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Introduction of inappropriate complementary feeding in the first year of life and associated factors in children with low socioeconomic status

Introdução de alimentos não recomendados no primeiro ano de vida e fatores associados em crianças de baixo nível socioeconômico

Introducción de alimentos no recomendados durante el primer año de vida y sus factores asociados en niños con bajo nivel socioeconómico

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Abstract

The study aimed to identify factors associated with the introduction of inappropriate complementary feeding in the first year of life in children living in municipalities (counties) with low socioeconomic statusl. This was a cross-sectional multicenter study in 1,567 children 12 to 59 months of age in 48 municipalities participating in the Brazil Without Poverty plan in the South of Brazil. A structured questionnaire was applied to the children's parents to obtain socio-demographic information and the age at which inappropriate complementary foods were introduced for the first time in complementary feeding. Prevalence of introduction of sugar before four months of age was 35.5% (n = 497; 95%CI: 33.1-38.0). The prevalence rates for the introduction of cookies/crackers, creamy yogurt, and jelly before six months of age were 20.4% (n = 287; 95%CI: 18.3-22.3), 24.8% (n = 349; 95%CI: 22.4-27.1), and 13.8% (n = 192; 95%CI: 12.0-15.7), respectively. Associations were identified between low maternal schooling (PR = 1.25; 95%CI: 1.03-1.51) and low monthly family income (PR = 1.22; CI95%: 1.01-1.48) and the introduction of inappropriate complementary feeding. The study identified the introduction of inappropriate complementary feeding in the first year of life among children in municipalities with high socioeconomic vulnerability in the South of Brazil, associated with low maternal schooling and low monthly family income.

Complementary Feeding; Infant Nutrition; Infant

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Introduction

Maternal breast milk alone is sufficient to meet the infant's nutritional needs in the first six months of life, and starting at this age the introduction of complementary feeding is necessary to supply adequate nutrients for the child's healthy growth and development [1]. However, worldwide, only 36% of children from birth to five months of age are exclusively breastfed [2], and the prevalence of early introduction of solid foods ranges from 40.4% to 83.5% in developed countries [3,4,5,6].

Complementary feeding should consist of healthy foods at affordable costs and prepared with foods and cooking ingredients consumed by the family. Highly processed industrialized foods with high salt, sugar, additives, and artificial preservatives should not be offered to children in early childhood [7]. Despite the available evidence, studies show an increase in early inappropriate introduction of complementary feeding with the supply of inappropriate complementary foods like cookies, instant noodles, soft drinks, powdered fruit drinks, and salty snacks in the first months of life [8,9,10]. The introduction of these ultra-processed, energy-dense, and hyperpalatable foods, associated with the interruption of maternal breastfeeding, jeopardizes the child's growth and development, besides favoring infections, allergies, and nutritional disorders. In addition, substances in these foods can irritate the infant's gastric mucosa, hindering digestion and the absorption of vital nutrients [7].

Cultural aspects heavily influenced by globalization and the transition away from traditional diet in recent decades have contributed to inadequate practices in the introduction of complementary feeding and are conditioned by socio-demographic characteristics [8,9,11]. Factors such as low family income and low maternal schooling have been associated with the introduction of non-nutritive foods, high in sugar, fat, and protein [8,11] in infant feeding [9].

The identification of factors associated with early and nutritionally inadequate complementary feeding, especially in contexts of low socioeconomic status, is essential for establishing public health measures for the promotion and incorporation of healthy eating practices throughout childhood. The most recent available surveys on complementary feeding in the South of Brazil are from nationwide surveys [12,13], addressing the consumption of specific foods in the first year of life by children from different socioeconomic strata. The current study analyzes these data and makes an additional contribution by examining the age at introduction of complementary foods in children living in municipalities with high social vulnerability, predominantly rural, located far from large cities in the South of Brazil. The study's aim is thus to identify factors associated with the introduction of inappropriate complementary feeding in the first year of life among children living in municipalities with low socioeconomic status in the South of Brazil.

Methods

This study consists of an analysis of data from a cross-sectional multicenter study, the main objective of which was to assess the prevalence of vitamin A deficiency and anemia in children from 12 to 59 months of age. Data were collected from January to June 2015 in a sample of 48 municipalities participating in the Brazil Without Poverty plan [14], located and distributed equally among the three states comprising the Southern Region of Brazil: Paraná, Santa Catarina, and Rio Grande do Sul. The South is the smallest of Brazil's five major geographic regions, with a population of approximately 30 million, the majority of whom are white. The region has the country's lowest infant mortality and illiteracy rates and the highest life expectancy at birth. However, in the year 2015, 9.6% of the population in the South were classified as low-income (poor or extremely poor), i.e., surviving on a per capita monthly income of one half the minimum wage (approximately USD 130 per capita per month) (Ministério do Desenvolvimento Social e Agrário. Relatório de informações sociais. O Brasil Sem Miséria no seu estado. https://aplicacoes.mds.gov.br/sagi/RIv3/geral/index.php, accessed on 29/Aug/2016). In the year 2012 (during the study's planning phase), the Brazil Without Poverty plan in the South of Brazil included 255 municipalities: 94 in Paraná State, 59 in Santa Catarina State, and 102 in Rio Grande do Sul State (Ministério do Desenvolvimento Social. O plano Brasil Sem Miséria no seu Estado. http://aplicacoes.mds.gov.br/sagirmps/ferramentas/nucleo/grupo.php?id_grupo=78, accessed on 10/Aug/2012).

Calculation of the sample size in the principal study in which the current study was nested provided for a total of 1,500 children from each primary sampling unit. In each of the three states, the primary sampling unit was defined as the set of municipalities participating in the Brazil Without Poverty plan in the year 2012 and with zero coverage in the National Program for Vitamin A Supplementation in the year 2014. Calculation of the sample size considered 21.5% prevalence of anemia in children less than five years of age in the South of Brazil [15], maximum error of 5%, 95% confidence interval (95%CI), infinite population, and sampling and design effect (*deff*) of 1.5. The design was planned to investigate the prevalence of vitamin A deficiency and anemia in this population. In this study, the sample was recalculated considering 13.3% prevalence of consumption of unhealthy foods in the South of Brazil [12], maximum error of 3%, 95%CI, infinite population, and sampling and design effect (*deff*) of 2.0. The total sample size was thus estimated at 965 children 12 to 59 months of age.

Due to issues of logistic complexity and difficulties in the prior identification of eligible children because of lack of current registries in the participating municipalities, the selection of participants for the study used convenience sampling. The identification and recruitment of children were done by the reference primary healthcare teams in each municipality, identified by the local administration. The Municipal Health Secretariats were contacted for this purpose, after their agreement to participate in the study, and they were asked to recommend one or more primary care units (PCU) that could cooperate with the study, considering the availability of healthcare professionals for identifying children in the target age bracket and an appropriate place to house the data collection. After definition of the PCU and health teams, they were contacted by telephone. During the first contact with the health team, the study's objectives were explained, and the primary care unit was asked to recommend a staff member that could be in charge of the local coordination of the strategy to publicize the study among the families with children 12 to 59 months of age and to arrange the place for the data collection. During the second telephone contact, the local health professional at each PCU received instructions for identifying eligible children for the study and the dates were scheduled for the data collection. Each local reference person also received a manual by online contact, containing instructions for the identification of eligible children. In all the PCU, the invitation to parents of children to participate in the study was done through the community health workers, when available, and through announcements in local communications media such as community radio stations, churches, posters in the waiting rooms of the PCU, and during appointments with health professionals at the PCU, thus producing a heterogeneous sample.

Exclusion criteria, based on the original study's criteria, were children with a history of blood or blood product transfusion, in immunosuppressive or corticoid therapy, with chronic diseases, HIV infection, or other serious infections, congenital malformation, and or hospitalization due to diarrhea within the previous month.

Data collection was done by two nutritionists hired for the study in each state, trained in the study protocol, on two days previously scheduled in each municipality. The data were collected in face-to-face interviews with the children's parents or legal guardians on the premises of a primary care clinic in each municipality, using a pre-coded structured questionnaire containing the following information: (1) the family's socio-demographic characteristics and information on the child; (2) age (in months) at which inappropriate complementary foods (according to the food guide for children under two years [7]) were introduced for the first time in the child's complementary feeding, based on a list containing the following: chocolate milk, sugar, candy/lollypop, cookies/crackers, cream-filled cookies, chocolate, breakfast cereal, jelly, honey, creamy yogurt, soft drinks, salty snacks, dried soup mix, ice cream, and powdered drink mix. Breakfast cereal was defined as cereal flakes, free of bran, cooked, with added malt extract, honey, syrup, salt, and other edible substances.

Dependent variable was defined as the age (in months) at which inappropriate complementary foods were introduced for the first time in the child's complementary feeding, treated in three distinct ways: continuous, for the survival analysis; categorized as < 4 months, 4 to < 6 months, 6 to < 8 months, and 8 to < 12 months for the descriptive analysis; and < 4 months and ≥ 4 months for the multiple regression analysis. Although the World Health Organization (WHO) [1] does not recommend the introduction of any solid or liquid food before six months of age, other than breast milk, the introduction of complementary feeding occurs before six months of age (Ministério do Desenvolvimento Social e Agrário. Relatório de informações sociais. O Brasil Sem Miséria no seu estado.

https://aplicacoes.mds.gov.br/sagi/RIv3/geral/index.php, accessed on 29/Aug/2016). Thus, the current study set the cutoff point for categorization at four months of age.

The following independent variables were selected on the basis of previous studies on this theme [16,17,18,19]: follow-up of the child at the PCU since birth (yes; no); maternal age (< 20 years; ≥ 20 years); maternal marital status (married or with partner; single or without partner); maternal skin color (white; non-white); maternal parity (primiparous; multiparous); maternal schooling (≤ 8 years; > 8 years); maternal occupation (unpaid; paid); household crowding (≤ 5 persons; > 5 persons); monthly family income (≤ 1 minimum wage; > 1 minimum wage, considering the prevailing amount of BRL 788.00 or about USD 260 in 2015).

All the data were duplicate-keyed in with Epidata 3.2 (Epidata Assoc., Odense, Denmark). Data analysis used the IBM SPSS software 21.0 (IBM Corp., Armonk, USA). The sample's characteristics were described by means of absolute (n) and relative frequencies (%). The multicollinearity test was performed with variance inflation factor (VIF), with cutoff set at > 10. The test showed absence of multicollinearity between the selected independent variables. Survival analysis used the Kaplan-Meier non-parametric method. Analysis of factors associated with the outcome used Poisson regression with robust variance, estimating the crude and adjusted prevalence ratios (PR) and respective 95%CI. Variables with p < 20% in the univariate analysis were included in the multivariate analysis. The definition of the final model set significance at 5%. All the analyses considered the sampling and design effect for complex samples, using sampling weights calculated in the *complex samples* module of the IBM SPSS software, 21.0.

The current study was approved by the Institutional Review Board of the Federal University of Health Sciences of Porto Alegre (case review 722.702/2014), and all the parents or legal guardians of the children signed the free and informed consent form.

Results

A total of 1,567 children were evaluated, and their characteristics are shown in Table 1. Of all the interviewees, 87.1% (n = 1,326; 95%CI: 85.5-88.8) were the biological mothers. One-third of the families had a monthly income less than or equal to the minimum wage. Mean maternal age (± SD) was 28.9 (± 7.18) years, 50.9% (n = 770; 95%CI: 48.3-53.4) of the mothers had eight years of schooling or less, and 41.2% (n = 631; 95%CI: 38.7-43.8) did unpaid work. The majority of the sample of children were males (n = 811, 51.8%; 95%CI: 49.4-54.2), and 92.2% (n = 1,372; 95%CI: 90.8-93.6) of the children had been followed at the PCU since birth.

Prevalence of introduction of inappropriate complementary feeding before four months of age was 47.8% (n = 616; 95%CI: 45.0-50.6). Prevalence of introduction of sugar before four months of age was 35.5% (n = 497; 95%CI: 33.0-38.1) (Table 2 and Figure 1). The prevalence rates for introduction of cookies/crackers, creamy yogurt, and jelly before six months of age were 20.4% (n = 287; 95%CI: 18.3-22.3), 24.8% (n = 349; 95%CI: 22.4-27.1), and 13.8% (n = 192; 95%CI: 12.0-15.7), respectively. The outcome was compared to the children's age brackets, and no significant difference was observed between the age groups (p = 0.145).

Table 3 shows the analysis of the possible factors associated with the introduction of inappropriate complementary feeding, based on the univariate and multiple regression analyses. In the univariate analysis, the child's follow-up at the PCU since birth, single maternal marital status, non-white maternal skin color, maternal schooling less than or equal to eight years, unpaid maternal occupation, and monthly family income less than or equal to one minimum wage were associated with the introduction of inappropriate complementary feeding. The adjusted analysis confirmed the association with low maternal schooling (PR = 1.25; 95%CI: 1.03-1.51) and low monthly family income (PR = 1.22; 95%CI: 1.01-1.48).

Table 1

Characteristics of the household, mother, and child in municipalities in the Brazil Without Poverty plan. South of Brazil, 2015 (N = 1,567).

Characteristics	n	%	95%CI
Household			
Crowding (persons) [n = 1,499] *			
> 5	196	13.1	11.5-14.7
≤ 5	1,303	86.9	85.3-88.5
Monthly family income (MW) [n = 1,473] *			
≤ 1	490	33.3	31.0-35.7
> 1	983	66.7	64.3-69.0
Conditional cash trasnfer program [n = 1,524] *			
Yes	703	46.1	43.7-48.5
No	821	53.9	51.5-56.3
Mother			
Age (years) [n = 1,513] *			
< 20	114	7.5	6.3-9.0
≥ 20	1,399	92.5	91.0-93.7
Marital status [n = 1,536] *			
Single	228	14.8	13.1-16.7
Married	1,308	85.2	83.3-86.9
Skin color [n = 1,496] *			
White	920	61.5	59.1-63.8
Non-white	576	38.5	36.2-40.9
Parity [n = 1,519] *			
Primiparous	608	40.0	37.6-42.6
Multiparous	911	60.0	57.4-62.4
Schooling (years) [n = 1,514] *			
≤ 8	770	50.9	48.3-53.4
> 8	744	49.1	46.6-51.7
Occupation [n = 1,533] *			
Paid	902	58.8	56.2-61.3
Unpaid	631	41.2	38.7-43.8
Child			
Sex			
Male	811	51.8	49.4-54.2
Female	756	48.2	45.8-50.6
Skin color [n = 1,523] *			
White	1,109	72.8	70.7-75.1
Non-white	414	27.2	24.9-29.3
Age (months)			
12-23	409	26.1	24.1-28.3
24-35	426	27.2	25.0-29.4
36-47	392	25.0	22.8-27.2
48-59	340	21.7	19.8-23.7
Birth weight (g) [n = 1,411] *			
≥ 2,500	1,287	91.2	89.7-92.7
< 2,500	124	8.8	7.3-10.3
Follow-up in PCU since birth [n = 1,488]			
Yes	1,372	92.2	90.8-93.6
No	116	7.8	6.4-9.2

95%CI: 95% confidence interval; MW: minimum wage; PCU: primary care unit.

Note: monthly MW prevailing in 2015, equivalent of BRL 788.00 (USD 260.00).

* Variables with missing data (lost or not recorded).

Table 2

Prevalence of inappropriate complementary feeding in the first year of life according to age bracket among children 12-59 months of age in municipalities in the Brazil Without Poverty plan. South of Brazil, 2015.

Foods	Age (months)							
	< 4		4 to < 6		6 to < 8		8 to < 12	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI
Chocolate milk [n = 1,404]	1.4	0.8-2.1	1.8	1.1-2.5	6.6	5.3-7.8	5.5	4.2-6.5
Sugar [n = 1,400]	35.5	33.0-38.1	12.7	11.0-14.5	16.7	14.7-18.7	2.9	2.1-3.7
Candy/Lollipops [n = 1,378]	1.5	0.9-2.1	3.0	2.1-3.9	15.5	13.5-17.4	21.9	19.7-24.2
Cookies/Crackers [n = 1,410]	5.5	4.3-6.6	14.9	13.2-16.7	43.3	40.8-46.1	15.2	13.4-17.2
Cream-filled cookies [n = 1,394]	1.0	0.5-1.6	2.9	2.0-3.8	13.1	11.3-14.9	17.0	14.8-19.0
Chocolate [n = 1,390]	0.6	0.2-1.0	2.8	1.9-3.7	8.7	8.2-11.2	17.3	15.3-19.3
Breakfast cereal [n = 1,399]	2.6	1.9-3.5	4.6	3.5-6.0	14.2	12.5-15.9	4.9	3.8-6.0
Jelly [n = 1,396]	3.1	2.2-4.0	10.7	9.1-12.4	33.8	31.4-36.3	16.6	14.5-18.6
Honey [n = 1,388]	7.8	6.3-9.3	3.4	2.4-4.4	5.8	4.6-7.2	5.3	4.2-6.9
Creamy yogurt [n = 1,410]	7.1	5.8-8.5	17.7	15.5-19.7	36.7	34.5-39.2	12.3	10.6-14.0
Soft drinks [n = 1,394]	0.1	0.0-0.4	1.8	1.1-2.5	6.5	5.4-8.0	9.3	7.6-10.9
Packaged salty snacks [n = 1,377]	0.6	0.2-1.0	1.2	0.7-1.8	9.9	8.3-12.0	13.3	11.4-14.9
Dried soup mix [n = 1,366]	1.4	0.8-2.0	4.4	3.2-5.4	8.6	7.2-10.2	4.0	2.9-5.1
Ice cream [n = 1,384]	0.1	0.0-0.4	1.3	0.7-2.0	6.8	5.8-8.0	10.9	9.3-12.7
Powdered drink mix [n = 1,375]	3.9	2.9-4.9	5.1	3.8-6.3	17.2	15.1-19.1	8.0	6.5-9.5

95%CI: 95% confidence interval.

Discussion

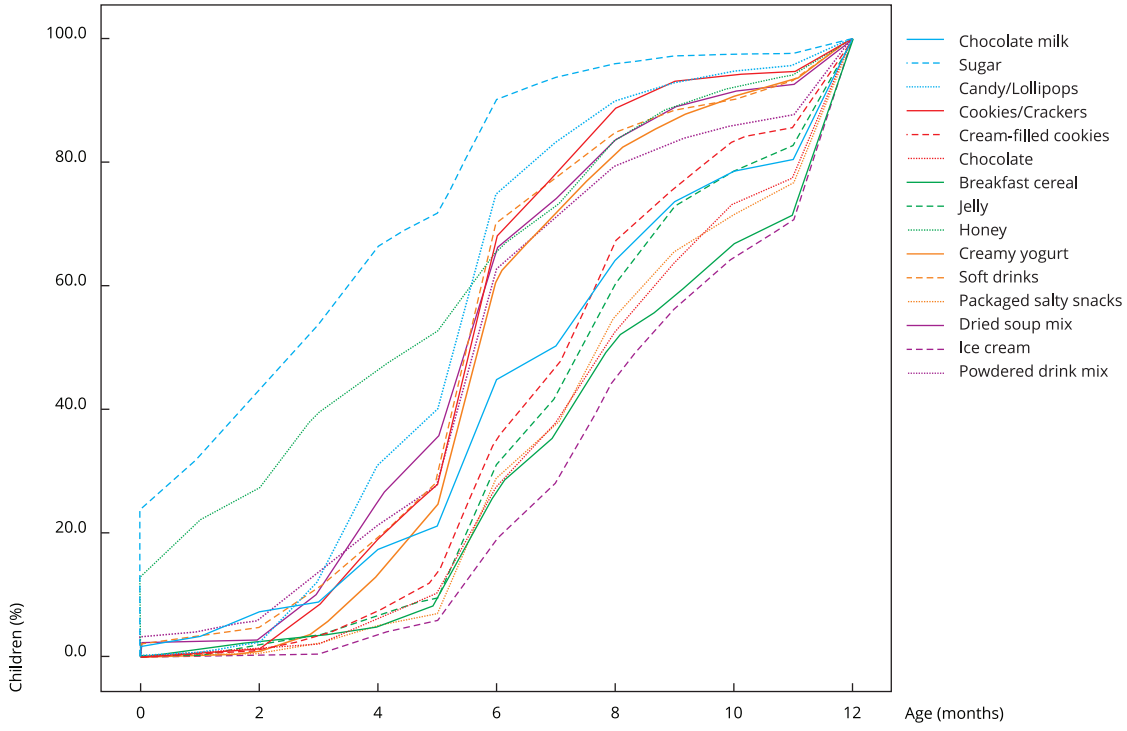
The study's results showed high prevalence of inappropriate complementary feeding in the first year of life in children 12 to 59 months of age, and this practice was associated statistically with low maternal schooling and low monthly family income. The introduction of inappropriate complementary feeding corroborates findings from other studies on infant nutrition, which identified the alarming prevalence of sweet and salty snacks and sugar-laden drinks in children under one year of age [20,21]. Children are known to have an inborn preference for salty and sweet foods, and early exposure to these foods can further increase their preference for these products, due mainly to the positive physiological consequences they provide, like satiety and guaranteed energy supply [22]. Not only are these products nutritionally unnecessary and harmful to digestion and the absorption of micronutrients, but they can also jeopardize the consumption of staple foods in a healthy and balanced diet, like vegetables, meat, and fruits, essential for the child's adequate growth and development [23]. At the public health level, frequent consumption of inappropriate complementary foods can determine the child's eating preferences for such products, which can be prolonged into adulthood [24]. Inappropriate complementary feeding is also related to harmful health effects, like the increase in concentrations of low-density lipoprotein (LDL) cholesterol and total cholesterol [25] and increase in body mass index (BMI) [26] in early childhood.

The sample's homogeneity in terms of inappropriate complementary feeding in the first year of life may be due to lack of nutritional orientation by health professionals for the children's parents [27]. When such orientation exists, it is often erroneous [4,10], based only on practical and personal experiences while ignoring evidence-based guidelines [28]. Despite government efforts and investment in public policies for prevention and nutritional education, especially in primary care [7,29], the implementation of such policies as part of routine activities in health services is still sporadic and insufficient to intervene and produce an impact on this reality.

Another factor that may relate to the study's findings is the advertising for these food products, broadcast mainly on television, the principal source of information and entertainment in Brazil [30].

Figure 1

Survival curve for age (in months) at introduction of inappropriate complementary foods in the first year of life in 12 to 59 months of age in municipalities in the Brazil Without Poverty plan. South of Brazil, 2015 (N = 1,567).



Persuasive strategies used by the food industry have a particularly strong impact, such as advertising that associates non-nutritive products with the child's well-being, happiness, and health [31,32]. This same logic includes the labeling used on a wide variety of food products targeted to children, calling their attention with bright splashy colors and inducing parents to believe that the products are nutritionally appropriate for their children. In addition, barriers such as complex wording, fine print, and opaque concepts induce consumers not to grasp the nutritional information available on the labeling and not to use it as a criterion for choosing foods for the child [33]. In Brazil, the technical regulations setting minimum requirements for advertising and commercial promotion of non-nutritive foods [34] do not apply to the labeling, which is still an important medium for the promotion of these products by the food industry.

After adjustment, the variables that remained associated with the introduction of inappropriate complementary feeding in the first year of life in this sample of children were low maternal schooling and low monthly family income. In relation to maternal schooling, this result reflects the limited access by illiterate mothers or those with low schooling to information on healthy feeding practices, when compared to mothers with more schooling [35], and the possible difficulties in reading and understanding the educational materials provided by health services. According to the *Infant Feeding Practices Study II*, mothers with less schooling showed higher odds of adopting eight of the 14 unhealthy practices in the introduction of complementary feeding, including giving their children foods with low nutritional value [36]. Brazilian studies show that children of mothers with less schooling are more prone to consuming foods like cookies, packaged salty snacks, and soft drinks [9,37]. Given this adverse context, nutritional counseling for mothers, especially in low-income populations like the one in this

Table 3

Factors associated with the introduction of inappropriate complementary foods before four months of age in children 12-59 months of age in municipalities in the Brazil Without Poverty plan. South of Brazil, 2015 (N = 1,567).

Variables	Introduction of inappropriate foods * (< 4 months of age)		
	% (95%CI)	PR_{crude} (95%CI)	$PR_{adjusted}$ (95%CI)
Follow-up in PCU since birth			
Yes	48.2 (45.3-51.0)	1.00	1.00
No	37.5 (27.8-47.4)	0.78(0.60;1.02)	0.90 (0.63-1.27)
Maternal age			
≥ 20 years	47.3 (44.4-50.0)	1.00	-
< 20 years	52.9 (43.6-62.6)	1.11 (0.91-1.35)	-
Maternal marital status			
Married	46.3 (43.4-49.5)	1.00	1.00
Single	57.0 (49.7-64.4)	1.22 (1.07-1.41)	1.12 (0.88-1.43)
Maternal skin color			
White	43.9 (40.0-47.3)	1.00	1.00
Non-white	53.2 (52.7-60.0)	1.21 (1.08-1.36)	1.12 (0.94-1.34)
Maternal parity			
Multiparous	45.9 (41.4-50.6)	1.00	-
Primiparous	49.0 (45.7-52.5)	1.07 (0.95-1.21)	-
Maternal schooling			
> 8 years	39.6 (35.8-43.8)	1.00	1.00
≤ 8 years	55.9 (51.9-59.9)	1.41 (1.25-1.59)	1.25 (1.03-1.51)
Maternal occupation			
Paid	52.8 (48.8-57.1)	1.00	1.00
Unpaid	44.3 (40.6-47.9)	1.17 (1.04-1.31)	1.07 (0.90-1.29)
Household crowding			
> 5 persons	48.5 (40.9-55.7)	1.00	-
≤ 5 persons	46.9 (44.0-49.9)	1.02 (0.86-1.21)	-
Monthly family income (MW)			
> 1	41.3 (38.2-44.8)	1.00	1.00
≤ 1	59.7 (54.7-64.5)	1.43 (1.27-1.60)	1.22 (1.01-1.48)

95%CI: 95% confidence interval; MW: minumum wage; PCU: primary care unit; PR_{crude}: crude prevalence ratio; $PR_{adjusted}$: adjusted prevalence ratio.

Note: monthly MW, equivalent of BRL 788.00 (USD 260) in 2015.

* Chocolate milk, sugar, candy/lollipops, cookies/crackers, cream-filled cookies, chocolate, breakfast cereal, jelly, honey, creamy yogurt, soft drinks, packaged salty snacks, dried soup mix, ice cream, and powdered drink mix.

study, appears to be an effective option for reducing inappropriate complementary feeding in children in early childhood [38]. Training health professionals in primary care appears to improve the quality of nutritional orientation for the children's mothers [39] and thus has positive effects on maternal practices related to breastfeeding and the introduction of complementary feeding [40,41,42]. Still, despite public policies to encourage healthy feeding practices in early childhood, such initiatives still appear to be undervalued by health professionals in Brazil's public healthcare services.

The outcome's association with low monthly family income corroborates other studies that have identified inadequate complementary feeding practices in children from low-income families [19,43,44]. This result can be attributed to the greater availability and affordability of such foods for families with lower purchasing power [45]. In general, ultra-processed foods are readily available in small local markets far removed from large cities [46,47] and at relatively low prices per calorie when compared to more nutritive and perishable foods like fruit, vegetables, and fresh meat, thus making ultra-processed

foods more accessible to economically underprivileged populations [45,48] and advantageous in terms of energy supply.

Some limitations need to be addressed when interpreting the study's findings. The cross-sectional design prevents any causal inference, but it may suggest associations. The findings should be interpreted with caution, since information on inappropriate complementary feeding was collected retrospectively *vis-à-vis* the child's first year of life, which may create imprecisions as to the time when they foods were first introduced. Still, the outcome was compared according to the children's age brackets, and no significant difference was seen between the groups. The results may also have been influenced by the parents' awareness of socially accepted infant feeding behaviors, possibly having been interviewed previously by nutritionists. The study included a sample of children with low socioeconomic status living in municipalities with high social vulnerability, thus limiting generalization of the results to other socioeconomic strata, even within the South of Brazil. The sample was selected by health teams working in primary care, which favors the selection of users of these services as opposed to non-users. Still, primary care is the principal form of healthcare and follow-up of children in these communities, and the strategies of publicizing the study were not limited to users of these health services, which increases the likelihood of having selected a representative pediatric population in these municipalities. Another limitation is that age at introduction of foods was measured in months, with no information on the amounts or frequency of foods given to the children. The retrospective data collection method could have decreased the trustworthiness of the answers. Therefore, we chose to measure that age in months at introduction of complementary foods (or lack thereof). The previously defined list of foods may not have covered all the foods offered before four months of age, which further reinforces the study's conclusions.

The current study identified the prevalence of inappropriate complementary feeding in the first year of life in children living in municipalities with high socioeconomic vulnerability in the South of Brazil. This practice was associated with low maternal schooling and low monthly family income, suggesting these as risk factors for the families' introduction of unhealthy foods in the child's diet. Frequent health follow-up in the first year of life by trained health professionals is essential for effectively intervening in this situation, in order to better orient mothers and caregivers concerning the appropriate introduction of complementary foods. Additionally, government measures that limit advertising and regulate labeling on these food products are also important tools for guaranteeing timely and healthy complementary feeding practices.

Contributors

C. Dallazen contributed to the study conception and design, data collection, analysis, and interpretation, and writing of the article. S. A. Silva, V. S. S. Gonçalves, E. A. F. Nilson, S. P. Crispim, R. M. F. Lang, J. D. Moreira e D. C. Tietzmann contributed to the study conception and design, critical revision of the intellectual content, and approval of the final version for publication. M. R Vítolo contributed to the study conception and design, data interpretation, critical revision of the intellectual content, and approval of the final version for publication.

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Resumo

Identificar os fatores associados à introdução de alimentos não recomendados no primeiro ano de vida, entre crianças residentes em municípios de baixo nível socioeconômico. Estudo multicêntrico transversal com 1.567 crianças de 12 a 59 meses de idade residentes em 48 municípios participantes do plano Brasil Sem Miséria da Região Sul do Brasil. Aplicou-se questionário estruturado aos responsáveis pelas crianças para a obtenção das informações sociodemográficas e idade na qual alimentos não recomendados foram introduzidos pela primeira vez na alimentação complementar. A prevalência de introdução de açúcar antes dos quatro meses de idade da criança foi de 35,5% (n = 497; IC95%: 33,1-38,0). As prevalências de introdução de biscoito doce/salgado, queijo petit suisse e gelatina antes do sexto mês de vida da criança foram de 20,4% (n = 287; IC95%: 18,3-22,3), 24,8% (n = 349; IC95%: 22,4-27,1) e 13,8% (n = 192; IC95%: 12,0-15,7), respectivamente. Identificou-se associação entre a menor escolaridade materna (RP = 1,25; IC95%: 1,03-1,51) e a menor renda mensal familiar (RP = 1,22; IC95%: 1,01-1,48) com a introdução de alimentos não recomendados. Verificou-se a introdução de alimentos não recomendados no primeiro ano de vida entre crianças residentes em municípios de alta vulnerabilidade socioeconômica da Região Sul do Brasil, e esta prática associou-se à menor escolaridade materna e menor renda familiar mensal.

Alimentação Complementar; Nutrição do Lactente; Lactente

Resumen

El estudio tuvo como fin identificar los factores asociados a la introducción de alimentos no recomendados durante el primer año de vida, entre niños residentes en municipios con un bajo nivel socioeconómico. Se trata de un estudio multicéntrico transversal con 1.567 niños de 12 a 59 meses de edad, residentes en 48 municipios participantes en el plan Brasil Sin Miseria de la región Sur de Brasil. Se aplicó un cuestionario estructurado a los responsables de los niños para la obtención de la información sociodemográfica y la edad en la que los alimentos no recomendados se introdujeron por primera vez en la alimentación complementaria. La prevalencia de introducción del aúcar, antes de los cuatro meses de edad del niño, fue de un 35,5% (n = 497; IC95%: 33,1-38,0). Las prevalencias de la introducción de galletas dulce/saladas, queso petit suisse y gelatina antes del sexto mes de vida del niño fueron de un 20,4% (n = 287; IC95%: 18,3-22,3), un 24,8% (n = 349; IC95%: 22,4-27,1) y un 13,8% (n = 192; IC95%: 12,0-15,7), respectivamente. Se identificó una asociación entre la menor escolaridad materna (RP = 1,25; IC95%: 1,03-1,51) y la menor renta mensual familiar (RP = 1,22; IC95%: 1,01-1,48), con la introducción de alimentos no recomendados. Se verificó la introducción de alimentos no recomendados durante el primer año de vida entre niños residentes en municipios de alta vulnerabilidad socioeconómica de la región Sur de Brasil, y esta práctica se asoció a una menor escolaridad materna y una menor renta familiar mensual.

Alimentación Complementaria; Nutrición del Lactante; Lactante

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