



ORIGINAL ARTICLE

## Early cow's milk consumption among Brazilian children: results of a national survey<sup>☆</sup>

Gisele Ane Bortolini<sup>a,\*</sup>, Márcia Regina Vitolo<sup>b</sup>, Muriel Bauermann Gubert<sup>c</sup>,  
Leonor Maria Pacheco Santos<sup>d</sup>

<sup>a</sup> Universidade de Brasília, Brasília, DF, Brazil

<sup>b</sup> Department of Nutrition, Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, RS, Brazil

<sup>c</sup> Department of Nutrition, Universidade de Brasília, Brasília, DF, Brazil

<sup>d</sup> Department of Collective Health, Universidade de Brasília, Brasília, DF, Brazil

Received 11 March 2013; accepted 26 April 2013

Available online 13 September 2013

### KEYWORDS

Breast milk  
substitutes;  
Infant nutrition;  
Food consumption;  
Public health

### Abstract

**Objective:** to assess the intake, frequency, and type of milk consumed by Brazilian children younger than 60 months of age.

**Methods:** this was a cross-sectional study, which used secondary data from the National Demographic and Health Survey of 2006-2007. Data from 4,817 children under the age of 60 months were used. All analyses were performed with expanded samples. The dietetic survey assessed the previous day's consumption, and estimates were made through univariate analysis, presented as a percentage.

**Results:** on the day prior to the survey, breast milk was consumed by 91% of the children younger than six months of age, by 61.5% of the children aged 6 to 12 months, and by 34.8% of the children aged 13 to 24 months. Among the children who had received other types of milk, cow's milk was consumed by 62.4% of the children younger than six months, by 74.6% of the children aged 6 to 12 months, and by approximately 80% of the children older than 12 months. Infant formulas were consumed by 23% of the children younger than six months of age, by 9.8% of the children aged 6 to 12 months, and by less than 1% of the older children. Soy milk consumption varied from 14.6% to 20% among the investigated ages. Non-breast milk consumption before the age of six months was more frequent in children living in the Northeastern and Southern regions.

**Conclusion:** the results of the present study demonstrated that most children received cow's milk prematurely as a substitute for breast milk, highlighting the importance of the development of public policies to promote, protect, and support breastfeeding in all regions of Brazil, aiming at reversing the observed scenario.

© 2013 Sociedade Brasileira de Pediatria. Published by Elsevier Editora Ltda. All rights reserved.

<sup>☆</sup> Please cite this article as: Bortolini GA, Vitolo MR, Gubert MB, Santos LM. Early cow's milk consumption among Brazilian children: results of a national survey. J Pediatr (Rio J). 2013;89:608–13.

\* Corresponding author.

E-mail: giselebortolini@hotmail.com (G.A. Bortolini).

**PALAVRAS-CHAVE**

Substitutos do leite humano;  
Nutrição do lactente;  
Consumo de alimentos;  
Saúde pública

**Consumo precoce de leite de vaca entre crianças brasileiras: resultados de uma pesquisa nacional****Resumo**

**Objetivo:** avaliar o consumo, frequência e tipo de leite ingerido por crianças brasileiras menores de 60 meses.

**Métodos:** estudo transversal baseado em dados secundários da Pesquisa Nacional de Demografia e Saúde de 2006/7. Foram utilizados dados de 4.718 crianças menores de 60 meses. Todas as análises foram realizadas com amostra expandida. O inquérito dietético representou o consumo do dia anterior e foi estimado por meio de análise univariada apresentada em percentual.

**Resultados:** consumiram leite materno no dia anterior à investigação 91% das crianças menores de seis meses e 34,8% das crianças de 13 a 24 meses. Entre as crianças que receberam outros leites, o leite de vaca foi consumido por 62,4% das crianças menores de seis meses, por 74,6% das crianças de 6 a 12 meses e por aproximadamente 80% das crianças maiores de doze meses. O consumo de fórmulas infantis foi de 23% em crianças menores de seis meses, 9,8% na idade de 6 a 12 meses e menor 1% nas demais idades. O consumo de leite de soja variou de 14,6% a 20% nas idades investigadas. O consumo de leite não materno antes de seis meses de idade foi mais frequente em crianças residentes nas Regiões Nordeste e Sul.

**Conclusão:** os resultados deste estudo mostram que a maior parte das crianças recebeu leite de vaca em substituição ao leite materno. Enfatiza-se a importância do fomento às políticas públicas de promoção, proteção e apoio ao Aleitamento Materno em todas as regiões brasileiras para reversão do cenário observado.

© 2013 Sociedade Brasileira de Pediatria. Publicado por Elsevier Editora Ltda. Todos os direitos reservados.

**Introduction**

Inadequate feeding practices in early life contribute to the fact that millions of children do not reach their full development potential, maintaining the intergenerational cycle of poverty.<sup>1</sup> The Brazilian Ministry of Health recommends that children should be exclusively breastfed until six months of age, and the introduction of complementary foods should start from this age onward, while maintaining breast milk consumption until age two years or older.<sup>2</sup>

According to the latest national survey on breastfeeding in Brazil, 41% of children younger than six months living in capital cities and in the Federal District were exclusively breastfed and 58.7% of children aged between nine and 12 months were breastfed.<sup>3</sup> The early consumption of food and other liquids other than breast milk before children had completed six months of life was observed in all capitals of the country.<sup>4</sup>

Approximately 50% of Brazilian children living in the capital cities had received breast milk substitutes at ages four to six months. Non-breast milk was the most common type food consumed, at greater frequency in the capitals of the Northeast and Southeast regions; however, the type of milk offered was not specified.<sup>3,4</sup> At the national level, the types of milk used as a breast milk substitutes for children aged up to two years are unknown. The aim of this study was to evaluate the intake, frequency, and type of non-breast milk used in the early years of life based on a national survey of a representative sample of the Brazilian population.

**Methods**

This was a descriptive study that used secondary data derived from the National Demographic and Health Survey

(Pesquisa Nacional de Demografia e Saúde - PNDS) 2006/7.<sup>5,6</sup> The PNDS is a cross-sectional study that had as target population all women of reproductive age, defined as those between 15 and 49 years old, residing in the selected households. Their children younger five years of age at the time of the survey were also investigated. Complex sampling procedures were used, involving stratification of all census sectors in the country, random selection of clusters of sectors within the strata, and random selection of households within sectors.

The research has national representation for the five macro-regions and for urban and rural areas. A total of 14,617 households, 15,575 women, and 4,858 children younger than five years who were alive at the time of the interview were studied. Data were obtained through questionnaires applied in person with the women. The sampling procedures and data collection have been described in detail elsewhere.<sup>5,6</sup>

The child health status questionnaire included the assessment of food frequency to evaluate consumption of the following in the previous 24 hours: breast milk, cow's milk, infant formula, soy milk; as well as the number of times that the child had received a meal that included milk products other than breast milk on the day before. The types of preparations used to offer other types of milks were not investigated.

The household food security status was assessed by the Brazilian Food Insecurity Scale (Escala Brasileira de Insegurança Alimentar - EBIA) and classified as mild, moderate, or severe food insecurity.<sup>6</sup>

Data analyses were performed using the Statistical Package for Social Sciences (SPSS), release 20.0. The analyses were performed using the complex samples module. The analysis plan considered the sample weight for the children, stratum, and household clusters. All analyses were

performed with the expanded sample and, therefore, results are shown as percentages only. A total of 140 children who did not live with their mothers were excluded, resulting in a final database consisting of 4,718 children younger than 60 months who lived with their mothers. The frequency of consumption was investigated by means of univariate analysis.

The original study was approved by the Research Ethics Committee of the Center for Reference and Training in sexually transmitted diseases/acquired immunodeficiency syndrome (STD/AIDS) of the State Health Secretariat of São Paulo.

## Results

Approximately 40% of the heads of the household had up to four years of schooling, and 26.6% of the families had family income below the Brazilian minimum wage (R\$ 350.00 in 2006); 24.1% of the studied families participated in the Brazilian income transference program. 46.6% of the children lived in households with some degree of food insecurity (Table 1).

A total of 91.8% of children younger than six months and 61.5% of children aged 6-12 months were breastfed. A total of 40.1% of those younger than six months, and 77.1% of those aged six to 12 months consumed other types of milk than breast milk. Among the children who received other types of milk, cow's milk was consumed by 62.4% of those younger than six months, and by 74.6% of those aged between six and 12 months. Approximately 60% of children aged six to 24 months had consumed more than two meals containing products other than breast milk on the day before. The consumption of infant formulas was 23% in children younger than six months, and 9.8% in those aged six to 12 months. Consumption of soy milk ranged from 14.6% to 20% at the age ranges studied. Breastfed children showed high frequency of consumption of other types of milk in all age groups studied (Table 2).

Among those younger than six months, children living in the Northeastern (48.7%) and Southern regions (45%) presented the highest prevalence of consumption of milk other than breast milk on the previous day. Among children aged six to 12 months, those from the Southern and Midwestern regions had most frequently consumed more than two meals including products other than breast milk on the day before: approximately 70%. For children younger than 24 months, consumption of cow's milk was more prevalent in children living in the Northern and Northeastern regions, whereas the consumption of infant formula was higher in the Southern and Southeastern regions (Table 3).

## Discussion

The results of this study demonstrate a high frequency of consumption of milk types other than breast milk at very early ages; cow's milk is the most consumed type, whether or not replacing breast milk. Thus, the results of this study demonstrate that food habits of Brazilian children fall short of the recommendations for a healthy diet.<sup>2</sup> The interruption of exclusive breastfeeding before six months of age and the discontinuation of breastfeeding in children older

**Table 1** Characteristics of the household, family, mothers and children younger than 59 months. Brazil, 2006-2007.

	% (95% CI)
<i>Stratum of household</i>	
Urban	80.9 (77.6-83.8)
Rural	19.1 (16.2-22.4)
<i>Number of people in the household</i>	
2 to 3	31.0 (28.4-33.7)
4 to 5	50.5 (47.6-53.4)
≥ 6	18.5 (16.5-20.7)
<i>Level of schooling of head of the family (years)</i>	
≥ 12	6.5 (5.1-8.3)
9 to 11	27.0 (24.5-29.7)
5 to 8	30.3 (27.3-33.5)
0 to 4	36.1 (33.2-39.2)
<i>Participant in an income transference program</i>	
Yes	24.1 (21.5-27.0)
No	75.9 (73.0-78.5)
<i>Family income (Brazilian Reais)</i>	
≤ 350.00	26.6 (23.8-29.6)
> 350.00 - 540.00	11.7 (9.9-13.9)
> 540 - 1000.00	23.2 (20.9-25.7)
> 1,000.00	38.4 (35.0-42.0)
<i>Level of food security/insecurity</i>	
Food security	53.4 (50.0-56.9)
Mild food insecurity	27.0 (24.4-29.8)
Moderate food insecurity	11.6 (9.8-13.7)
Severe food insecurity	7.9 (6.6-9.4)
<i>Mother's civil status</i>	
No partner	13.8 (11.6-16.2)
With partner	86.2 (83.8-88.4)
<i>Mother's age (years)</i>	
< 20	10.6 (8.8-12.7)
≥ 20	89.4 (87.3-91.2)
<i>Prenatal consultations</i>	
< six	17.4 (15.4-19.6)
≥ six	82.6 (80.4-84.6)
<i>Child's gender</i>	
Male	52.3 (49.9-54.7)
Female	47.7 (45.3-50.1)
<i>Child's age (months)</i>	
< six	11.1 (9.5-13.1)
six to 12	11.9 (10.5-13.5)
13 to 24	19.0 (17.3-20.9)
25 to 59	57.9 (55.5-60.3)

CI, confidence interval.

All analyses were performed with expanded sample, considering the sample weight for children, stratum, and conglomerate. The non-expanded sample size n was 4,718.

than six months are associated with increased morbidity and mortality in children.<sup>7,8</sup>

It is noteworthy that there are rare situations in which children cannot be breastfed;<sup>9</sup> in such cases, health professionals have an important role in counseling mothers about

**Table 2** Prevalence of breastfeeding and consumption of breast milk substitutes in children younger than 59 months. Brazil, 2006-2007.

Description of milk consumption <sup>a</sup>	0 to 5 months %	6 to 12 months %	13 to 24 months %	25 to 59 months %
<i>Was receiving breast milk</i>				
Yes	91.8	61.5	34.8	8.0
No	8.2	38.5	65.2	92.0
<i>Consumption of breast milk substitutes on the previous day</i>				
Yes	40.1	77.1	85.5	83.7
No	59.9	22.9	14.5	16.3
<i>Number of meals containing milk products on the previous day</i>				
≤ 2	48.6	40.7	34.5	55.2
> 2	51.4	59.3	65.5	44.8
<i>Type of milk consumed</i>				
Cow's milk	62.4	74.6	79.6	83.1
Infant formula	23	9.8	0.4	0.1
Soy milk	14.6	15.6	20	16.8
<i>Breastfed children</i>				
Consumed other types of milk	33.4	64.3	67.9	70.5
Did not consume other types of milk	66.6	35.7	32.1	29.5

<sup>a</sup> All analyses were performed with expanded sample, considering the sample weight for children, stratum, and conglomerate. The non-expanded sample size n was 4,718.

infant feeding. The theoretical recommendations highlight that, when breastfeeding is impossible and all possibilities of relactation have been exhausted, children should receive infant formula; cow's milk is not recommended before one year of age.<sup>2,10</sup> However, this study demonstrates the excessive consumption of cow's milk in infants and shows an actual conflict between the technical recommendations and the reality observed in the country.

The frequency of consumption of other milks in this study is similar to that observed in the II Survey on Maternal Breastfeeding, which indicated that children younger than six months living in the Northeastern and Southeastern regions consume non-breast milk more frequently.<sup>4</sup> In the present study, the consumption of other types of milk was also high among children younger than six months living in the Southern Region. The present study contributes the data that cow's milk is the milk most often offered.

It has been demonstrated that early introduction of cow's milk is associated with low maternal education and low family socioeconomic status.<sup>11</sup> The results of this study confirmed this evidence, as cow's milk is most often consumed by children older than 12 months living in the Northern and Northeastern regions. Food and nutrition insecurity is commonly due to lack of financial resources to acquire food; the highest levels are found in the Northern and Northeastern regions.<sup>12</sup> Thus, in a situation of food insecurity, where there are restrictions to the amount of food available in the household, breast milk should be prioritized, as it will prevent an unnecessary expense for the purchase of other types of milk.<sup>13</sup>

In addition to social issues, other factors, such as the presence of maternal grandmothers, lack of support from the partners, teenager mother, having had fewer than six prenatal consultations, and the use of baby bottles/pacifiers

also contribute to the non-continuity of breastfeeding and thus, the introduction of other types of food.<sup>14-16</sup>

A study carried out in the state of Pernambuco has shown that the food most consumed by children younger than six months was cow's milk (69.3%), followed by breast milk (60.0%), and sugar (52.9%).<sup>17</sup> Another study showed that 50.3% of children younger than six months living in Curitiba, São Paulo, and Recife were no longer breastfed, and that only 12.0% of those received infant formulas. In addition to the low frequency of infant formula use, only 23.8% received properly diluted formula, which is a risk for the children's health.<sup>18</sup> The present study did not evaluate the dilution, the type of preparation used to supply the meal, and type of milk used (liquid or powder).

According to the Brazilian Society of Pediatrics, cow's milk is not recommended for children younger than one year.<sup>10</sup> Cow's milk has a high amount of protein; an inadequate proportion between casein and whey proteins; high levels of sodium, chlorides, potassium, and phosphorus; and insufficient amounts of carbohydrates, essential fatty acids, vitamins, and minerals for this age group.<sup>19</sup> In addition to nutritional inadequacy, cow's milk is very allergenic for children, and its consumption has been associated with the development of atopy.<sup>20</sup>

Within the public health scenario, the high frequency of cow's milk consumption at all ages can contribute to the maintenance of high levels of anemia observed in the country.<sup>6</sup> The consumption of cow's milk at an early age and during childhood increases the risk of anemia.<sup>21-23</sup> The early introduction of cow's milk has a negative impact on children's iron stores due to the low quantity and bioavailability of iron present in this food. Additionally, it can cause microgastrointestinal bleeding due to the immaturity of the gastrointestinal tract, resulting in blood loss.<sup>19</sup>

**Table 3** Prevalence of consumption of other types of milk in children younger than 59 months according to region of residence. Brazil, 2006-2007.

Description of milk consumption <sup>a</sup>	North (%)	Northeast (%)	Midwest (%)	Southeast (%)	South (%)
<b>Had consumed other types of milk on the previous day</b>					
<i>Zero to five months</i>	40.2	48.7	19.6	35.8	45.0
<i>Six to 12 months</i>	69.6	81.9	62.9	81.0	72.4
<i>13 to 24 months</i>	76.7	79.8	84.6	91.2	86.4
<i>25 to 59 months</i>	75.6	79.4	88.5	86.1	88.4
<b>Had more than two meals containing milk products on the previous day</b>					
<i>Zero to five months</i>	53.9	47.3	63.2	42.7	84.0
<i>Six to 12 months</i>	40.0	62.9	68.1	56.5	71.3
<i>13 to 24 months</i>	49.5	42.9	58.3	79.5	73.4
<i>25 to 59 months</i>	30.3	32.4	46.4	51.2	56.4
<b>Type of milk consumed</b>					
<i>Children aged 0 to five months</i>					
Cow's milk	76.7	70.3	47.7	59.5	40.8
Infant formula	17.9	12.2	17.7	32.6	34.1
Soy milk	5.4	17.5	34.6	7.9	25.0
<i>Children aged six to 12 months</i>					
Cow's milk	87.8	83.0	68.6	68.6	70.1
Infant formula	2.9	5.3	2.3	16.9	5.5
Soy milk	9.3	11.7	29.1	14.6	24.4
<i>Children aged 13 to 24 months</i>					
Cow's milk	80.0	84.8	71.9	78.5	78.0
Infant formula	1.7	0	0	0.6	0.0
Soy milk	18.2	15.2	28.1	20.9	22.0
<i>Children aged 25 to 59 months</i>					
Cow's milk	79.7	81.1	69.7	89.3	79.6
Infant formula	0.3	0	0.4	0	0.3
Soy milk	20.0	18.8	34.9	10.7	20.0

<sup>a</sup> All analyses were performed with expanded sample, considering the sample weight for children, stratum, and conglomerate. The non-expanded sample size n was 4,718.

It can also be observed that most children in all age groups who were still breastfed also received non-breast milk. Breastfed children do not need other types of milk or other dairy products, as the calcium from breast milk meets their requirements at this age.<sup>2</sup> Health professionals have an important role in counseling families, reinforcing the superiority of breast milk, and discouraging the introduction of other types of milk.

The practice of exclusive breastfeeding until six months of life, and of breastfeeding supplemented by other types of food up to two years of age or more, should be encouraged. Offering other types of milk to children in unnecessary situations should be prevented. Such behavior results in several benefits to the health of children and mothers, and it is a low-cost practice. When breastfeeding is impossible, cow's milk is not recommended for young children, and infant formula is expensive for most Brazilian families. Thus, it is extremely important to stimulate public policies that promote, protect, and support breastfeeding in all Brazilian regions to reverse the observed scenario.

## Conflicts of interest

The authors declare no conflicts of interest.

## References

1. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B, et al. Developmental potential in the first 5 years for children in developing countries. *Lancet*. 2007;369:60-70.
2. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Dez passos para uma alimentação saudável: guia alimentar para menores de dois anos. Um guia para o profissional da saúde na atenção básica. Brasília: Ministério da Saúde; 2010. (Serie A. Normas e Manuais Técnicos).
3. Venancio SI, Escuder MM, Saldiva SR, Giugliani ER. Breastfeeding practice in the Brazilian capital cities and the Federal District: current status and advances. *J Pediatr (Rio J)*. 2010;86:317-24.
4. Saldiva SR, Venancio SI, Gouveia AG, Castro AL, Escuder MM, Giugliani ER. Regional influence on early consumption of foods other than breast milk in infants less than 6 months of age in Brazilian State capitals and the Federal District. *Cad Saude Publica*. 2011;27:2253-62.

5. Brasil. Ministério da Saúde. Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher – PNDS 2006: aspectos metodológicos. Brasília: Ministério da Saúde; 2008.
6. 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/Centro Brasileiro de Análise e Planejamento; 2009. 300p.(Série G. Estatística e Informação em Saúde).
7. Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding: a systematic review. Geneva: World Health Organization; 2002.
8. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS, Bellagio Child Survival Study Group. How many child deaths can we prevent this year? *Lancet*. 2003;362:65–71.
9. World Health Organization (WHO). Acceptable medical reasons for use of breast-milk substitutes. Geneva: WHO; 2009.
10. Sociedade Brasileira de Pediatria. Manual de orientação para a alimentação do lactente, do pré-escolar, do escolar, do adolescente e na escola. Departamento de Nutrologia. 3ª ed. Rio de Janeiro: Sociedade Brasileira de Pediatria; 2012.
11. Wijndaele K, Lakshman R, Landsbaugh JR, Ong KK, Ogilvie D. Determinants of early weaning and use of unmodified cow's milk in infants: a systematic review. *J Am Diet Assoc*. 2009;109:2017–28.
12. Gubert MB, Benício MH, Santos LM. Estimates of severe food insecurity in Brazilian municipalities. *Cad Saude Publica*. 2010;26:1595–605.
13. Gomes GP, Gubert MB. Breastfeeding in children under 2 years old and household food and nutrition security status. *J Pediatr (Rio J)*. 2012;88:279–82.
14. Susin LR, Giugliani ER, Kummer SC. Influence of grandmothers on breastfeeding practices. *Rev Saude Publica*. 2005;39:141–7.
15. Santo LC, de Oliveira LD, Giugliani ER. Factors associated with low incidence of exclusive breastfeeding for the first 6 months. *Birth*. 2007;34:212–9.
16. Falceto OG, Fernandes CL, Baratojo C, Giugliani ER. Factors associated with father involvement in infant care. *Rev Saude Publica*. 2008;42:1034–40.
17. Farias Junior Gde, Osório MM. Alimentary profile of under-five year old children. *Rer Nutr*. 2005;18:793–802.
18. Caetano MC, Ortiz TT, Silva SG, Souza FI, Sarni RO. Complementary feeding: inappropriate practices in infants. *J Pediatr (Rio J)*. 2010;86:196–201.
19. Castilho SD, Barros Filho AA. The history of infant nutrition. *J Pediatr (Rio J)*. 2010;86:179–88.
20. Greer FR, Sicherer SH, Burks AW, American Academy of Pediatrics Committee on Nutrition; American Academy of Pediatrics Section on Allergy and Immunology. Effects of early nutritional interventions on the development of atopic disease in infants and children: the role of maternal dietary restriction, breastfeeding, timing of introduction of complementary foods, and hydrolyzed formulas. *Pediatrics*. 2008;121:183–91.
21. Gunnarsson BS, Thorsdottir I, Pálsson G. Iron status in 2-year-old Icelandic children and associations with dietary intake and growth. *Eur J Clin Nutr*. 2004;58:901–6.
22. Male C, Persson LA, Freeman V, Guerra A, van't Hof MA, Haschke F, et al. Prevalence of iron deficiency in 12-month-old infants from 11 European areas and influence of dietary factors on iron status (Euro-Growth study). *Acta Paediatr*. 2001;90:492–8.
23. Thorsdottir I, Gunnarsson BS, Atladottir H, Michaelsen KF, Pálsson G. Iron status at 12 months of age – effects of body size, growth and diet in a population with high birth weight. *Eur J Clin Nutr*. 2003;57:505–13.