



## ORIGINAL ARTICLE

## Nutritional quality of dietary patterns of children: are there differences inside and outside school?☆

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### KEYWORDS

Food consumption;  
Dietary patterns;  
Children;  
School feeding;  
Factor analysis

### Abstract

**Objectives:** To describe the dietary patterns of children inside and outside school and investigate their associations with sociodemographic factors and nutritional status.

**Methods:** This was a multicenter cross-sectional study in which children of both sexes, aged 1–6 years, attending private and public daycare centers and preschools in Brazil, were evaluated ( $n = 2979$ ). Demographic, socioeconomic and dietary data (weighed food records and estimated food records) were collected. Dietary patterns were derived by factor analysis from 36 food groups.

**Results:** Four dietary patterns were identified inside school, and three outside. Inside school, the “traditional” pattern was associated to low income and presented high nutritional quality. The “dual” pattern was associated with low income and with high intake of added sugar and glycemic load. The “snack” pattern was associated with children enrolled at private schools and with high intake of added sugar and glycemic load. The “bread and butter” pattern was associated with high intake of added sugar and trans fat. Outside school, the “traditional” pattern was associated with high intake of saturated fat, trans fats, sodium, and total fiber. The “bread and butter” pattern was associated with high intake of trans fats and glycemic load, whereas the “snack” pattern was associated with overweight, private schools, high income, and high intake of trans fats, sodium, and total fiber.

**Conclusion:** There are differences in the nutritional quality of dietary patterns inside and outside school, and heterogeneity in adherence to these patterns were observed across regions and socioeconomic classes.

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**PALAVRAS-CHAVE**

Consumo alimentar;  
Padrões alimentares;  
Crianças;  
Alimentação escolar;  
Análise fatorial

**Qualidade nutricional dos padrões alimentares de crianças: existem diferenças dentro e fora da escola?****Resumo**

**Objetivos:** Descrever os padrões alimentares de crianças dentro e fora da escola e investigar a sua associação com fatores sociodemográficos e estado nutricional.

**Métodos:** Trata-se de um estudo multicêntrico transversal, no qual foram avaliadas crianças de 1 a 6 anos de ambos os sexos, atendidas em creches públicas e privadas e pré-escolas no Brasil (n = 2979). Foram coletados dados demográficos, socioeconômicos e dietéticos. Os padrões alimentares foram derivados por análise fatorial a partir de 36 grupos de alimentos.

**Resultados:** Quatro padrões alimentares foram identificados dentro da creche e três fora da creche. Dentro da creche, o padrão "tradicional" foi associado a menor renda e apresentou melhor qualidade nutricional. O padrão "dual" associou-se a menor renda e maior ingestão de açúcar de adição e carga glicêmica. O padrão "lanches" foi associado a crianças matriculadas em escolas privadas e com maior ingestão de açúcar de adição e carga glicêmica. O padrão "pão com manteiga" associou-se a maior ingestão de açúcar de adição e gordura trans. Fora da creche, o padrão "tradicional" foi associado a maior ingestão de gordura saturada, trans, sódio e fibra. O padrão "pão com manteiga" associou-se a maior ingestão de gordura trans e carga glicêmica, enquanto o padrão "lanches" associou-se às crianças com excesso de peso, de creches privadas, maior renda e com maior ingestão de gordura trans, sódio e fibra.

**Conclusão:** Houve diferença na qualidade nutricional dos padrões dentro e fora da escola e a aderência a esses ocorreu de forma heterogênea nas regiões e classes socioeconômicas.

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**Introduction**

The investigation of dietary patterns can help elucidate the complex relationship between diet and health by considering the simultaneous effect of multiple foods and dietetic components, as well as their interactions, on the occurrence of one or more outcomes of interest.<sup>1</sup>

In the past decades, transitions in dietary intake among children have been observed and characterized by a higher intake of foods rich in fats, sodium, and sugar and by lower intakes of nutrient dense foods such as fruit and vegetables.<sup>2,3</sup> These changes in food intake have had a major impact on the development of obesity and nutritional deficits. In addition, studies have suggested the role of childhood nutrition on the development of morbidity in further life cycles, such as in adulthood.<sup>4,5</sup>

Therefore, identifying the dietary patterns experienced by children in different environment settings is essential to guide public policies and educational actions regarding health and nutrition in the early stages of life. Thus, the objective of the present study was to describe the dietary patterns inside and outside the school setting and to investigate their associations with demographic, socioeconomic, and nutritional status of children in Brazil.

**Methods****Study population**

Data were gathered from a multicenter cross-sectional study conducted in 2007 among children aged 1–6 years who attended private and public daycare centers and preschools.

A total of 85 primary schools (54 public and 31 private) were included from nine Brazilian cities (Manaus, Recife, Natal, Brasília, Cuiabá, Caxias do Sul, Viçosa, Rio de Janeiro, and São Paulo) located in five regions. The eligibility criteria for inclusion of the schools in the study were: be located in the urban area of the city, full-day attendance, and have a conventional serving system for meals.<sup>6</sup>

In each city, 350 children were assessed, of whom 250 were from public and 100 from private schools. The proportion of interviews in public and private schools in each city was based on the number of enrolments in daycare centers and preschools according to data from the National School Census conducted in 2005 by the Brazilian Ministry of Education. The sample size for each city was estimated at 350 subjects based on the estimated prevalence of inadequate nutritional intake (approximately 65%), with a margin of error of 5% and a confidence level of 95%. All children whose parents or guardians authorized data collection by signing an informed consent were assessed, comprising a total sample of 3058 preschoolers. For the present study, 79 children were excluded from the analysis due to incomplete food intake data, leading to a final sample of 2979 children of both genders.

Data was collected between February and December of 2007 by undergraduate nutrition students, trained and supervised by nutrition researchers in each city. In order to standardize data collection, structured forms and manuals with specific guidelines for the study were developed and used.<sup>6</sup>

This study was approved by the Research Ethics Committee at the Federal University of São Paulo, in accordance with the principles of the Declaration of Helsinki for research involving human subjects. An informed consent was

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