0.3	0.8
Vegetables				Pies, creams	0.4	0.8	0.6
Tomato	36.6	35.6	36.1	Jams	0.6	0.3	0.4
Onion	34.4	37.4	35.9	Chocolate truffle	0.2	0.6	0.4
Pumpkin, carrot	3.8	5.2	4.5	Milkshake, sundae	0.2	0.1	0.1
Lettuce	3.4	5.2	4.3	Fast food			
Roselle		3.2	3.4	Snacks, pastries*[8]	6.6	1.7	4.1

FOODS	MALE (%)	FEM. (%)	TOT (%)	FOODS	MALE (%)	FEM. (%)	TOT (%)
Gherkin, okra	1.2	2.3	1.8	Popcorn	1.5	2.1	1.8
Kale	1.0	1.8	1.4	Hot dog	0.6	0.8	0.7
Cuxá, bobó*[2]	1.2	0.3	0.8	Hamburguer	0.2	0.7	0.4
Meat and eggs				Drinks and beverages			
Beef	12.1	11.1	11.6	Coffee*[9]	84.6	80.0	82.3
Egg	9.6	8.1	8.8	Artificial fruit juice	15.6	14.8	15.2
Chicken	3.2	3.4	3.1	Fruit juice	5.7	6.3	6.0
Fish	2.3	2.2	2.2	Soft drinks	5.3	5.5	5.4

* P-value <0.05. Value of chi-square tests: *[1]= 6.68; *[2] = 4.44; *[3] = 5.96; *[4] = 5.63; *[5] = 4.46; *[6] = 4.79; *[7] = 4.44; *[8] = 21.37; *[9] = 4.47.

Discussion

In this study, it was found that most adolescents from Maranhão have low family income. This fact is confirmed by the UNDP:[14] Maranhão ranks in the 26th position in the Human Development Index of the 27 states of Brazil. It should be noted that such a situation can cause risks to adolescents, since the socioeconomic conditions affect nutrition and health.[15]

In the assessment of nutritional status, it became clear that adolescents from Maranhão are mostly eutrophic, despite the likelihood of overweight and obesity. Research conducted in Brazil showed a higher tendency: data from the Household Budget Survey (HBS) of 2008 and 2009 revealed a prevalence of 3.4% for low-weight, 20.5% for overweight and 4.9% for obesity.[16] in another study conducted in Rio Grande do Norte, northeastern Brazil, Silva *et al*. observed a prevalence of 1.2%, 14.9% and 13.6% for low-weight, overweight and obesity, respectively.[17]

In the present study, Maranhão has lower prevalence of overweight and more prevalence of low weight. It is suggested that the lowest social and economic situation may particularly contribute to these results. There is no record of previous research investigating the nutritional status of adolescents in Maranhão, but studies in other age groups showed the association between nutritional deficiency and malnutrition with low income, low education and poor access to health services by people from Maranhão.[18,19]

Importantly, the prevalence of low-weight adolescents in Maranhão does not show a significant percentage of underweight; instead, these adolescents follow the nutritional transition process observed in Brazil, where there is a tendency to overweight.[16] These results may reflect the increased urbanization of the municipalities, which has enabled greater access to food, and the implementation of government income transfer programs, which allow more capital and greater purchasing power.[20]

It was found that the most commonly consumed foods were considered as trivial, as they are usually eaten at meals - breakfast, lunch and dinner. In addition, they are inexpensive when compared with fruit, meat and milk. The HBS provides similar data; foods most frequently consumed by the Brazilian population are rice (84%), coffee (79%), beans (72.8%) and bread (63%). [21] Silva *et al*. observed that, in Fortaleza, foods mostly consumed by adolescents attending public schools were also rice, bread and beans. [22]

According to Cerdeño,[23] rice is considered to be a staple food by over half the world's population. Consumption of both rice and beans is a great contribution to the diet of any population. It is a typical Brazilian dish, and it is nutritionally rich and appropriate.[24] Intake of beans is an important source of nutrients for low-income individuals because they are easily available. Although it is one of the most consumed foods, however, this study shows a finding that can be a cause for concern: daily intake of beans was observed in just half of adolescents from Maranhão.

The consumption of flour is important in Maranhão, given the regional characteristics of the state. It is produced from cassava planted and harvested by many families as a source of income and food - which accounts for the percentage of consumption observed. It has high caloric value but is poor in nutrients, which can affect the nutritional status of this population. When considering the use of cassava flour by levels of economic performance, the HBS [21] shows that the consumption of this product is ten times greater in lower income classes of the population

Margarine and butter were the main source of fat in the diet of this age group, consistent with studies by Levy et al[25] and Dalla Costa,[26] who also identified these products as the favorite source of fat of adolescents. It should be pointed out that high consumption of foods rich in saturated fats is a major factor for the development of obesity and cardiovascular diseases.[27]

Importantly, the present study found that the adolescents reported eating meats and eggs very infrequently; this is indicative of a diet that lacks in protein and probably heme iron as well, which can impair the growth and development of those adolescents.

Divergent results between different studies and the present study refer to low beef consumption; the HBS reported consumption of 48.7% by Brazilians, regardless of age.[21]. Conceição et al., when surveying students aged nine to 16 years from public and private schools in the capital of Maranhão, found that the most frequently consumed foods on a daily basis were rice (97.6%), bread (77.6%), beans (61.6%), butter and margarine (61.1%), beef (59.6%) and flour (53.9%).[28] This difference can be explained by the low purchasing power of the study group - more than 70% of them had family incomes below two minimum wages.

Daily milk intake was reported by only a quarter of adolescents from Maranhão. Consumption of milk and dairy products ensures calcium intake, which is crucial for bone development. In Brazil, calcium intake is low and this is probably due to the high cost of milk as well as cultural habits of the population: consumption of dairy foods is being gradually replaced with juice and soft drinks. [29]

The consumption of fruits and vegetables was not as frequent. Daily intake of such foods is recommended because it is known that they are important sources of vitamins, minerals and fibers, and potentially protective against diseases.[30] It is noticed that the most consumed fruits and vegetables are low cost or are those used in the preparation of foods (for example, tomato and onion, which are used as spices), or eaten at meals (such as banana and orange).

In addiiton, the consumption of natural fruit juice was lower than the consumption of artificial juice. A study that investigated the consumption of beverages at meals by adolescents from a public school in São Paulo showed that the most consumed beverage at meals is industrialized juice (38%), followed by soft drinks (29%).[31] Consumption of artificial juice is very common in Maranhão because it is readily available even to people living in rural areas; besides, it is low cost, widely accepted and easy to prepare.

Cookies, snacks, soft drinks and artificial juice were more frequently consumed than natural fruit juice, meat, dairy products and some other types of fruit. Leal et al. confirmed these findings and showed that adolescents prefer food with inadequate nutritional value but high energy density, saturated fat, cholesterol, sodium, sugar, and other refined foods, as often represented by the excessive consumption of soft drinks, sweets and fast food.[4]

As compared with the literature,[4,21,32,33] it was found that these foods are eaten in much smaller proportions by adolescents from Maranhão, which can be attributed to better socioeconomic situation experienced in other states, greater urbanization of their cities and consequently increased availability of processed food for the population, which is not observed in rural and urban areas of the state of Maranhão.

An interesting finding is that adolescent females have higher chocolate intake while males eat snacks more often; this is consistent with studies by Neutzling and Malta.[32,34]

Regional food consumption frequencies were fairly unimpressive, which can be attributed to the low nutritional education of the population, poor dissemination of information about the importance of consuming such food and / or nutritional culture itself at this stage of life, where processed foods are more readily accepted. It was observed that adolescents from Maranhão do not take advantage of the wide offer of foods that are low cost and easily available, as well as rich in nutrients, such as jicara, which is a source of energy, lipids, dietary fiber, fatty monounsaturated fatty acids and minerals.[35] There is also Jewels of Opar, rich in iron, zinc and selenium;[36] roselle, a source of iron;[37] and buriti, a source of betacarotene.[38]

Conclusions

The situation of the nutritional status of adolescents in Maranhão is similar to the nutritional transition process occurred in several locations in the country, although it is taking place more slowly. It still reflects their economic condition with low purchasing power, with a dull, nutrient-poor diet, preferably consisting of carbohydrate-rich foods and low consumption of meat, milk, fruits and vegetables.

Despite the significant number of eutrophic adolescents in Maranhão, their eating habits are inadequate, with possible repercussions on the development of disorders and non-communicable diseases in adulthood. Thus, specific intervention measures should be developed, primarily aimed at the implementation of educational programs in order to ensure an adequate standard of eating, with an emphasis on regional food consumption, thus providing a healthier lifestyle.

Acknowledgements

We are thankful to the Foundation for Research and Scientific and Technological Development of Maranhão. We also wish to thank the coordinators of the survey, the interviewers and the respondents for their support and participation.

References

1. Silva JG, Teixeira MLO, Ferreira MA. Alimentação e saúde: sentidos atribuídos por adolescentes. Esc Anna Nery 2012; 16(1):88- 95.
2. Velásquez KM, Tomio RF, Pacheco VC, Liberalli R. Perfil antropométrico de jovens escolares do município de Lages/SC. Rev. Bras. Obes. Nut. Emagrece 2007; 1(3):47-54.
3. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar 2012. Rio de Janeiro: IBGE; 2013.
4. Leal GVS, Philippi ST, Matsudo SMM, Toassa EC. Consumo alimentar e padrão de refeições de adolescentes, São Paulo, Brasil. Rev. Bras. Epidemiol. 2010; 13(3):457-467.
5. Batista Filho M, Rissin A. A transição nutricional no Brasil: tendências regionais e temporais. Cad. Saúde Pública 2003; 19(1):181-191.
6. World Health Organization. Inequalities young people's health: key findings from the Health Behaviour in School-aged Children (HBSC) 2005/2006 survey fact sheet. Copenhagen: WHO; 2008. [acesso em 13 ago. 2013]. Disponível em: http://www.euro.who.int/__data/assets/pdf_file/0004/83695/fs_hbsc_17june2008_e.pdf
7. Bertin RL, Karkle ENL, Ulbrich AZ, Stabelini Neto A, Bozza R, Araujo IQ, et al. Estado nutricional e consumo alimentar de adolescentes da rede pública de ensino da cidade de São Mateus do Sul, Paraná, Brasil. Rev. Bras. Saúde Materno Infant. 2008; 8(4):435-443.
8. Costa ASV, Chein MBAC, Tonial SR, Gama MEA, Martins MLB, Cunha CLF, et al. Estado nutricional de adolescentes do Maranhão, Brasil, por critérios nacional e internacional. Ciênc. Saúde Coletiva 2013; 18(12):3715-3720.
9. Instituto Brasileiro de Geografia e Estatística. Pesquisa de orçamento familiar 2002-2003. Antropometria e análise do estado nutricional de crianças e adolescentes no Brasil. Rio de Janeiro: IBGE; 2006.
10. Instituto Brasileiro de Geografia e Estatística. Síntese de indicadores sociais, 2006. Rio de Janeiro: IBGE; 2006.
11. Sichieri R. Avaliação do consumo alimentar e do consumo de energia. In: Sichieri R. Epidemiologia da obesidade. Rio de Janeiro: EDUERJ; 1998. p. 65-88.
12. Block G, Hartman AM, Dresser CM, Carroll MD, Gannon J, Gardner L. A data-based approach to diet questionnaire design and testing. Am. J. Epidemiol. 1986; 12(3):453-69.
13. World Health Organization. Growth reference data for 5-19 years [Internet]. Geneva: WHO; 2007. [acesso 10 jul. 2013]. Disponível em: http://www.who.int/growthref/en
14. Programa das Nações Unidas para o Desenvolvimento. Relatório do Desenvolvimento Humano 2013. New York: PNUD; 2013. 210 p.

15. Gomes FS, Anjo LA, Vasconcellos MTL. Associação entre o estado nutricional antropométrico e a situação sócio-econômica de adolescentes em Niterói, Rio de Janeiro, Brasil. Cad. Saúde Pública. 2009; 25(11):2446-2454.

16. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamento Familiar 2008-2009: antropometria e estado nutricional de crianças, adolescentes e adultos do Brasil. Rio de Janeiro: IBGE; 2010.

17. Silva JB, Silva FG, Medeiros HJ, Roncalli AG, Knackfuss MI. Estado nutricional de escolares do semi-árido do nordeste brasileiro. Rev Salud Pública 2009; 1(1):62-71.

18. Toniall SR, Silva AA, organizadores. Saúde, nutrição e mortalidade infantil no estado do Maranhão. São Luís: UFMA; UNICEF; 1997.

19. Toniall SR. Desnutrição e obesidade: faces contraditórias na miséria e na abundância. Recife: Publicações Científicas do Instituto Materno Infantil de Pernambuco; 2001.

20. Castro JA, Modesto L. Bolsa família 2003-2010: avanços e desafios. Brasília: IPEA; 2010.

21. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamento Familiar 2008-2009: análise do consumo alimentar pessoal no Brasil. Rio de Janeiro: IBGE; 2011.

22. Silva ARV, Damasceno MMC, Marinho NB, Almeida LS, Araújo MFM, Almeida PC, et al. Hábitos alimentares de adolescentes de escolas públicas de Fortaleza, CE, Brasil. Rev. Bras. Enferm. 2009; 62(1):18-24.

23. Martín Cerdeño VJ. Consumo de arroz: principales características. Distribución y consumo. 2006; 1:72-82.

24. Brasil. Ministério da Saúde. Guia alimentar para a população brasileira. promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2005.

25. Levy RB, Claro RM, Mondini L, Sichieri R, Monteiro CA. Distribuição regional e socioeconômica da disponibilidade domiciliar de alimentos no Brasil em 2008-2009. Rev Saúde Pública 2012; 46(1):6-15.

26. Dalla Costa MC, Cordoni Junior L, Tiemi M. Hábito alimentar de escolares adolescentes de um município do oeste do Paraná. Rev. Nutr. 2007; 20(5):461-471.

27. Scherr C, Ribeiro JP. Gorduras em Laticínios, Ovos, Margarinas e Óleos: implicações para a Aterosclerose. Arq. Brasileiro Cardiol. 2010; 95(1):55-60.

28. Conceição SIO, Santos CJN, Silva AAM, Silva JS, Oliveira TC. Consumo alimentar de escolares das redes pública e privada de ensino de São Luís, Maranhão. Rev. Nutr. 2010; 23(6):993-1004.

29. Almeida CF, Pereira RBC, Coelho SC, Ribeiro RL, Bittencourt A. Frequência de consumo alimentar versus saúde de adolescentes. Rev. Rede de Cuidados em Saúde 2009; 3(3):1-12.

30. Sampaio HAC, Sabry MOD, Sá MLB, Castro SMV, Feijão IEP, Bezerra SR, et al. Consumo de Frutas e Hortaliças por indivíduos atendidos pelo programa saúde da família na periferia da cidade de Fortaleza – CE. Rev. APS. 2010; 13(2):175-181.

31. Estima CCP, Philippi ST, Araki EL, Leal GVS, Martinez MF, Alvarenga MS. Consumo de bebidas e refrigerantes por adolescentes de uma escola pública. Rev Paul Pediatr. 2011; 29(1):41-5.

32. Neutzling MB, Araújo CLP, Vieira MFA, Hallal PC, Menezes AMB. Frequência de consumo de dietas ricas em gordura e pobres em fibra entre adolescentes. Rev Saúde Pública 2007; 41(3):336-342.

33. Santos GG, Sousa JB, Toscano MB, Morais MEA. Hábitos alimentares e estado nutricional de adolescentes de um centro de juventude da cidade de Anápolis. Ensaios e Ciência Ciências biológicas, Agrárias e da Saúde [Internet]. 2011; 15(1).

34. Malta DC, Sardinha LMV, Mendes I, Barreto SM, Giatti L, Castro IRR, et al. Prevalência de fatores de risco e proteção de doenças crônicas não transmissíveis em adolescentes: resultados da Pesquisa Nacional de Saúde do Escolar (PeNSE), Brasil, 2009. Ciênc. Saúde Coletiva 2010; 15(2):3009-3019.

35. Yuyama LKO, Aguiar JPL, Silva Filho DF, Yuyama K, Varejão MJ, Fávaro DI, et al. Caracterização físico-química do suco de açaí de Euterpe precatoria Mart. oriundo de diferentes ecossistemas amazônicos. 2011; 41(4): 545-552.

36. Manhães LRT, Marques MMM, Sabaa-Srur AUO. Composição química e do conteúdo de energia do cariru (Talinum esculentum, Jacq.). Acta Amaz. 2008; 38(2):307-310.

37. Martins MAS. Vinagreira (Híbiscus sabdariffa. L): uma riqueza pouca conhecida. São Luis: EMAPA; 1985. 12p.

38. Aquino JS, Pessoa DCNP, Oliveira CEV, Cavalheiro JMO, Stamford TLM. Processamento de biscoitos adicionados de óleo de buriti (Mauritia flexuosa L.): uma alternativa para o consumo de alimentos fontes de vitamina A na merenda escolar. Rev. Nutr. 2012; 25(6):765-774.

Received: Mar. 05, 2014
Reviewed: Apr. 25, 2014
Approved: May.04, 2014