

Prevalence of processed and ultra-processed food intake in Brazilian children (6–24 months) is associated with maternal consumption and breastfeeding practices

Marcela Martins Soares, Leidjaira Lopes Juvanhol, Sarah Aparecida Vieira Ribeiro, Sylvia do Carmo Castro Franceschini & Raquel Maria Amaral Araújo

To cite this article: Marcela Martins Soares, Leidjaira Lopes Juvanhol, Sarah Aparecida Vieira Ribeiro, Sylvia do Carmo Castro Franceschini & Raquel Maria Amaral Araújo (2021): Prevalence of processed and ultra-processed food intake in Brazilian children (6–24 months) is associated with maternal consumption and breastfeeding practices, International Journal of Food Sciences and Nutrition, DOI: [10.1080/09637486.2021.1885016](https://doi.org/10.1080/09637486.2021.1885016)

To link to this article: <https://doi.org/10.1080/09637486.2021.1885016>



Published online: 27 Feb 2021.



Submit your article to this journal [↗](#)



Article views: 57



View related articles [↗](#)



View Crossmark data [↗](#)

RESEARCH ARTICLE



Prevalence of processed and ultra-processed food intake in Brazilian children (6–24 months) is associated with maternal consumption and breastfeeding practices

Marcela Martins Soares^a, Leidjaira Lopes Juvanhol^b, Sarah Aparecida Vieira Ribeiro^b ,
Sylvia do Carmo Castro Franceschini^b  and Raquel Maria Amaral Araújo^b

^aNutrition Science, Federal University of Viçosa, Viçosa, Brazil; ^bDepartment of Nutrition and Health, Federal University of Viçosa, Viçosa, Brazil

ABSTRACT

The aim of this study is to identify maternal consumption of processed and ultra-processed foods and to verify the factors associated with the supply of these foods to Brazilian children. This is a cross-sectional study with 231 mothers and children aged from 6 to 24 months. The mother's and children's food consumption was measured using three 24-hour recalls. The foods consumed were categorised according to the NOVA classification. The data were analysed by multinomial logistic regression. The supply of processed and ultra-processed foods to children was associated with the child's age (T2: OR = 1.17, $p < .001$; T3: OR = 1.23, $p < .001$), the absence of breast milk consumption (T3: OR = 3.82, $p = .006$) and the greater consumption of these foods by mothers (T2: OR = 3.15, $p = .018$; T3: OR = 4.59, $p = .004$). We conclude that mothers who consume processed and ultra-processed foods also include them in complementary feeding, and the consumption of these foods by the child increases with age, absence of breastfeeding, and with increased maternal consumption.

ARTICLE HISTORY

Received 3 December 2020
Revised 23 January 2021
Accepted 31 January 2021

KEYWORDS

Child nutrition;
breastfeeding; maternal
nutrition; food
consumption; ultra-
processed foods

Introduction

There is some evidence that the first thousand days, from conception to two years of age, influence health and the long-term development (Mameli et al. 2016; Darling et al. 2020) and that the quality of the food provided to the child in this period is defining of their future health (Mameli et al. 2016). Therefore, special attention should be given to the foods offered in the period of complementary feeding, period from 6 to 24 months, when liquid or solid foods are offered in addition to breast milk to meet the nutritional needs of children (World Health Organization 2003).

In Brazil, the Nutritional Guidelines for Children Under Two Years (Brasil 2019) advises that in the period of complementary feeding, there is a predominance of natural foods, avoiding processed foods and excluding ultra-processed foods, due to their high concentration of fats, sodium and sugar (Monteiro et al. 2016). Also, as it is a critical phase for the formation of eating habits, the offer of these foods to the child may have a risk of being overweight and of chronic non-communicable diseases in the future (Monteiro et al. 2016).

Studies on the nutritional status of Brazilian children indicate low duration of breastfeeding (Brasil 2009), little variety and low consumption of *in natura* foods and early exposure to foods with a high level of processing (Bortolini et al. 2012; Sparrenberger et al. 2015; Mello et al. 2016; Batalha et al. 2017; Karnopp et al. 2017; Brasil 2019; Lopes et al. 2020). This condition becomes worrying, since the early substitution of breastfeeding associated with the low quality of the food offered, can cause different forms of malnutrition, with consequences for children's health and development (Brasil 2009). Studies in other countries also evidence the consumption of unhealthy foods by the entire population (Moubarac et al. 2014; Mendonça et al. 2016), including children (Steele et al. 2016; Moubarac et al. 2017; Marrón-Ponce et al. 2019).

We highlight that the child's eating experiences are conditioned by the family environment (Collins et al. 2016; Jaime et al. 2017; Trofholz et al. 2017; Navarro et al. 2019a, 2019b) and that the family interferes in the eating habit (Friedrich et al. 2012; Navarro et al. 2019a). The mother, in this context, represents the

main influence on infant feeding, as, usually she is the person who decides on the foods and preparations that will be offered to the child (Brasil 2010; Adamo and Brett 2014; Cantalice et al. 2015; Jaime et al. 2017) and tends to offer foods that make part of her food consumption (Jaime et al. 2017). Considering that the prevalence of consumption of processed and ultra-processed foods, worldwide has increased (Monteiro et al. 2011; Martins et al. 2013; Moubarac et al. 2014), we believe that in the early period of life children are exposed to the consumption of these foods through maternal influence. However, the literature still lacks studies that seek to understand how the relationship between the consumption of these foods by mothers and child consumption occurs.

Thus, the objective of the study was to identify maternal consumption of processed and ultra-processed foods and to verify the factors associated with the supply of these foods to Brazilian children in period of complementary feeding. This knowledge can contribute to public health interventions and inform health professionals about interventions to promote healthy diet in childhood with a focus on maternal diet.

Methods

Study design and population

This is a cross-sectional study, conducted with 231 mothers and their children from 6 to 24 months of age accommodated at the public health network in the municipality of Viçosa-MG. The selection criteria adopted were: inclusion of children from 6 to 24 months of age, and non-inclusion of pregnant mothers, premature children and mothers and/or children with the presence of diseases that lead to changes in diet.

Data collection was conducted from October 2016 to June 2019 in five Basic Health Units (UBS), since the others did not develop puericulture activities. The study was approved by the Research Ethics Committee of the Federal University of Viçosa (UFV), under registration number 1833627. All participants provided informed consent.

Study variables

The data were collected by previously trained researchers, through the application of a structured questionnaire. Socioeconomic, demographic, behavioural and food consumption variables were assessed. The socioeconomic status was classified according to

the criteria of the 2016 Brazilian Association of Research Companies – ABEP (Brasil 2016). Among the behavioural variables, there were the use of pacifiers and baby bottles by children, use of tobacco and alcohol consumption by mothers, which were self-reported by them, and the consumption of breast milk.

The dyad's food consumption was assessed using the 24-hour recall, so that mothers responded to three recalls regarding their diet and three referring to their children. The recalls were applied on non-consecutive days, one referring to the weekend. The first 24-hour recall was applied at the health unit and the others were obtained through household visits. After collecting the data of food consumption, the presence of ready-to-eat foods was verified in the 24-hour recall and, if found, the brand and type of product were questioned for further analysis of the ingredients and nutritional composition on the labels.

The practice of breastfeeding was assessed considering the information present in the recalls about the foods and preparations consumed by the child. The nutritional composition of the mothers' and children's diet was obtained using the Dietpro[®] software, version 5. The Brazilian Food Composition Table – TACO (Brasil 2011) was used as reference. The assessed nutrients were carbohydrates, proteins, lipids, fibre, sodium, iron, calcium, vitamin A, saturated fat, mono-unsaturated fat, polyunsaturated fat and cholesterol.

The food consumption of the mother-child dyad was assessed according to the level of food processing, considering the NOVA (Monteiro et al. 2016) classification. The nutritional information present in the packaging of processed foods was considered to better guide the identification of the degree of food processing. The analysis of the consumption of processed and ultra-processed foods considered the recommendation of the Food Guidelines for Brazilian Children Under 2 years (Brasil 2019), which considers both inappropriate for child consumption and encourages the consumption of natural and minimally processed foods. Infant formulas were not counted as ultra-processed foods, as they are indicated as substitutes for breast milk (Brasil 2019).

Data analysis

The study's population was characterised by calculating measures of absolute and relative frequency. The magnitude of consumption of processed and ultra-processed foods by mothers and their children was assessed through the average contribution of energy

related to these foods (in percentage and in calories). The average caloric intake and the percentage of macro- and micronutrients were also assessed. The normality of the quantitative variables was assessed by the Shapiro–Wilk test and the asymmetry coefficient.

The caloric intake (kcal) of processed and ultra-processed foods was categorised in tertiles for association analysis and the first tertile was considered as a reference. The analysis was conducted using a hierarchical approach (Victora et al. 1997) with explanatory variables grouped into three blocks, considering the proximity to the outcome variable: distal, including (child's age, child's gender, maternal age, maternal education, socioeconomic status, partner's presence; number of people in the household); intermediate, including (use of pacifier, use of baby bottle, alcohol consumption by mothers, tobacco use by mothers, breastfeeding practice); and proximal, including (consumption of processed and ultra-processed foods by mothers) (Figure 1). Initially, simple multinomial logistic regression was performed to estimate the crude odds ratio (OR_{crude}) and the 95% confidence interval (95% CI) of the association between each explanatory variable and the consumption of processed and ultra-processed foods by the children. Those variables that presented $p < .20$ in the simple models were included in the multiple analysis, considering the hierarchical blocks. All variables included in the hierarchically inferior blocks were used as an adjustment for the subsequent blocks and the adjusted OR ($OR_{adjusted}$) was obtained. Food consumption variables were adjusted by energy (100 kcal). Statistical analyses were performed using Stata software version 13.0 (StataCorp, College Station, TX), and the level of significance adopted was 5%.

Results

The children had a mean age of 14.5 months, with 37.2% consuming breast milk and, among these, 52.3% were less than 12 months old. Approximately, 59% of the children used the baby bottle, either for infant formula or other liquids, and most children did not use a pacifier. The mothers had a mean age of 27.4 years (minimum of 16 and maximum of 45 years), and the majority had one child (50.2%), lived with their husband or partner (73.6%) and lived with less than four people at the household (73.6%). Most of the sample had completed high school or higher education (73.0%) and belonged to economic classes C, D and E (77.5%). About 36% of mothers consumed alcohol and 11.3% used tobacco (Table 1).

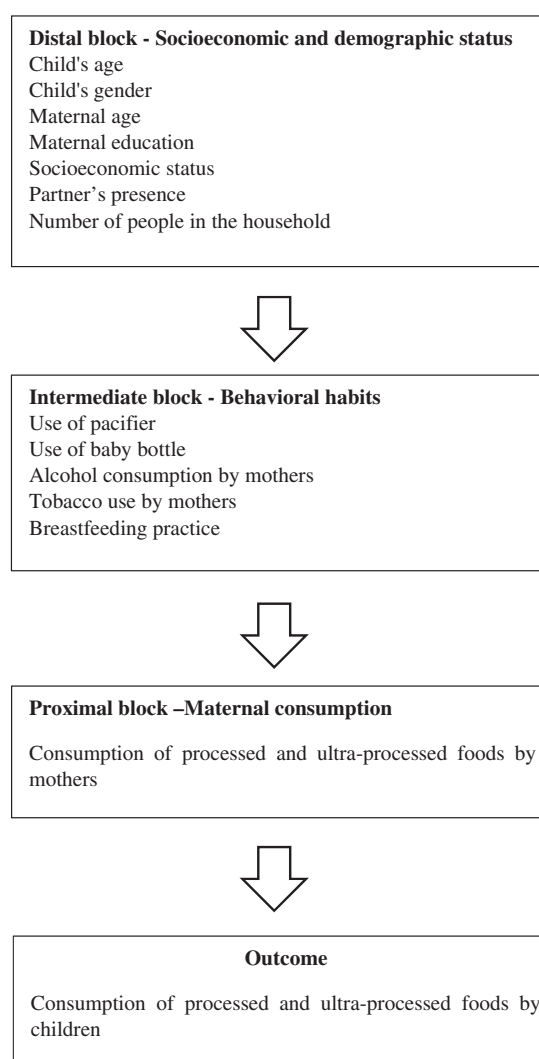


Figure 1. Theoretical model to determine the factors associated with consumption of processed and ultra-processed foods by children aged from 6 to 24 months of age.

About 94% of children consumed processed and ultra-processed foods in the period of complementary feeding. In maternal diet, this percentage was 99.6%. The energy and nutrient contribution related to the total daily consumption and from the processed and ultra-processed foods of mothers and their children can be found in Table 2. It was verified that 23.8% of the energy consumption came from processed and ultra-processed foods, and carbohydrates prevailed among the macronutrients present in these foods. In addition, it was found that the offer of micronutrients through these foods was less than 50%, whose emphasis should be given to the percentage of contribution of vitamin A (4.25%), fibre (15.05%), calcium (15.6%) and iron (38.65%). Attention is also drawn to the contribution of sodium (15.83%) and saturated fat (13.51%). In maternal diet, 41.5% of energy consumption came from these foods, which also had a high

Table 1. Characterisation of the sample ($n = 231$), Viçosa, Minas Gerais, 2016–2019.

Variables	% (n)
<i>Demographic and socioeconomic</i>	
Child's gender	
Female	46.8 (108)
Male	53.2 (123)
Child's age	
≤ 12 months	48.5 (112)
> 12 months	51.5 (119)
Mother's age	
< 18 years	8.2 (19)
18–30 years	58.0 (134)
> 30 years	33.8 (78)
Maternal education	
Illiterate to incomplete high school	26.8 (62)
Complete high school to complete college	73.2 (169)
Socioeconomic status	
A and B	22.5 (52)
C, D and E	77.5 (179)
Partner's presence	
Yes	73.6 (170)
No	26.4 (61)
Number of people in the household	
< 4	73.6 (170)
≥ 4	26.4 (61)
<i>Behavioural variables</i>	
Breastfeeding	
Yes	37.2 (86)
No	62.8 (145)
Baby bottle	
Yes	59.3 (137)
No	40.7 (94)
Pacifier	
Yes	40.7 (94)
No	59.3 (137)
Alcohol consumption	
Yes	36.4 (84)
No	63.6 (147)
Use of tobacco	
Yes	11.3 (26)
No	88.7 (205)

participation of carbohydrates (44.88%), total fat (43.96%), saturated fat (45.10%) and monounsaturated fat (41.66%) and low contribution of micronutrients and fibres (20.39%) (Table 2). Regarding the children's age group, it was found that ultra-processed processed foods had a greater contribution on the diet of children older than 12 months (28.77%) compared to those between 6 and 12 months (17.52%).

In the crude analysis, we found that the supply of processed and ultra-processed foods to children was positively associated with the child's age (distal block) and the absence of breastfeeding (intermediate block) as shown in Table 3. After the adjustments, considering the hierarchical approach, we found that the supply of these foods to children continued to be greater with advancing age and among those who were not breastfeeding. Moreover, the greater consumption of processed and ultra-processed foods by mothers was associated with a greater consumption by their children (Table 4).

Discussion

The results of this study indicate that mothers who consumed processed and ultra-processed foods offered them to their children in period of introducing complementary foods, and the quantity offered was greater when they had a higher consumption. In addition, children's consumption of these foods was associated with child's age and absence of breastfeeding.

The factors associated with the consumption of processed and ultra-processed foods by children include the practice of breastfeeding (Fonseca et al. 2019; Passanha et al. 2019), child's age (Sparrenberger et al. 2015; Batalha et al. 2017; Karnopp et al. 2017), maternal education (Batalha et al. 2017; Mais et al. 2018; Giesta et al. 2019; Passanha et al. 2019) and socioeconomic status (Karnopp et al. 2017; Passanha et al. 2019). We know that the parents' eating practice is considered the first social influence in the formation of the child's eating habits and, therefore, the parents receive the responsibility for the positive example to the children of healthy diet (Friedrich et al. 2012; Cantalice et al. 2015; Jaime et al. 2017; Navarro et al. 2019a).

In the present study, we found an association between mothers' and children's food consumption so that the odds of the child consuming more processed and ultra-processed foods was greater as the mother's consumption increased. Several studies reinforce the relationship between the characteristics of child and family food consumption. Jaime et al. (2017), for example, found an association between the consumption of sugary drinks among children and adults in the house. Collins et al. (2016) found that children had a better quality of diet when mothers had a healthy diet. A study using data from the Household Budget Survey (2008–2009) showed that children become more susceptible to the early introduction of unhealthy foods (breads, cookies, cakes and sausages) when this practice is present in the adults' diet (Martins et al. 2013). According to Bassul et al. (2020) study, parents' consumption of vegetables showed a negative association with the intake of bakery products and sugary drinks by children aged from three to five years of age, and children whose parents consumed less vegetables were 59% less likely to eat vegetables daily.

Age has been one of the factors associated with the consumption of foods with a high level of processing (Sparrenberger et al. 2015; Batalha et al. 2017; Karnopp et al. 2017; Moubarac et al. 2017). Studies conducted with children, in different age groups, have verified an increasing tendency in the consumption of

Table 2. Daily energy and nutrient intake total and coming from processed and ultra-processed foods of mothers and their children ($n = 231$), Viçosa, Minas Gerais, 2016–2019.

Variables	Mothers		Children	
	Total Mean (SD)	Processed and ultra-processed Mean (SD)	Total Mean (SD)	Processed and ultra-processed Mean (SD)
Energy (kcal/d)				
Absolute	1.786,68 (531.76)	747.74 (385.79)	1.145,57 (278.76)	277.17 (168.86)
Percentage	100.00	41.46 (17.38)	100.00	23.81 (13.44)
Protein (g/d)				
Absolute	77.71 (24.33)	20.57 (12.73)	40.76 (15.62)	7.63 (7.18)
Percentage	100.00	27.23 (15.76)	100.00	18.33 (12.64)
Lipids (g/d)				
Absolute	60.60 (20.85)	27.24 (16.20)	40.28 (12.46)	6.14 (5.56)
Percentage	100.00	43.96 (20.53)	100.00	15.96 (13.68)
Carbohydrates (g/d)				
Absolute	232.60 (84.10)	105.06 (59.74)	155.00 (42.84)	47.85 (29.63)
Percentage	100.00	44.88 (19.33)	100.00	29.76 (16.01)
Fibre (g/d)				
Absolute	25.27 (9.79)	4.67 (3.16)	12.89 (5.27)	1.89 (1.26)
Percentage	100.00	20.39 (13.79)	100.00	15.05 (9.90)
Sodium (mg/d)				
Absolute	3.143,44 (1099.49)	1.188,03 (772.70)	1.496,36 (619.00)	278.99 (427.16)
Percentage	100.00	37.08 (18.84)	100.00	15.83 (14.11)
Iron (mg/d)				
Absolute	9.02 (3.06)	3.59 (2.21)	5.50 (3.08)	2.26 (1.96)
Percentage	100.00	39.68 (20.29)	100.00	38.65 (23.10)
Vitamin A (mcg/d)				
Absolute	163.39 (120.30)	19.43 (28.68)	366.40 (233.27)	12.83 (41.56)
Percentage	100.00	16.27 (21.47)	100.00	4.25 (10.62)
Calcium (mg/d)				
Absolute	447.15 (212.02)	133.98 (96.64)	620.92 (270.26)	97.00 (89.78)
Percentage	100.00	31.48 (19.40)	100.00	15.60 (13.68)
Saturated fat (g/d)				
Absolute	20.40 (7.67)	9.55 (6.01)	17.03 (5.68)	2.09 (2.05)
Percentage	100.00	45.10 (21.78)	100.00	13.51 (13.66)
Monounsaturated fat (g/d)				
Absolute	18.73 (7.24)	7.96 (5.36)	12.41 (4.65)	1.80 (1.81)
Percentage	100.00	41.66 (21.61)	100.00	15.90 (14.66)
Polyunsaturated fat (g/d)				
Absolute	12.49 (4.63)	4.04 (2.98)	6.11 (2.16)	0.91 (0.86)
Percentage	100.00	31.87 (18.34)	100.00	14.70 (11.64)
Cholesterol (mg/d)				
Absolute	262.69 (115.82)	57.94 (43.90)	145.26 (58.87)	10.57 (14.56)
Percentage	100.00	23.36 (17.04)	100.00	7.77 (10.17)

these foods with advancing age (Sparrenberger et al. 2015; Batalha et al. 2017; Karnopp et al. 2017), similar to what has been verified in the present study. It is noteworthy that some ready-to-eat foods intended for children propagate appealing marketing strategies to parents about the benefits in child's growth and development. This condition may be associated with a greater offer of these foods to children (Abrams et al. 2015).

Some authors have found that maternal age is also associated with the offer of processed and ultra-processed foods to children (Giesta et al. 2019; Passanha et al. 2019; Ortelan et al. 2020). Giesta et al. (2019) found that the more advanced the maternal age, the greater the amount of ready-to-eat foods introduced into the diet of their children. Ortelan et al. (2020) and Passanha et al. (2019) found that the greatest consumption of these foods occurred in children born from younger mothers. In the present study, maternal

age was not significantly associated with the consumption of processed and ultra-processed foods by children under two years of age. However, this divergence of results verified in the literature points to the need for more studies to be conducted to establish the relationship between maternal age and the quality of the children's diet.

When studying children in the first two years of life, special attention should be given to the practice of breastfeeding. There are several benefits already consolidated in the literature regarding this practice, which are related to child's development (Victora et al. 2016; Koletzko et al. 2019), to the reduction of neonatal mortality and infections of the gastrointestinal and respiratory tracts (Horta and Victora 2013; Victora et al. 2016), and to the change in the risk of chronic disease in the long term (Horta et al. 2015; Victora et al. 2016; Gungor et al. 2019). Breastfeeding can also influence maternal health outcomes, such as

Table 3. Simple multinomial logistic regression for associating the consumption of processed and ultra-processed foods by children with socioeconomic, demographic and behavioural variables ($n = 231$), Viçosa, Minas Gerais, 2016–2019.

Explanatory variable	Consumption of processed and ultra-processed foods			
	T2		T3	
	OR _{crude} (95% CI)	<i>p</i> Value	OR _{crude} (95% CI)	<i>p</i> Value
Distal block				
Child's age (months)	1.17 (1.10–1.25)	.000	1.23 (1.15–1.31)	.000
Gender				
Male	1.00	.332	1.00	.332
Female	1.37 (0.73–2.59)		1.37 (0.73–2.59)	
Mother's age	0.97 (0.92–1.02)	.242	1.00 (0.96–1.06)	.801
Maternal education				
Illiterate to incomplete high school	1	.102	1	.102
Complete high school to complete college	0.58 (0.30–1.11)		0.58 (0.30–1.11)	
Socioeconomic status				
A and B	1	.055	1	.463
C, D and E	2.17 (0.98–4.77)		1.31 (0.64–2.70)	
Partner's presence				
Yes	1	.098	1	.189
No	1.87 (0.89–3.93)		1.65 (0.78–3.50)	
Number of people in the household				
Up to 4	1	.363	1	.709
More than 4	1.40 (0.68–2.86)		1.15 (0.55–2.39)	
Intermediate block				
Pacifier				
Yes	1.00	.247	1.00	.139
No	0.68 (0.35–1.31)		0.61 (0.32–1.17)	
Baby bottle				
Yes	1.00	.143	1.00	.194
No	0.62 (0.32–1.18)		0.65 (0.34–1.24)	
Breastfeeding				
Yes	1.00	.000	1.00	.000
No	3.64 (1.87–7.08)		9.48 (4.38–20.49)	
Tobacco by mother				
Yes	1.00	.389	1.00	.053
No	0.60 (0.19–1.92)		0.34 (0.12–1.01)	
Alcohol by mother				
Yes	1.00	.393	1.00	.095
No	0.75 (0.38–1.46)		0.57 (0.29–1.10)	
Proximal block 3				
Processed/ultra-processed consumption by mother				
T1	1.00		1.00	
T2	1.30 (0.60–2.83)	.505	1.52 (0.70–3.29)	.285
T3	1.52 (0.70–3.29)	.285	1.47 (0.68–3.22)	.330

T2: second tertile; T3: third tertile; OR_{crude}: crude odds ratio; CI: confidence interval.

First tertile (T1) of children's consumption of processed and ultra-processed foods was used as a reference. The bold values represents as statistically significant $p < .05$ values.

breast cancer and type 1 and 2 diabetes (Chiara et al. 2009; Jäger et al. 2014; Chowdhury et al. 2015). In the present study, children who did not consume breast milk had a higher consumption of processed and ultra-processed foods. This finding confirms yet another benefit of breastfeeding that goes beyond its biological effects and highlights its impact on child nutrition as a behaviour modulating practice (Lauzon-Guillain et al. 2013; Fonseca et al. 2019).

Passanha et al. (2019) and Fonseca et al. (2019) also found similar results with regard to breastfeeding and consumption of ultra-processed foods. According to Passanha et al. (2019), the consumption of drinks and sugary foods was lower among children who were breastfeeding. On the other hand, Fonseca et al.

(2019) highlighted the importance of exclusive breast-feeding time when they verified that the longer the time (months), the lower the consumption of foods with a high degree of processing by children at 4–7 years of age. In addition, they found that children breastfed for less time had a higher consumption of ultra-processed foods and less consumption of fruits and vegetables (Fonseca et al. 2019; Spaniol et al. 2020). These results reinforce the importance of breastfeeding for the formation of good eating habits in childhood (Lauzon-Guillain et al. 2013; Marrón-Ponce et al. 2019), which tend to perpetuate in adulthood (Soldateli et al. 2016; Jaime et al. 2017) and prevent the occurrence of comorbidities, such as overweight and obesity.

Table 4. Hierarchical multinomial logistic regression for associating the consumption of processed and ultra-processed foods by children with socioeconomic, demographic and behavioural variables ($n = 231$), Viçosa, Minas Gerais, 2016–2019.

Explanatory variable	Consumption of processed and ultra-processed foods			
	T2		T3	
	OR _{adjusted} (95% CI)	<i>p</i> Value	OR _{adjusted} (95% CI)	<i>p</i> Value
Distal block				
Child's age (months)	1.17 (1.10–1.25)	.000	1.23 (1.15–1.32)	.000
Mother's age	0.97 (0.92–1.03)	.361	1.00 (0.94–1.06)	.992
Maternal education				
Illiterate to incomplete high school	1	.262	1	.099
Complete high school to complete college	0.64 (0.29–1.40)		0.50 (0.22–1.14)	
Socioeconomic status				
A and B	1	.311	1	.785
C, D and E	1.60 (0.65–3.94)		0.88 (0.32–2.15)	
Partner's presence				
Yes	1	.436	1	.611
No	1.39 (0.61–3.15)		1.25 (0.53–2.99)	
Intermediate block ^a				
Pacifier				
Yes	1.00	.417	1.00	.321
No	0.72 (0.33–1.58)		0.66 (0.29–1.50)	
Baby bottle				
Yes	1.00	.307	1.00	.644
No	0.66 (0.30–1.47)		0.82 (0.35–1.92)	
Breastfeeding				
Yes	1.00	.205	1.00	.006
No	1.76 (0.73–4.23)		3.82 (1.46–10.00)	
Tobacco by mother				
Yes	1.00	.847	1.00	.288
No	0.87 (0.22–3.48)		0.47 (0.12–1.89)	
Alcohol by mother				
Yes	1.00	.919	1.00	.933
No	1.04 (0.48–2.28)		0.97 (0.43–2.19)	
Proximal block ^b				
Processed/ultra-processed consumption by mother				
T1	1.00		1.00	
T2	1.93 (0.77–4.82)	.159	2.92 (1.12–7.63)	.028
T3	3.15 (1.21–8.18)	.018	4.59 (1.64–12.88)	.004

T2: second tertile; T3: third tertile; OR: adjusted odds ratio; CI: confidence interval.

First tertile (T1) of the consumption of processed and ultra-processed foods was used as a reference.

^aIntermedial block – model adjusted by the variables in distal block.

^bProximal block – model adjusted by variables in distal block and intermedial block.

The bold values represents as statistically significant $p < .05$ values.

The use of pacifiers and baby bottles by children was not associated with the consumption of processed and ultra-processed foods. However, studies show that these behavioural habits influence the duration of breastfeeding, leading to early weaning (Zimmerman and Thompson 2015; Batista et al. 2018). Therefore, we believe that the use of these artefacts should be better studied as it can have an impact on the quality of infant feeding, since early weaning is related to the introduction of unhealthy foods (Lauzon-Guillain et al. 2013; Fonseca et al. 2019; Passanha et al. 2019).

The less favoured socioeconomic classes (C, D and E) were more prevalent in our study, although, there was no significant relationship between the consumption of processed and ultra-processed foods and socioeconomic status. In literature, it appears that this relationship has been controversial (Karnopp et al. 2017; Giesta et al. 2019). Karnopp et al. (2017) found

that the consumption of ultra-processed foods by children increased as income increases. Giesta et al. (2019) verified that the higher the family's income, the lower the number of ultra-processed foods presented in infant diet. Regarding education, our findings are inconclusive, whereas studies have found a relationship between the higher consumption of ultra-processed foods and the lower maternal education (Batalha et al. 2017; Mais et al. 2018; Giesta et al. 2019; Passanha et al. 2019).

A study shows that the presence of a partner contributes positively to the occurrence of breastfeeding (Teston et al. 2018). Regarding the quality of children's diet, the findings of the present study indicate that the fact that the mother has a partner did not interfere with the offer of foods with a high level of processing for the children. However, we highlight need for further studies to be conducted with this

theme to try to better understand the presence of the partner in the family environment and its influence on the introduction of complementary foods.

With regard to the parents' behavioural aspects, the knowledge they have about adequate diet, attitudes and healthy food consumption seem to favour children's healthy diet (Romanos-Nanclares et al. 2018; Bassul et al. 2020). Smoking and female alcoholism are related to the social and behavioural condition of women (Mendes et al. 2011; World Health Organization 2011). Therefore, we believe that both practices can have an impact on the quality of food offered to children. Oliveira (2020) found a relationship between smoking and diet quality. However, the present study did not find an association between the offer of processed and ultra-processed foods to children with these mothers' behavioural practices.

In addition to these factors, others such as adiposity and the level of physical activity may also influence in the consumption of processed and ultra-processed foods. Study has verified a relationship between excess weight and the consumption of these foods (Louzada et al. 2018). Costa et al. (2018) verified that the longer the time of sedentary behaviour, the greater the prevalence of consumption of ultra-processed foods. However, our study is limited to assess the relationship of these factors. Therefore, we emphasise the need for further studies to be conducted in order to verify the relationship between mothers' adiposity and level of physical activity with the offer of processed and ultra-processed foods for children.

The recommendation in the Food Guidelines for Children Under Two Years (Brasil 2019), published by the Ministry of Health in Brazil is that infant diet should not contain ultra-processed foods, and that processed foods should be avoided. Most of the assessed children consumed these foods, which represented approximately a quarter of the energy ingested. Similar results were obtained by other authors (Batalha et al. 2017; Karnopp et al. 2017; Giesta et al. 2019). Giesta et al. (2019) found that 79% of children under two years old had already consumed ultra-processed foods, 56.5% of them before six months of age. Batalha et al. (2017) found that 25.8% of the foods consumed by children aged from 13 to 35 months were relative to processed and ultra-processed foods, similar to what was found in the present study. On the other hand, Karnopp et al. (2017), found that 19.7% of the food consumption of children under two years of age came from ultra-processed foods. Such results alert to the quality of food offered to children.

The offer of processed and ultra-processed foods to children favours the high consumption of calories, carbohydrates, sodium, total, saturated and trans fats, and less proteins, fibres and micronutrients (Sparrenberger et al. 2015; Karnopp et al. 2017; Moubarac et al. 2017). In the present study, we found that the percentage of contribution of fibres, calcium, iron and vitamin A from processed and ultra-processed foods in infant feeding was less than 50%. These nutrients are essential for the proper functioning of the organism and their deficiency in childhood affects growth and development, in addition to contributing to the occurrence of iron-deficiency anaemia (Oliveira et al. 2020) and vitamin A deficiency (Lima et al. 2018), already recognised as serious public health problems in Brazil (André et al. 2018; Lima et al. 2018).

Furthermore, the high sodium consumption observed in the children of the study can culminate in changes in blood pressure levels (Brasil 2010; Vitolo et al. 2013) and the chronicity of this consumption pattern can, in the long run, result in the appearance of cardiovascular and kidney diseases (Filho et al. 2019). Considering the low offer of polyunsaturated fatty acids, special care should be given to the consumption of fats from these foods, as it is known that they do not contribute to the consumption of omega 3 and 6 fatty acids, which are essential for adequate cognitive development of the baby during the first thousand days (Pérez-Escamilla et al. 2017). In addition, processed and ultra-processed foods are rich in saturated and trans fats (Sparrenberger et al. 2015; Karnopp et al. 2017; Moubarac et al. 2017), which have been associated with chronic non-communicable diseases.

In relation to mothers, almost all reported consumption of processed and ultra-processed foods that contributed with more than a third of the energy present in the daily diet, which coincides with the evidence of increased consumption of these foods in the general population (Martins et al. 2013; Monteiro et al. 2016). However, in the case of women at child-bearing age, this condition is worrying, considering the nutritional characteristics of ready-to-eat foods, which have a high content of carbohydrates, sugars and fats (Sparrenberger et al. 2015; Monteiro et al. 2016; Karnopp et al. 2017; Moubarac et al. 2017), predisposing to overweight/obesity (Sparrenberger et al. 2015; Monteiro et al. 2018; Moreira et al. 2018), changes in the lipid profile (Rauber et al. 2015; Beserra et al. 2020), hypertension (Mendonça et al. 2017) and metabolic syndrome (Lavigne-Robichaud et al. 2018; Nasreddine et al. 2018), which can compromise their health and obstetric performance.

The present study has as a limitation the inherent memory bias of the instrument used to collect information regarding the food consumption of mothers and children. However, we highlight as a positive point some alternatives aiming to get the nutritional composition of the dyad's feeding as close as possible to the maximum, such as the application of three 24-hour recalls, on non-consecutive days, one referring to the weekend, the use of manuals of household measurements to facilitate the measurement of the quantities consumed, and the search for information on the brands and nutritional composition of industrialised foods consumed. Another limitation of the study was the analysis of the consumption of total polyunsaturated fats, which hindered a more detailed analysis of the omega-3 and -6 fatty acids.

We conclude that the food consumption of children aged from 6 to 24 months is in disagreement with the recommendations of the Ministry of Health in Brazil and the World Health Organization, since mothers offer unhealthy foods, such as processed and ultra-processed foods, compromising nutrition and the establishment of healthy eating habits. In addition, we conclude that the odds of a higher consumption of these foods increase when children are older, are not breastfed and when mothers have a high consumption of processed and ultra-processed foods.

Considering the specificities of nutritional requirements in the first two years of life, the results of the present study alert to the urgent need for investment by public health agencies in propagating information for parents about the risks of consuming foods with a high level of processing at this stage of life. Also, invest in the training and continuous updating of health professionals regarding the quality of infant feeding, so that they can adequately guide mothers and family members.


Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) [Grant Numbers 001].

ORCID

Sarah Aparecida Vieira Ribeiro  [http://orcid.org/0000-0304-2711](http://orcid.org/0000-0002-0304-2711)

Sylvia do Carmo Castro Franceschini  <http://orcid.org/0000-0001-7934-4858>

References

- Abrams KM, Evans C, Duff BRL. 2015. Ignorance is bliss. How parents of preschool children make sense of front-of-package visuals and claims on food. *Appetite*. 87: 20–29.
- Adamo KB, Brett KE. 2014. Parental perceptions and childhood dietary quality. *Matern Child Health J*. 18(4): 978–995.
- André HP, Sperandio N, Siqueira RL, Franceschini SCC, Priore SE. 2018. Food and nutrition insecurity indicators associated with iron deficiency anemia in Brazilian children: a systematic review. *Cien Saude Colet*. 23(4): 1159–1167.
- Bassul C, Corish CA, Kearney JM. 2020. Associations between the home environment, feeding practices and children's intakes of fruit, vegetables and confectionary/sugar-sweetened beverages. *Int J Environ Res Public Health*. 17(13):4837.
- Batalha MA, França AKTC, Conceição SIO, Santos AM, Silva FS, Padilha LL, Silva AAM. 2017. Processed and ultra-processed food consumption among children aged 13 to 35 months and associated factors. *Cad Saude Publica*. 33(11):e00152016.
- Batista CL, Ribeiro VS, Nascimento MD, Rodrigues VP. 2018. Association between pacifier use and bottle-feeding and unfavorable behaviors during breastfeeding. *J Pediatr*. 94(6):596–601.
- Beserra JB, Soares NIS, Marreiros CS, Carvalho CMRG, Martins MCC, Freitas BJSA, Santos MM, Frota KMG. 2020. Do children and adolescents who consume ultra-processed foods have a worse lipid profile? A systematic review. *Cien Saude Colet*. 25(12):4979–4989.
- Bortolini GA, Gubert MB, Santos LMP. 2012. Food consumption Brazilian children by 6 to 59 months of age. *Cad Saude Publica*. 28(9):1759–1771.
- Brasil. 2009. Ministério da Saúde. II Pesquisa de prevalência de aleitamento materno nas capitais brasileiras e distrito federal. Brasília: Ministério da Saúde; 1.ed. 108 p.; [accessed 2021 Jan 6]. <https://portaldeboaspraticas.iff.fiocruz.br/biblioteca/ii-pesquisa-de-prevalencia-de-aleitamento-materno-nas-capitais-brasileiras-e-distrito-federal/>
- Brasil. 2010. Ministério da Saúde. Pesquisa de Orçamentos Familiares 2008–2009. Análise do consumo alimentar pessoal no Brasil. Brasília: Ministério da Saúde. 130 p.; [accessed 2021 Jan 6]. <https://biblioteca.ibge.gov.br/visualizacao/livros/liv50063.pdf>
- Brasil. 2011. Tabela brasileira de composição de alimentos/ NEPA – UNICAMP – 4. ed. rev. e ampl. Campinas: NEPA-UNICAMP. 161 p.; [accessed 2021 Jan 6]. http://www.nepa.unicamp.br/taco/contar/taco_4_edicao_ampliada_e_revisada.pdf?arquivo=taco_4_versao_ampliada_e_revisada.pdf
- Brasil. 2016. Associação Brasileira de Empresas de Pesquisa. Critério de Classificação Econômica Brasil; [accessed 2021 Jan 6]. <http://www.abep.org/criterio-brasil>
- Brasil. 2019. Ministério da Saúde, Secretaria de Atenção Primária à Saúde, Departamento de Promoção da Saúde. Guia alimentar para crianças brasileiras menores de 2 anos. Brasília: Ministério da Saúde. 265 p.; [accessed 2021 Jan 6]. http://189.28.128.100/dab/docs/portaldab/publicacoes/guia_da_crianca_2019.pdf

- Cantalice ASC, Santos NCCB, Silva DCM, Collet N, Reichert APS, Medeiros CCM. 2015. Estado nutricional materno e o excesso de peso em crianças e adolescentes. *Rev Bras Nutr Clin*. 30(1):39–44.
- Chiara R, Mello G, Jovanovic L. 2009. Breastfeeding and the basal insulin requirement in type 1 diabetic women. *Endocr Pract*. 15(3):187–193.
- Chowdhury R, Sinha B, Sankar MJ, Taneja S, Bhandari N, Rollins N, Bahl R, Martinez J. 2015. Breastfeeding and maternal health outcomes: a systematic review and meta-analysis. *Acta Paediatr*. 104(467):96–113.
- Collins LJ, Lacy KE, Campbell KJ, McNaughton SA. 2016. The predictors of diet quality among Australian children aged 3.5 years. *J Acad Nutr Diet*. 116(7):1114–1126.
- Costa CS, Flores TR, Wendt A, Neves RG, Assunção MCF, Santos IS. 2018. Comportamento sedentário e consumo de alimentos ultraprocessados entre adolescentes brasileiros: Pesquisa Nacional de Saúde do Escolar (PeNSE), 2015. *Cad Saúde Pública*. 34(3):e00021017.
- Darling JC, Bamidis PD, Burberry J, Rudolf MCJ. 2020. The first thousand days: early, integrated and evidence-based approaches to improving child health: coming to a population near you? *Arch Dis Child*. 105(9):837–841.
- Filho AF, Rocha WA, Marques MRM, Silva ES. 2019. Riscos cardíacos, renais e preferência por dieta hipersódica, induzidos por alta ingestão de sódio em ratos machos Wistar. *Rev Espaço Transdisciplinar*. 1(1):92–99.
- Fonseca PCA, Ribeiro SAV, Andreoli CS, De Carvalho CA, Pessoa MC, De Novaes JF, Priore SE, Franceschini SCC. 2019. Association of exclusive breastfeeding duration with consumption of ultra-processed foods, fruit and vegetables in Brazilian children. *Eur J Nutr*. 58(7):2887–2894.
- Friedrich RR, Schuch I, Wagner MB. 2012. Effect of interventions on the body mass index of school-age students. *Rev Saude Publica*. 46(3):551–560.
- Giesta JM, Zoche E, Correa RS, Bosa VL. 2019. Fatores associados à introdução precoce de alimentos ultraprocessados na alimentação de crianças menores de dois anos. *Ciênc Saúde Coletiva*. 24(7):2387–2397.
- Gungor D, Nadaud P, LaPergola CC, Dreibelbis C, Wong YP, Terry N, Abrams SA, Beker L, Jacobovits T, Jarvinen KM, et al. 2019. Infant milk-feeding practices and diabetes outcomes in offspring: a systematic review. *Am J Clin Nutr*. 109(Suppl. 7):817S–837S.
- Horta BL, Loret de Mola C, Victora CG. 2015. Long-term consequences of breastfeeding on cholesterol, obesity, systolic blood pressure and type 2 diabetes: a systematic review and meta-analysis. *Acta Paediatr*. 104(467):30–37.
- Horta BL, Victora CG. 2013. Short-term effects of breastfeeding: a systematic review on the benefits of breastfeeding on diarrhoea and pneumonia mortality. Geneva: World Health Organization (WHO).
- Jäger S, Jacobs S, Kröger J, Fritsche A, Schienkiewitz A, Rubin D, Boeing H, Schulze MB. 2014. Breast-feeding and maternal risk of type 2 diabetes: a prospective study and meta-analysis. *Diabetologia*. 57(7):1355–1365.
- Jaime PC, Prado RR, Malta DC. 2017. Family influence on the consumption of sugary drinks by children under two years old. *Rev Saude Publica*. 51(Suppl. 1):13s.
- Karnopp EVN, Vaz JS, Schafer AA, Muniz LC, Souza RDLV, Santos I, Gigante DP, Assunção MCF. 2017. Food consumption of children younger than 6 years according to the degree of food processing. *J Pediatr (Rio J)*. 93(1):70–78.
- Koletzko B, Godfrey KM, Poston L, Szajewska H, Van Goudoever JB, Waard M, Brands B, Grivell RM, Deussen AR, Dodd JM, et al. 2019. Nutrition during pregnancy, lactation and early childhood and its implications for maternal and long-term child health: the early nutrition project recommendations. *Ann Nutr Metab*. 74(2):93–106.
- Lauzon-Guillain B, Jones L, Oliveira A, Moschonis G, Betoko A, Lopes C, Moreira P, Manios Y, Papadopoulos NG, Emmett P, et al. 2013. The influence of early feeding practices on fruit and vegetable intake among preschool children in 4 European birth cohorts. *Am J Clin Nutr*. 98(3):804–812.
- Lavigne-Robichaud M, Moubarac JC, Lantagne-Lopez S, Johnson-Down L, Batal M, Sidi EAL, Sidi EAL, Lucas M. 2018. Diet quality indices in relation to metabolic syndrome in an Indigenous Cree (Eeyouch) population in northern Québec, Canada. *Public Health Nutr*. 21(1):172–180.
- Lima DB, Damiani LP, Fujimori E. 2018. Deficiência de vitamina A em crianças brasileiras e variáveis associadas. *Rev Paul Pediatr*. 36(2):176–185.
- Lopes WC, Pinho L, Caldeira AP, Lessa AC. 2020. Consumption of ultra-processed foods by children under 24 months of age and associated factors. *Rev Paul Pediatr*. 38:e2018277.
- Louzada MLDC, Ricardo CZ, Steele EM, Levy RB, Cannon G, Monteiro AC. 2018. The share of ultra-processed foods determines the overall nutritional quality of diets in Brazil. *Public Health Nutr*. 21(1):94–102.
- Mais LA, Warkentin S, Vega JB, Latorre MdRDdO, Carnell S, Taddei JAdAC. 2018. Sociodemographic, anthropometric and behavioural risk factors for ultra-processed food consumption in a sample of 2–9-year-olds in Brazil. *Public Health Nutr*. 21(1):77–86.
- Mameli C, Mazzantini S, Zuccotti G. 2016. Nutrition in the first 1000 days: the origin of childhood obesity. *Int J Environ Res Public Health*. 13(9):838.
- Marrón-Ponce JA, Flores M, Cediell G, Monteiro CA, Batis C. 2019. Associations between consumption of ultra-processed foods and intake of nutrients related to chronic non-communicable diseases in Mexico. *J Acad Nutr Diet*. 119(11):1852–1865.
- Martins AP, Levy RB, Claro RM, Moubarac JC, Monteiro CA. 2013. Increased contribution of ultra-processed food products in the Brazilian diet (1987–2009). *Rev Saude Publica*. 47(4):656–665.
- Mello CS, Barros KV, Morais MB. 2016. Brazilian infant and preschool children feeding: literature review. *J Pediatr (Rio J)*. 92(5):451–463.
- Mendes MC, Cunha JRF, Nogueira AA. 2011. A mulher e o uso de álcool. *Rev Bras Ginecol Obstet*. 33(11):323–327.
- Mendonça RdD, Lopes ACS, Pimenta AM, Gea A, Martinez-Gonzalez MA, Bes-Rastrollo M. 2017. Ultra-processed food consumption and the incidence of hypertension in a Mediterranean cohort: the Seguimiento Universidad de Navarra Project. *Am J Hypertens*. 30(4):358–366.

- Mendonça RdD, Pimenta AM, Gea A, de la Fuente-Arrillaga C, Martinez-Gonzalez MA, Lopes ACS, Bes-Rastrollo M. 2016. Ultraprocessed food consumption and risk of overweight and obesity: the University of Navarra Follow-Up (SUN) cohort study. *Am J Clin Nutr.* 104(5): 1433–1440.
- Monteiro CA, Cannon G, Levy RB, Moubarac JC, Jaime P, Martins AP, Canella D, Louzada M, Parra D, Ricardo C. 2016. NOVA. A estrela brilha. Classificação dos alimentos. *Saúde Pública. World Nutr.* 7:28–40.
- Monteiro CA, Cannon G, Moubarac JC, Levy RB, Louzada ML, Jaime PC. 2018. The UN decade of nutrition, the NOVA food classification and the trouble with ultra-processing. *Public Health Nutr.* 21(1):5–17.
- Monteiro CA, Levy RB, Claro RM, de Castro IR, Cannon G. 2011. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. *Public Health Nutr.* 14(1):5–13.
- Moreira PV, Hyseni L, Moubarac J-C, Martins APB, Baraldi LG, Capewell S, O'Flaherty M, Guzman-Castillo M. 2018. Effects of reducing processed culinary ingredients and ultra-processed foods in the Brazilian diet: a cardiovascular modelling study. *Public Health Nutr.* 21(1):181–188.
- Moubarac JC, Batal M, Louzada ML, Steele EM, Monteiro CA. 2017. Consumption of ultra-processed foods predicts diet quality in Canada. *Appetite.* 108:512–520.
- Moubarac JC, Batal M, Martins APB, Claro RM, Levy RB, Cannon G, Monteiro C. 2014. Processed and ultra-processed food products: consumption trends in Canada from 1938 to 2011. *Can J Diet Pract Res.* 75(1):15–21.
- Nasreddine L, Tamim H, Itani L, Nasrallah MP, Isma'eel H, Nakhoul NF, Abou-Rizk J, Naja F. 2018. A minimally processed dietary pattern is associated with lower odds of metabolic syndrome among Lebanese adults. *Public Health Nutr.* 21(1):160–171.
- Navarro P, Mehegan J, Murrin CM, Kelleher CC, Phillips CM. 2019a. Adherence to the Healthy Eating Index-2015 across generations is associated with birth outcomes and weight status at age 5 in the Lifeways Cross-Generation Cohort Study. *Nutrients.* 11(4):928.
- Navarro P, Shivappa N, Hébert JR, Mehegan J, Murrin CM, Kelleher CC, Phillips CM. 2019b. Predictors of the dietary inflammatory index in children and associations with childhood weight status: a longitudinal analysis in the Lifeways Cross-Generation Cohort Study. *Clin Nutr.* 39(7):2169–2179.
- Oliveira TMS, Bressan J, Pimenta AM, Martínez-González MA, Shivappa N, Hébert JR, Hermsdorff HM. 2020. Dietary inflammatory index and prevalence of overweight and obesity in Brazilian graduates from the Cohort of Universities of Minas Gerais (CUME project). *Nutrition.* 71:110635.
- Ortalan N, Neri DA, Benício MHD. 2020. Práticas alimentares de lactentes brasileiros nascidos com baixo peso e fatores associados. *Rev Saúde Pública.* 54:14.
- Passanha A, Benício MHDA, Venancio SI. 2019. Determinants of fruits, vegetables, and ultra-processed foods consumption among infants. *Ciência e Saúde Coletiva.* [periódico na internet]; [accessed 2021 Jan 6]. <http://www.cienciaesaudecoletiva.com.br/artigos/determinants-of-fruits-vegetables-and-ultraprocessed-foods-consumption-among-infants/17189?id=17189>
- Pérez-Escamilla R, Segura-Perez S, Lott M. 2017. Feeding guidelines for infants and young toddlers: a responsive parenting approach. Durham (NC): Healthy Eating Research.
- Rauber F, Campagnolo PDB, Hoffman DJ, Vitolo MR. 2015. Consumption of ultra-processed food products and its effects on children's lipid profiles: a longitudinal study. *Nutr Metab Cardiovasc Dis.* 25(1):116–122.
- Romanos-Nanclares A, Zazpe I, Santiago S, Marín L, Rico-Campà A, Martín-Calvo N. 2018. Influence of parental healthy-eating attitudes and nutritional knowledge on nutritional adequacy and diet quality among pre-schoolers: the SENDO project. *Nutrients.* 10(12):1875.
- Soldateli B, Vigo A, Giugliani ERJ. 2016. Effect of pattern and duration of breastfeeding on the consumption of fruits and vegetables among preschool children. *PLoS One.* 11(2):e0148357.
- Spaniol AM, da Costa THM, Bortolini GA, Gubert MB. 2020. Breastfeeding reduces ultra-processed foods and sweetened beverages consumption among children under two years old. *BMC Public Health.* 20(1):330.
- Sparrenberger K, Friedrich RR, Schiffer MD, Schuch I, Wagner MB. 2015. Ultra-processed food consumption in children from a basic health unit. *J Pediatr.* 91(6): 535–542.
- Steele EM, Baraldi LG, Louzada MLC, Moubarac JC, Mozaffarian D, Monteiro CA. 2016. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open.* 6(3):e009892.
- Teston EF, Reis TS, Góis M, Spigolon DN, Maran E, Marcon SS. 2018. Aleitamento materno: percepção do pai sobre seu papel. *Rev Enferm Cent-Oeste Min.* 8:e2723.
- Trofholz AC, Tate AD, Draxten ML, Rowley SS, Schulte AK, Neumark-Sztainer D, MacLehose RF, Berge JM. 2017. What's being served for dinner? An exploratory investigation of the associations between the healthfulness of family meals and child dietary intake. *J Acad Nutr Diet.* 117(1):102–109.
- Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, Murch S, Sankar MJ, Walker N, Rollins NC. 2016. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet.* 387(10017): 475–490.
- Victora CG, Huttly SR, Fuchs SC, Olinto MT. 1997. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. *Int J Epidemiol.* 26(1): 224–227.
- Vitolo MR, Louzada MLC, Rauber F, Campagnolo PD. 2013. Risk factors for high blood pressure in low income children aged 3–4 years. *Eur J Pediatr.* 172(8):1097–1103.
- World Health Organization. 2003. Global strategy for infant and young child feeding. WHA55/2002/REC/1, Annex 2; [accessed 2021 Jan 6]. <https://www.who.int/nutrition/publications/infantfeeding/9241562218/en/>
- World Health Organization. 2011. Global status report on alcohol and health. Geneva: WHO.
- Zimmerman E, Thompson K. 2015. Clarifying nipple confusion. *J Perinatol.* 35(11):895–899.