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Coexistence of high content of critical nutrients and claims in food products targeted at Brazilian children

Coexistência de altos teores de nutrientes críticos e alegações em produtos alimentícios voltados para crianças brasileiras

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ABSTRACT

Objective: This study aimed to evaluate food labels targeted at children and identify the concomitant presence of claims and high levels of critical nutrients and/or the presence of sweeteners. As a secondary objective, it aimed to list different types of claims and check which marketing strategies are most used.

Methods: We collected 409 products, from 8 popular food groups targeted at children, in Brazilian market (i.e., fruit drinks, dairy drinks, sandwich cookies, cakes, breakfast cereals, jellies, corn snacks, and yogurts). The contents of critical nutrients (e.g., sugar, total fat, saturated fat, and trans-fat, and sodium) and presence/absence of sweetener were calculated, considering Pan American Health Organization (PAHO) parameters. Then, we verified the presence and types of claims in these products.

Results: Overall, 265 (64.7%) labels presented claims. In three of the eight categories (i.e., breakfast cereals, dairy drinks, and yogurt), all products with claims (50, 34, and 34 products, respectively) had one or more nutrients in harmful concentrations (critical nutrients above PAHO's nutritional profile and/or presence of sweeteners). In the other categories, only one product (of 63 sandwich cookies and 26 breakfast cereals with claims) and three products (of 22 cakes and 28 jellies with claims) had no nutrient in critical concentration. The presence of claims, like "rich/source" of micronutrient, was predominant in seven of the eight food groups.

Conclusion: In the present study, there was a high presence of claims, of different types, in foods targeted at children, which, for the most part, also have excess of at least one critical nutrient, according to PAHO.

Keywords: Food labeling; Nutritional sciences; Feeding; Social marketing; Nutrients.

RESUMO

Objetivo: Avaliar rótulos de alimentos direcionados ao público infantil e identificar a presença concomitante de alegações e de altos teores de nutrientes críticos e/ou presença de adoçantes. Como objetivo secundário, listar os diferentes tipos de alegações e verificar quais estratégias de *marketing* são mais utilizadas.

Métodos: Foram coletados 409 produtos provenientes das oito categorias de alimentos mais populares entre crianças brasileiras (bebidas à base de frutas, bebidas lácteas, biscoitos recheados, bolos, cereais matinais, gelatinas, salgadinhos de milho e iogurtes). Foram calculados os teores de nutrientes críticos (açúcares, gorduras totais, saturadas e trans e sódio) e presença/ausência de adoçante, considerando-se os parâmetros da Organização Pan-Americana de Saúde (OPAS). Em seguida, verificamos a presença e os tipos de alegações nesses produtos.

Resultados: No total, 265 (64,7%) rótulos apresentaram alegações. Em três das oito categorias (cereais matinais, bebidas lácteas e iogurtes), todos os produtos com alegações (50, 34 e 34 produtos, respectivamente) continham um ou mais nutrientes em concentrações prejudiciais (nutrientes críticos acima do preconizado pela OPAS e/ou presença de edulcorantes). Nas demais categorias, apenas um produto (de 63 biscoitos recheados e 26 cereais matinais com alegação) e três (de 22 bolos e 28 gelatinas com alegação) não apresentavam nutrientes em concentração crítica. A presença de alegações, como "rico" ou "fonte" de micronutriente, foi predominante em sete dos oito grupos de alimentos.

Conclusões: Observou-se alta presença de alegações, de diferentes tipos, em alimentos destinados a crianças, que, em sua maioria, também possuem excesso de pelo menos um nutriente crítico, de acordo com a OPAS.

Palavras-chave: Rotulagem de alimentos; Ciências da nutrição; Dieta; Marketing social; Nutrientes.

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INTRODUCTION

The increased incidence of childhood obesity in recent years has been attributed to the intake of energy dense and nutritionally unbalanced foods, such as processed and ultra-processed foods.[1] The Pan American Health Organization (PAHO) published a Nutritional Profile Model (NPM) with parameters for these type of foods, classifying high contents of critical nutrients, such as sodium, sugar, total fat, saturated fat, and trans-fat, as well as the presence of sweeteners.[2] Several studies considered this PAHO's NPM as a reference, although it was developed to be used in various Latin American foods and nutrition policies, or highlight its impact on categorizing products with excessive nutrients compared with others NPM.[3,4]

The information displayed on food labels, once read and correctly interpreted, helps the consumer to understand the nutritional profile of the product.[5] Several studies indicated the influence of labeling on children's food preferences and their perceptions of healthiness.[6,7] Marketing strategies aim to attract the attention of consumers and to create positive associations between food and packaging through functionality, fun, and interactivity.[8] However, this use can confuse the consumer, for example, when labeling information such as "home-made" in food products with no difference in its composition compared to conventional options.[9]

In Brazil, evidences points out the need for government regulation of food and beverage marketing targeted at children and adolescents,[10] following the Chilean and Uruguayan examples, where these strategies, such as cartoons, cannot be displayed in labels of foods with high content of critical nutrients.[11] In theory, the national Consumer Defense Code, covering claims in food products, prohibits all marketing strategies for children and adolescents.[12] However, the regulatory inspection is ineffective and a Resolution of the Collegiate Board (*Resolução da Diretoria Colegiada* – RDC), in force since 2012, allows the use of nutritional claims on food labels, including foods targeted at children.[13]

This study aimed to evaluate food labels targeted at children through the presence of claims and critical nutrients scored according to parameters determined by the PAHO's NPM. As a second outcome, we verify which marketing strategy is most practiced in eight food groups (i.e., fruit drinks, dairy drinks, sandwich cookies, cakes, breakfast cereals, jellies, corn snacks, and yogurts). The main hypothesis is that the high occurrence of claims may mask the unbalanced nutritional profile of products with high proportion of one or more nutrients harmful to human health.

METHOD

This is a cross-sectional, descriptive, quantitative study, carried out by collecting the labeling of eight food groups targeted at children, in the Brazilian market: "fruit" drinks (e.g., fruit nectars, fruit-based and fruit-flavored drinks, and excluding pure fruit juices), "dairy drinks" (e.g., dairy-based soft drinks, such as chocolate milk, and excluding pure milk), sandwich cookies, cakes, breakfast cereals, jellies, corn snacks, and yogurts. The categorization in these eight food groups can be justified by the fact that they are the eight most popular food classes among Brazilian children.[7] Then we verified the content of critical nutrients according to PAHO's NPM (i.e., free sugar, total fat, saturated fat, and trans-fat, sodium, and the presence/absence of sweeteners) in products with the presence of claims.

Data collection proceeded in the second half of 2018, in supermarket chains in the city of Belo Horizonte-MG and the metropolitan region, southeastern Brazil, and the collected products in these locations are sold throughout the country. Initially, possible products for the study were listed, according to the food industries' websites (n=1,051). Then, we excluded products that did not meet any of the following three inclusion criteria:

1. Presence of animated/television characters, or reference to films;
2. Presence of phrases that suggest the consumption by children; or
3. Colorful design with illustrations or atypical packaging format, resulting in a final list of possible products available for collection (n=545).

With the final list (545 products), we proceed with local data collection using the Epicollect 5 software. Through this software collector, using smartphones filled out questionnaires with the necessary information for the study (e.g., sales denomination, brand, photo of the front label, nutritional table, list of ingredients, and date) and stored data in the cloud. Some products in the final list were not available at the supermarkets for data collection (food labeling information), being disregarded (n=136), totaling 409 products at the end.

For each product in each food group, we calculated the content of critical nutrients (e.g., free sugar, total fat, saturated fat, and trans-fat, and sodium) and verified the presence/absence of sweeteners. This calculation was carried out according to the information provided on the label and based on the parameters determined by the PAHO's NPM (i.e., ≥1 mg sodium per 1 kcal, ≥10% of the total energy value from free sugar, any amount of other sweeteners, ≥30% of the total energy value from total fat, ≥10% of the total energy value from saturated fat, and ≥1% of the total energy value from trans-fat). In many products, the information about the sugar content was not available on the label, so these were discarded during the analysis of the results for sugar content.

We listed which of these collected products have claims on the front panel of the label and/or marketing strategies (e.g., like interactive packaging). Then, we verified if these products

with claims also had a high content of nutrients considered critical for human consumption. We inserted and evaluated data using Microsoft Excel version 2016 and presented results in the form of frequency and absolute numbers.

In addition, as a secondary outcome, the different types of claims, in each category, were listed and classified into six different categories, according to an adapted classification proposed by a Canadian study.[14] This classification is described in Figure 1.

Type of claim	Description	Examples
Nutrient content claims	Increase/ reduction/ absence of nutrients and calories	"Rich in vitamins", "Source of calcium", "0% cholesterol", "30% less calories"
Methods of production claims	Highlighted method of applied production technology	"Baked", "More layers"
Subjective characteristics claims	Use of claims that cannot be substantiated and are individual perceptions	"Delicious", "Refreshing", "Original", "Perfect match", "Irresistible"
Composition and quality claims	Highlighted or absence of ingredients, certified seals	"With fruit juice", "Selected ingredients", "Without artificial powder", "Organic"
Claims related to intolerances	Declaration of absence of allergens	"Gluten-free", "Lactose-free", "Zero lactose"
Other claims	Claims that do not fit into any of the other categories	"Interactive fun on the back of the package", "Economic package"

Figure 1. Description of different types of claims according to an adapted classification proposed by a Canadian study.[14]

RESULTS

Considering all 409 analyzed labels, the category of sandwich cookies was the majority, with 25.2% (n=103) products (Table 1). Only 122 products declared the sugar content on their labels.

Overall, 265 (64.7%) labels presented claims praising some positive characteristics of the product. Most breakfast cereals (86.7%) and fruit drinks (83.1%) contained claims on their labels. Only yogurts showed a percentage below 50% (Table 2).

Of all products with claims (n=265), three of the eight categories also had all products with nutrients in high concentration (i.e., corn snacks – 50 products|dairy drinks – 34 products|yogurts – 34 products), according to PAHO's NPM. In the other remaining categories, only one product (for sandwich cookies and breakfast cereals) and three products (for cakes and jellies) had no critical content. In the group of fruit drinks, 33 products were not scored for critical content, but the sugar information could not be obtained in 39 samples of this group (Table 3).

In the group of sandwich cookies, the presence of critical content for total fat in the absolute majority of products with claims (61/63 products) stood out. We also highlight the saturated fat content in this group (55/63 products). Corn snacks and cakes also showed unbalanced values for total and saturated fats. In addition, the seasoning and salt used in corn snacks justifies the high sodium content in most products collected with claims (27/34 products). For jellies, of 28 products with claims, 19 had a high content of sodium, 7 products that declared the sugar content on its labels had a high content of this nutrient, and we highlight the presence of sweeteners in 25 products. Sugar was also at a critical level in breakfast cereals (n=23, considering a total sample of 25 products with claims and sugar content declared). For dairy drinks and yogurts, the saturated fat content was generally high (Table 3).

The presence of nutrient content claims, like "rich" or "source" of some micronutrients (e.g., vitamins, iron, zinc, and calcium), was predominant in seven of the eight studied food groups, not being much used only in the category of corn snacks, where the most used claims refer to the methods of production (Figure 2).

Another frequent claim was the ones referring to the composition and quality of the product, for example, claiming that a fruit drink has fruit juice in its composition (n=8). Cakes with fruit-based filling highlighting fruit juice in its composition (n=10), corn snacks made from corn (n=19), and cookies with a mix of cereals in the formulation with this information conveyed in the sales denomination (n=1) were other observed examples in this study.

Table 1. Number of collected food labels, according to categories.

Category	n	%
Sandwich cookies	103	25.2
Fruit drinks	65	15.9
Corn snacks	50	12.2
Jellies	50	12.2
Cakes	43	10.5
Dairy drinks	34	8.3
Yogurts	34	8.3
Breakfast cereals	30	7.3

Table 2. Number of labels with the presence and absence of claims, by food category.

Category	Presence of claims	Absence of claims	Percentage of claims in each group (%)
Breakfast cereals	26	4	86.7
Fruit drinks	54	11	83.1
Corn snacks	34	16	68.0
Dairy drinks	22	12	64.7
Sandwich cookies	63	40	61.2
Jellies	28	22	56.0
Cakes	22	21	51.2
Yogurts	16	18	47.1
Total	265	144	

Some companies even made claims of subjective product characteristics, such as terms "tasty," "fruit-flavored fun," and "doubly fun." Other claims were also pointed out, but all with the same intention of praise some positive characteristic of the product, for example, claims referring to economic packages, size portions, and interactive packaging fun (Figure 2).

DISCUSSION

We observed that in almost all food groups in the study, except for yogurts, more than half of the analyzed labels presented some type of claim, which denotes the high presence of this strategy in products targeted at children. This finding corroborates with similar studies. In Uruguay, researchers demonstrated that the vast majority of processed products had nutritional claims and other resources aiming to attract children's attention.[6] In a study conducted in the United States, 71% of products targeted at children had nutritional claims.[8] Ferreira et al.[7] identified the use of 20 different marketing strategies in labels of industrialized food and drinks targeted at children, such as the use of cartoons, the highlight of beneficial nutritional characteristics, colorful letters, fresh food images, symbols, or phrases that refer to environmental appeal, among others.

The high number of products with nutrients in critical levels, according to PAHO's NPM, in products with claims, reveals the unbalanced nutritional profile of ultra-processed food products popular among Brazilian children. Authors reported the same problem in an Uruguayan study, in which 97% of the analyzed products targeted at children were ultra-processed and contained high levels of critical nutrients.[6] A recent study indicated that the nutritional profile of ultra-processed food

Table 3. Products with claims and critical nutrients, according to PAHO NPM.

Category	With claims	Total fat	Saturated fat	Trans-fat	Sodium	Sugar*	Sweeteners	No critical content†	No critical content‡
Sandwich cookies (n=103)	63	61	55	2	0	13/13	0	1	0
Fruit drinks (n=65)	54	1	0	0	4	14/15	17	32	1
Corn snacks (n=50)	34	20	23	0	27	0/7	0	0	0
Jellies (n=50)	28	0	0	0	19	7/7	25	3	0
Cakes (n=43)	22	17	13	0	0	1/1	0	3	0
Dairy drinks (n=34)	22	0	17	0	14	9/9	0	0	0
Yogurts (n=34)	16	2	16	0	0	10/10	3	0	0
Breakfast cereals (n=30)	26	0	0	0	9	23/25	0	1	0
Total (n=409)	265	101	124	2	73	77 87	45	40	1

*Only products that declared sugar content on their labels; †No critical content and no declaration of sugar content on the product label; ‡No critical content and with a declaration of sugar content on the product label.

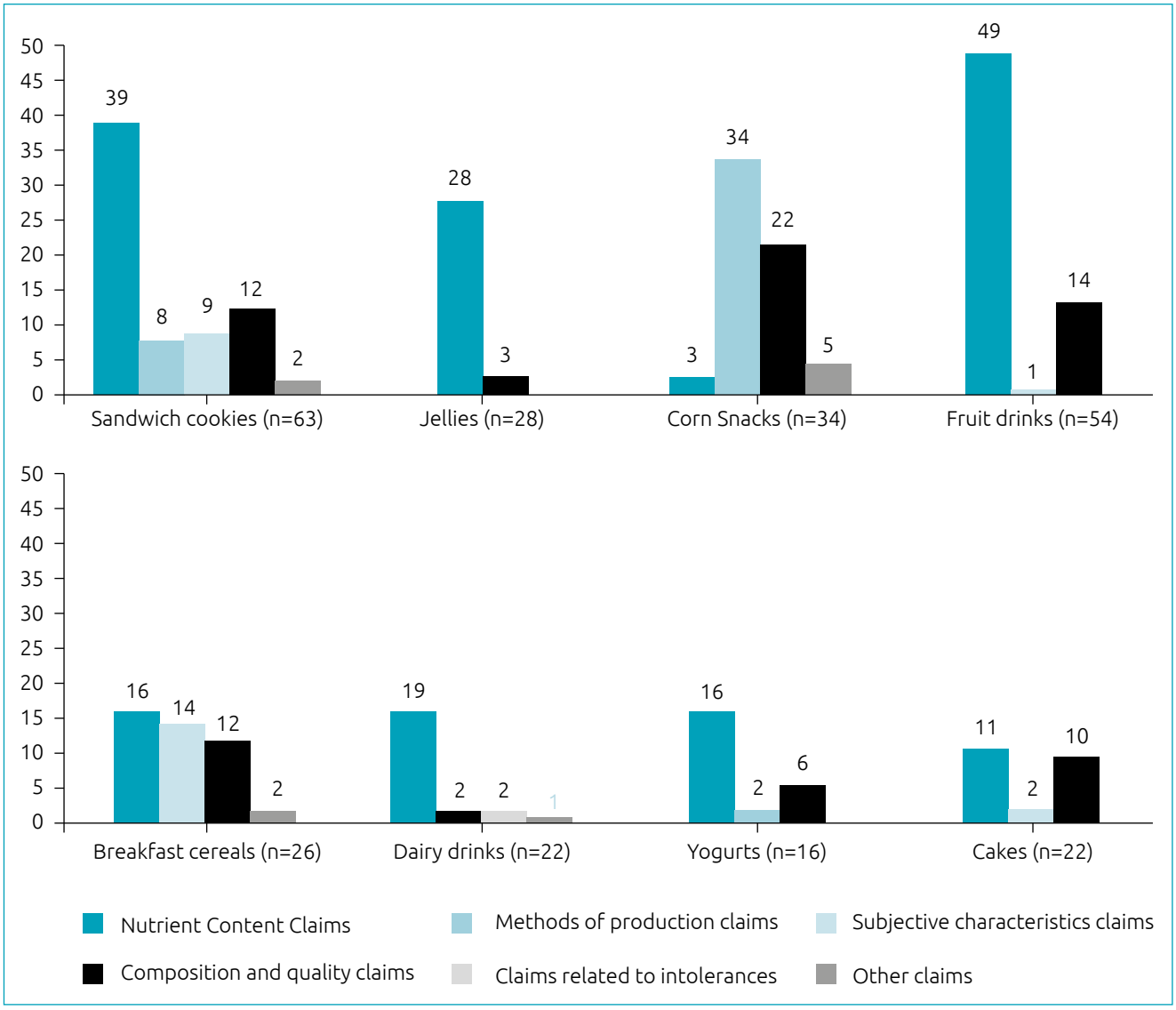

Figure 2. Number of different types of claims, in each food category, according to classification grouping described in Figure 1.

products consumed by Brazilian children is also unbalanced, with high levels of energy or at least one critical nutrient, and for this reason, authors suggest a reduction in the consumption of these foods and dissemination of the Brazilian Dietary Guidelines, which advocates for a diet consisting basically of fresh foods.[15]

Ultra-processed foods contribute with 77.8% of the maximum sodium intake and only 13.2% of the fiber recommendation, when compared to minimally processed or fresh foods, in the composition of nutrients consumed by children aged between 13 and 35 months.[16] In addition, they have an unbalanced energy profile, with 54.4% of energy from carbohydrates, 32.5% from total fat, and only 13.1% from proteins.[16] Considering the increased consumption of ultra-processed foods in recent years, the importance of reducing its consumption is highlighted.[15,17]

The frequency of sodium in high levels in corn snack and jellies stands out, considering the group of products with claims. This content in snacks is justified by the use of seasonings with high-salt content, and in jellies, due to the low-energy density (by the presence of sweeteners) and the presence of sodium in some additives used in its formulations. The use of additives is hardly identified by consumers since most do not interpret or correctly identify when its chemical names describe it in the ingredient list.[18,19] High-sodium diets are widely associated with increased blood pressure,

which consequently increases the risk of developing cardiovascular disease.[20]

In this study, high levels of total and saturated fats were observed in sandwich cookies and corn snacks. This is an alarming data, considering the indicated information by some authors on the consumption of these two classes of products by children before the first year of life (65.9% for snacks and 68.7% for sandwich cookies).[21] In addition, a longitudinal Brazilian study reinforced that higher lipid blood levels in children was associated with consumption of ultra-processed food.[22] However, present data indicate that most yogurts and dairy drinks were classified as "high" in saturated fat. However, this finding is questionable, since this content comes from milk fat, present due to the use of milk and derivatives in its formulation, and does not result from the addition of ingredients that are not essential to the formulation of the final product.

The presence of sweeteners in most formulations, such as jellies and fruit drinks, reinforces the findings of the American Dietetic Association, which states that artificial sweeteners are commonly used to replace sugar in yogurts, jellies, and sweetened drinks.[23] The long-term effects of sweetener intake by children still need to be further studied. It is known that the consumption of this additive has been increasing at all ages, and, in the United States, at least 25% of children regularly eat sweeteners through their usual diet and no beneficial long-term effect has been proven to justify this consumption.[18]

The high number of products with no critical content in the fruit drinks group can be justified by the absence of the sugar content on its label. The primary critical nutrient of these drinks is precisely sugar and, if declared, the possibility of it being in quantities above that stipulated by PAHO is high. Unfortunately, to present date, Brazilian legislation has not yet made it mandatory to inform sugar content, which ends up limiting the collection of data for this study.[24] Assuming that all declared carbohydrates are sugar, 98.5% of them would have sugar levels above that established by PAHO, corroborating with 100% of drinks aimed at children with high-sugar content, analyzed in Taiwan[19] and with a Brazilian study which indicated more than 80% of fruit-flavored drinks and soda with nutritional claims were high in critical nutrients.[25]

The different types of claims demonstrated the great versatility that the marketing of these food industries uses to disseminate attractive information to the consumer. Foods usually never have just one claim on its labels and are usually accompanied by complementary claims, such as the declaration of the content of any nutrient and the beneficial effects of its presence or absence.[26]

All categories have food products with claims related to the nutrient content (e.g., "source" or "rich"), according to current legislation.[13] A randomized experimental study found that when some snacks have a nutritional claim or vitamin fortification, participants look less for nutritional information, are more likely to choose this product for purchase, increase their perception of healthiness, and are confused when choosing which product would be the healthiest, in real comparison situations.[27]

The use of various types of claims is generally intended to highlight something interesting and positive to the consumer and thus promote the sale of the product. Often, the use of these strategy distracts the consumer from the actual nutritional composition of the food and highlights only the positives aspects of the product.[8] In addition, parents, who are in most cases responsible for choosing the food for their children, end up being confused and allow higher consumption of products that have information on their labels such as "no added sugar" or "light," forgetting that these can be nutritionally unbalanced and contain sweeteners as substitutes.[18]

Children's food profile can be determined by how attractive the product packaging and labels are, and since the labels of minimally processed and fresh products tend to be simpler, or not to have labels at all, it ends up generating a lack of interest in their consumption.[28] In an Uruguayan experimental study, consumers were exposed to food labels with and without claims, in a simulated way, and the presence of this information had a positive effect on the food choice.[24] The marketing on labels can be considered a form of nudge, according to Pelle Hanen's proposal, which influences people's judgment and choice in a predictable way, by repetitive and frequent contact with this form of information.[29]

It is worth mentioning some limitations of the study, such as the collection of products marketed only in a region of the country, which, despite being of national brands, does not represent all brands of food products targeted at children, available in Brazil. In addition, not all products suitable for this study were available for data collection at the supermarket, resulting in a loss of 25% of the eligible sample. The non-mandatory declaration of the sugar content on the food label can also be cited as a limiting factor in the study. Regarding the sample size (n=409), we can state that the number of food labels, targeted at children, analyzed in another study is compatible with this study.[19]

There is a high presence of claims, of different types, in foods targeted at children, which, for the most part, also have excess of at least one critical nutrient (i.e., fat, sugar, or sodium) and/or the presence of sweeteners, according to PAHO. These claims can distract the consumer from the real nutritional value of the product and the consumption of nutritional unbalanced ultra-processed foods can lead to several non-communicable chronic diseases for children.

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Conflict of interests

The authors declare there is no conflict of interests.

Author's contribution

Study design: Silva ARCS, Anastácio LR. *Data collection:* Silva ARCS, Braga LVM. *Data analysis*: Silva ARCS, Anastácio LR. *Manuscript writing*: Silva ARCS. *Manuscript revision*: Anastácio LR. *Study supervision*: Anastácio LR.

Declaration

The database that originated the article is available with the corresponding author.

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