BREASTFEEDING, COMPLEMENTARY FEEDING AND HEALTH

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Sociodemographic inequalities in the age of introduction of ultra-processed food in the first year of life. The CLaB-Brazil study

Desigualdades sociodemográficas na idade de introdução de alimentos ultraprocessados no primeiro ano de vida. Estudo CLaB-Brasil

Abstract

Introduction: Food inadequacies in the first year of life are considered a global problem, especially the introduction of extremely palatable ultra-processed foods (UPFs) with low nutritional value to infant diets. *Objective:* To identify sociodemographic differences related to the median age of introduction of UPFs in the first year of life in a cohort of infants. *Methods:* Prospective cohort study collecting data on the diet of 641 babies during their first year of life through face-to-face and telephone interviews. Socioeconomic and demographic data were obtained at the baseline. The UPFs were grouped according to their nature, composition and purpose of consumption. The median ages at onset of the UPF groups were estimated by Kaplan-Meier survival curves using the Log Rank test (Mantel-Cox) with $p < 0.05$ as the critical value to determine significant differences in median ages according to sociodemographic variables. *Results:* Nonwhite mothers introduced sandwich cookies, snacks, and ultra-processed sweetened drinks 25 days earlier than white mothers; adolescents offered ultra-processed sweetened and ultra-processed dairy drinks 120 days earlier than adults. Absence of a partner led to the lowest median age of introduction of the "margarine and spreads" group. Primiparas introduced ultra-processed sweetened drinks, milk flours, children's

cereals and powdered chocolate earlier, with a median age of 190 and 290 days, respectively. *Conclusions:* There were sociodemographic differences in the age of introduction of UPFs, with unfavorable results for infants whose mothers were non-white, adolescents, primiparous and did not live with a partner.

Keywords: Complementary Feeding; Socioeconomic Factors; Infant Food.

Resumo

Introdução: Inadequações alimentares no primeiro ano de vida são consideradas como problema global, destacando-se a introdução, na alimentação infantil, de alimentos ultraprocessados (AUP), extremamente palatáveis e de baixo valor nutricional. *Objetivo:* Identificar diferenças sociodemográficas relacionadas à idade mediana de introdução de AUP no primeiro ano de vida em coorte de lactentes. *Métodos:* Estudo de coorte prospectiva que coletou dados sobre alimentação de 641 bebês mediante entrevistas presenciais e telefônicas ao longo do primeiro ano de vida. Na linha de base, foram obtidos dados socioeconômicos e demográficos. Os AUP foram agrupados segundo sua natureza, composição e finalidade de consumo. As idades medianas de início dos grupos de AUP foram estimadas por curvas de sobrevida de Kaplan-Meier, utilizando o teste de Log Rank (Mantel-Cox) e $p<0,05$ como valor crítico para determinar diferenças significativas nas idades medianas segundo variáveis sociodemográficas. *Resultados:* Mães não brancas introduziram biscoitos recheados, guloseimas e bebidas adoçadas ultraprocessadas 25 dias mais cedo do que as brancas; adolescentes ofereceram bebidas adoçadas ultraprocessadas e lácteos ultraprocessados 120 dias mais cedo do que adultas. Ausência de companheiro levou a menor idade mediana de introdução do grupo "margarina e requeijão". Primíparas introduziram mais cedo bebidas adoçadas ultraprocessadas e produtos adoçados para adição ao leite (farinhas lácteas e achocolatados), com idades medianas de 190 e 290 dias, respectivamente. *Conclusões:* Houve diferenças sociodemográficas na idade de introdução de AUP, com resultados desfavoráveis aos lactentes cujas mães eram não brancas, adolescentes, primíparas e não viviam com companheiro.

Palavras-chave: Alimentação complementar. Nutrição da Criança. Comportamento alimentar

INTRODUCTION

Inadequate eating practices in the first year of life are very common in many countries around the world, both in the West and East and in developed and low- or middle-income countries. It is, therefore, a global problem challenging health authorities and researchers.[1-4] Inadequate practices include feeding infants with ultra-processed foods (UPFs).

UPFs are defined through the NOVA classification system, which groups foods according to the extent and purpose of industrial processing.[5] In the manufacture of UPFs, ingredients and processes are used for the purpose of creating highly profitable products with low costs, long durability and low nutritional value, and which are hyperpalatable, usually rich in sodium, sugars and fats, and are either ready for consumption or require minimal preparation.[6] In recent years, the availability and consumption of these foods has increased considerably worldwide, both among adults and children.[7] More recently, data has shown that infants are also consuming UPFs,[8] including chocolate milk, dairy flours, dairy products, sweetened yoghurt and petit suisse cheese, crackers, sweetened drinks, soda and instant noodles.[8]

An American study found that 6.6% of children under two years old already consumed sugary drinks and 13.6% consumed sweets and snacks even before finishing their first year of life. The same study also showed that there was social inequality in UPF consumption, and infants born to non-white mothers (Hispanic or black) consumed fewer vegetables and, in contrast, had higher consumption of sugary drinks, sweet and salty snacks.[9]

Another study, conducted in four African and Asian cities with infants under two years of age, found high consumption of fast food and industrialized sugary drinks. It also identified an association between maternal education level and packaged snack consumption: lower-income mothers were five times more likely to offer packaged snacks, commercial snacks, and sugary drinks with low nutritional value to infants compared with those with better socioeconomic status.[10]

Socioeconomic status and demographic variables influence individual food choices,[11] but it is the eating environment that allows and favors the consumption of these foods. In recent years, there has been a significant change in the global food system due to advances in food processing technology, which in turn has resulted in greater availability, accessibility and commercialization of highly processed foods. The use of increasingly sophisticated processing methods in food production alters the structure, nutritional content and taste of foods,[12] making them highly palatable, low in nutritional value and rich in fats, sodium, sugars and chemicals such as stabilizers, thickeners, food coloring, preservatives and flavorings.[6]

In Brazil, studies have also shown a high prevalence of UPF consumption during the first year of infants' lives. An evaluation of markers associated to an unhealthy complementary diet in nationally representative research data shows a high share of infants between nine and 12 months old who consumed coffee (8.7%), soda (11.6%) and, mainly, biscuits and packaged snacks (71.8%).[1] This situation has been repeated in specific populations, as shown in a study conducted in the metropolitan region of São Paulo, where the prevalence of UPF intake during the first year of life was 43.1%. Inequality was also identified in the consumption pattern, since infants who were not breastfed and children of mothers with less years of schooling consumed more UPFs than those who breastfed and whose mothers had higher education.[13]

The studies quoted above reported on UPF consumption in children under two years of age. However, due to most of these studies' cross-sectional design, it is not possible to know at what age such foods are being introduced into each infant's diet and how this event (age of introduction of each type of UPF) is distributed according to the socioeconomic and demographic strata of the population. This is precisely the gap that this study aims to fill.

Thus, the aim of this study was to identify sociodemographic differences in the age of introduction of UPFs in a cohort of infants during their first year of life.

METHODS

Design and location of the study

This is a prospective study with data from the CLaB - "Infant Cohort" study, conducted in a city with 139,480 inhabitants, located in the south-central region of the state of São Paulo, Brazil. The city has a human development index (HDI) of 0.800, higher than the country's index (HDI = 0.754).

According to data from the SEADE Foundation (State Data Analysis System), in 2015 the infant mortality rate was 12.6 per 1,000 live births, lower than in Brazil in the same year (15.3 per 1,000 live births).[14] The overall objective of the CLaB study was to describe events and health-related situations of mothers and infants during the first year of life.

Study participants

The CLaB study is population-based, with the target population being all mothers and their live births in the municipality from June 29, 2015 to January 11, 2016. Participants were approached and invited to enter the study when attending a municipal government-provided

neonatal screening service which offered on-demand centralized care to all newborns in the municipality's two maternity wards, one public and the other private. This service achieved a high population coverage: 80% in 2014, according to municipal health authorities.

After informing the mothers about the study's objectives and procedures, they were invited to join the cohort. Inclusion criteria were: newborns of any gestational age and birth weight, whose mothers had cognitive and hearing conditions to understand and respond to face-to-face and telephone interviews, and who were residents in the municipality's urban area. The following categories were excluded from the present study: twins and their mothers, infants who presented conditions that contraindicate or hinder breastfeeding, such as a cleft lip and palate, mothers who tested positive for HIV or who had any other condition that made it impossible to breastfeed.

Data collection

Data collection was carried out with tested and standardized questionnaires applied in person and by telephone. The first questionnaire was conducted at the neonatal screening service, after the mother accepted the invitation to participate and signed the Informed Consent Form.

In the interview, socioeconomic, demographic and health data regarding the mother and infant were collected, as well as data about care and feeding practices from birth to the day of the interview. All infants were inserted into the cohort before their 30th day of life. At two and four months of age, the mothers, reached by telephone, answered questionnaires about their own and their infant's health, about their maternal work situation and about care and feeding practices. The same questionnaires were administered at three, six, nine and 12 months at home. On these occasions, mothers and babies were also weighed, and their length was measured.

Questionnaires included questions about breastfeeding status (yes or no) and the introduction into the infant's diet (yes, no) of 48 food items, including various types of non-breast milk (formulas, fluid or powdered cow's milk, yoghurts, cheese or other dairy products), water and other liquids (teas, juices, sodas) and solid foods (fruits, vegetables, cereals, pasta, soups, legumes, meats, sausages, sweets and various ultra-processed foods).

Following the recommendations of the NOVA classification system,[5,6] the foods considered as UPFs were selected and then grouped by their nature, composition and purpose of consumption, as follows: *1* - ultra-processed dairy products (cheese, sweetened processed

yoghurt, dairy drinks and petit suisse-type cheese); *2* – Sandwich cookies and snacks (sweet or savory sandwich cookies, packet snacks, candies such as ice cream, chocolates and other snacks); *3* - Milk flours, children's cereals and powdered chocolate (which are all sweetened products that are added to milk); *4* - ultra-processed breads and biscuits (plain biscuits and processed breads); 5 - instant noodles and seasonings (seasonings, instant noodles and soups); *6* - sausages (ham, turkey breast, sausage, salami, bologna, hamburger and *nuggets); 7* - margarine and spreads (margarines, cream cheese, mayonnaise); *8* - Ultra-processed sweetened non-dairy drinks (ready-to-drink processed juices such as fruit nectar, soft drink powder, ready-to-eat soy drinks and soft drinks).

It was considered that a food had been introduced into the infant's diet when the mother reported having already offered it and/or it was consumed in the week prior to the questionnaire. For each food item already introduced, the infant's age was recorded in days according to the date when the food was first consumed. In all interviews, researchers asked again about the insertion of foods that had not yet been introduced in previous interviews.

Statistical analysis

Data coding was performed simultaneously to data collection. Data entry was performed in Excel®, after thorough review of the questionnaires by supervisors for information consistency checking. The analyzes were performed using the *Statistical Package for the Social Sciences*- SPSS® v.20 for Windows®.

The number and percentage of infants who consumed each of the eight UPF groups in their first year of life were calculated, as well as the median ages (and the 25th and 75th percentiles) at the time of introduction. The median introduction ages of each UPF group were estimated using Kaplan-Meier survival curves.[15,16] These curves were constructed separately according to the following variables: skin color (self-reported and later sorted into white / non-white), *per capita* family income (categorized in quartiles), maternal education (complete years of study, categorized as ≥ 12 / 9-11 / ≤ 8 years), maternal work status (working and on maternity leave, working and not on maternity leave or not working), mother's age at birth (categorized as ≤ 19, 20-34 and ≥35 years old), mother lives with partner (yes/no) and parity (multiparous/primiparous). These variables were selected because of their potential association with the age of introduction of UPFs.

A Log Rank test (Mantel-Cox) was used to test the association between the age of introduction of each UPF group and the variables described, considering statistically significant values of $p \leq 0.05$.[17]

Ethical aspects

This project was approved by the Local Research Ethics Committee, under the number 893508/2014 and respected the ethical procedures required under the legal terms

RESULTS

The CLaB study cohort consisted of 656 infants and 650 mothers. For the present study, 15 infants were excluded: 12 because they were twins, one because her mother had undergone a mastectomy, one because his mother tested positive for HIV and one because she had a cleft lip and palate. The present study began with 641 infants and their mothers. Figure 1 is a flowchart of the participants in each data collection phase and the reasons for losses in follow-up.

Comparing the mother/infant binomials that remained in the study during 12 months with the losses, there were no significant differences regarding the socioeconomic, demographic and health characteristics of the children and their mothers (data not shown).

Figura 1. Fluxograma da formação e do acompanhamento da coorte de nascimentos até o primeiro ano de vida, 2015-2016

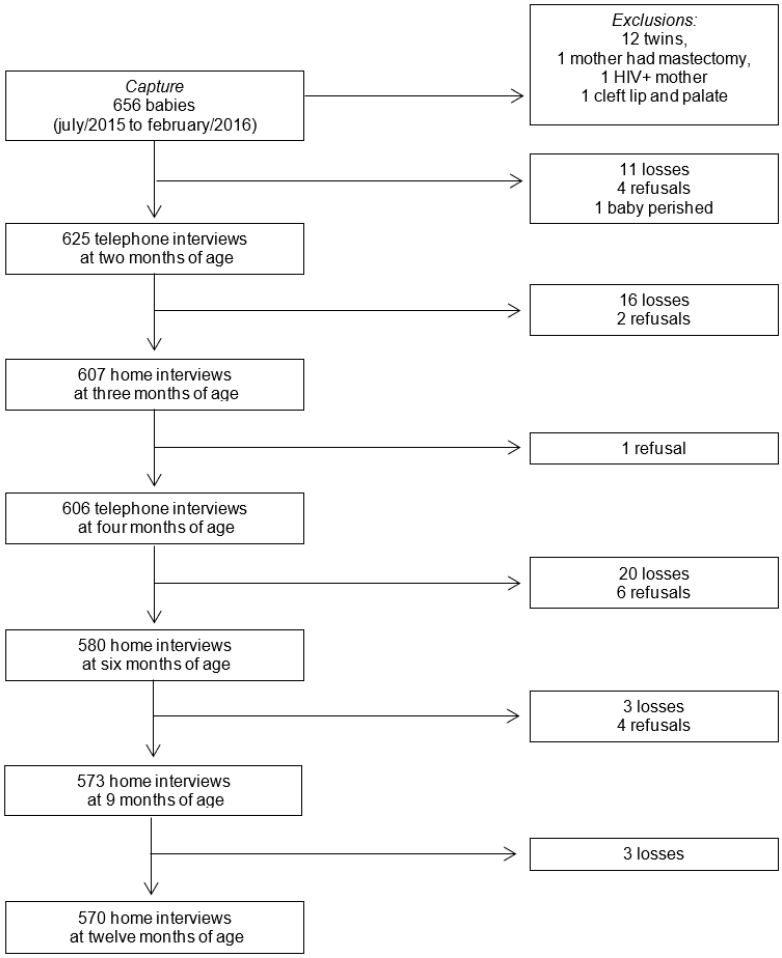


Table 1 shows the description of participants at baseline and the breastfeeding status of infants at the ages evaluated. By self-declaration, 62.1% of the mothers were white, 12.8% were under 20 years old and 15.6% were 35 or more years old. Regarding education (years of school passed), 17.0% had eight or less years of schooling and 63.5% had between 9 and 11 complete years of schooling. Regarding work status, 51.5% of mothers were employed at the time of cohort recruitment and on paid maternity leave; 5.6% were employed, but without paid maternity leave; and the rest had no formal employment, being housewives or unemployed. 12.3% of mothers did not live with a husband/partner(Table 1).

Table 1. Sociodemographic characteristics of mothers in the cohort, 2015-2016.

Variables	N (%)
Skin color	
White	398 (62.1)
Not White	243 (37.9)
Age of mother at childbirth (years)	
20-34	459 (71.6)
≤ 19	82 (12.8)
≥35	100 (15.6)
Schooling (full years of schooling)	
≥ 12	125 (19.5)
9-11	407 (63.5)
≤ 8	109 (17.0)
Per capita Income	
1st Quartile	156 (24.4)
2nd Quartile	163 (25.5)
3rd Quartile	149 (23.3)
4th Quartile	172 (26.9)
Parity	
Multipara	325 (50.7)
Primipara	316 (49.3)
Work situation (outside the home)	
Not working	275 (42.9)
Works, but on maternity leave	330 (51.5)
Works, but not on maternity leave	36 (5.6)
Lives with partner	
Yes	562 (87.7)
No	79 (12.3)

Regarding type of delivery, 52.6% of infants were born by c-section and 6.1% weighed less than 2,500g, with an average birth weight of 3,191 grams (SD = 0.478) (data not shown on table).

Table 2 shows the percentage of infants who received UPFs during their first year of life, the median age and the respective 25th and 75th percentiles, as well as the minimum and maximum values of this introduction, in days.

Table 2. Frequency and median age of introduction of UPF groups during infants' first year of life, 2015-2016.

UPF Groups	N (%)	Median age of introduction (P25 and P75)	Minimum and maximum age of UPF introduction (days)
1 – Ultra-processed dairy products	571(89,1)	170 (135–240)	60–360
2 – Sandwich cookies and snacks	392 (61,2)	275 (240–330)	90–365
3 – Milk flours, children's cereals and powdered chocolate	378 (59,0)	180 (150–240)	30–352
4 – Ultra-processed breads and cookies	279 (43,5)	330 (300–330)	60–365
5 – Instant noodles and seasonings	123 (19,2)	185 (150–330)	90–330
6 – Sausages	104 (16,2)	290 (240–330)	120–360
7 – Margarine and spreads	55 (8,6)	300 (270–330)	105–360
8 – Ultra-processed sweetened non-dairy drinks	43 (6,7)	180 (150–240)	70–330

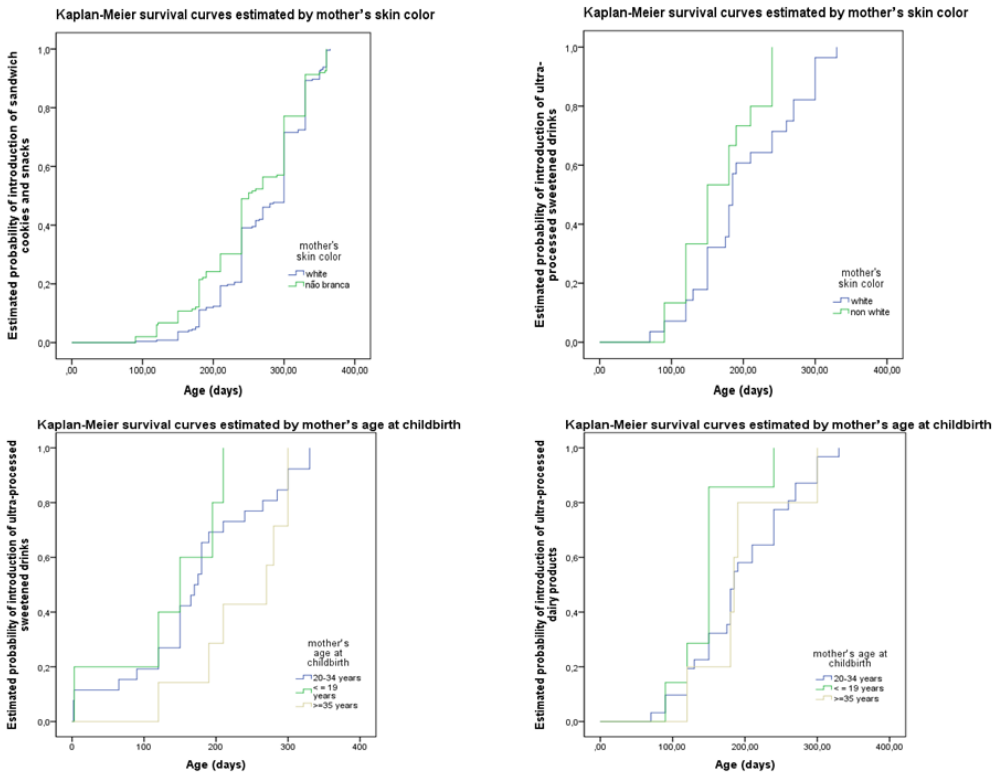
A large share of infants is fed UPFs during their first year of life: 89.1% of children had ultra-processed dairy products (cheese, yogurt and dairy drinks) introduced into their diet, with *petit suisse* cheese being the most frequently offered. This UPF group was the most mentioned as being introduced during the infants' first year of life. The median age of introduction was 170 days. The second most consumed group (61.2%) consists of sandwich cookies, packaged snacks, sweets and other snacks, with a median introduction age of 275 days.

Milk flour and chocolate powders were introduced to 59.0% of infants. The earliest age of introduction was 30 days and the median age was 180 days. Ultra-processed breads and cookies were offered to 43.5% of infants, with a median age of 330 days. Instant noodles and ready-made seasonings were fed to 19.2% of infants, with 185 days being the median age of introduction.

Sausages were offered to 16.2% of infants, with a median age of 290 days. The introduction of margarine and spreads to infants happened at a median age of 300 days. Ultra-processed

sweetened non-dairy drinks were reported for 6.7% of infants, and their earliest introduction was at 70 days, with a median age of 180 days (Table 2).

Figure 2. Kaplan-Meier survival curves according to sociodemographic factors, 2015-2016.

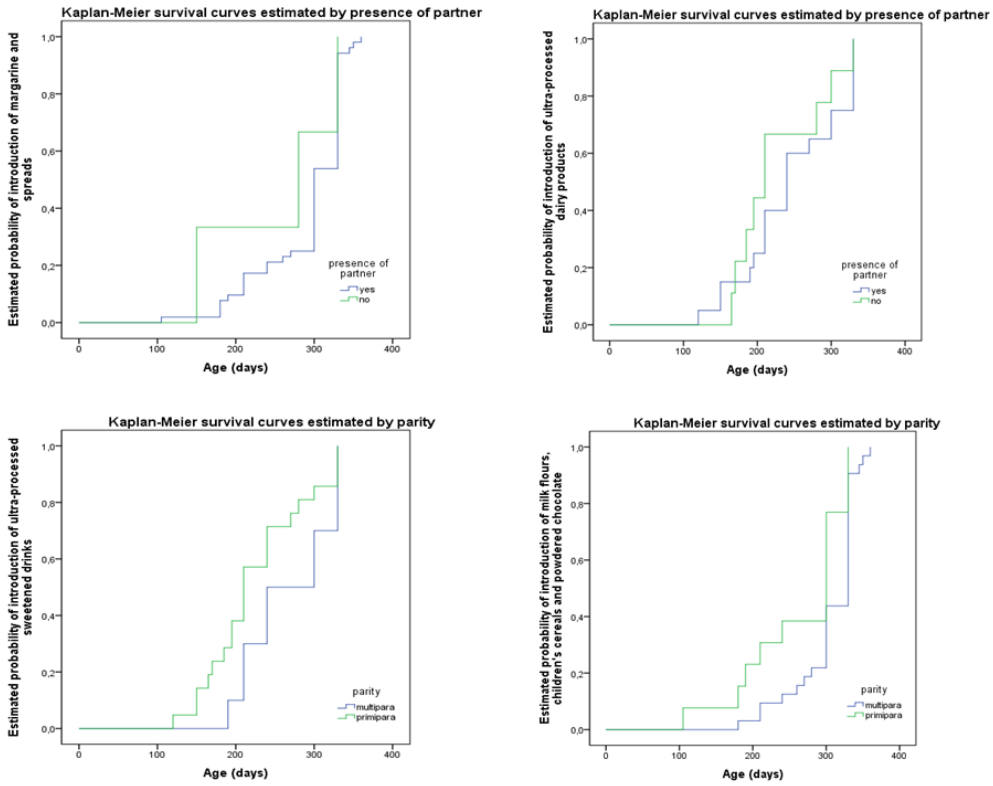


Figures 2 and 3 show the median ages of UPF introduction estimated by Kaplan-Meier survival curves according to the factors of interest that were statistically significant ($p < 0.05$) by the log rank test (Mantel-Cox): parity, skin color, living with a partner and maternal age. The following indicators were not selected to plot survival curves, since they were not associated with the age of introduction of any UPF group: per capita family income, maternal education and maternal work status.

Nonwhite mothers introduced sandwich cookies, packaged snacks, and candy 25 days earlier (median 250 days) than white mothers (median 275 days). This factor was also related to the earlier introduction of ultra-processed sweetened drinks: non-white mothers introduced them at 150 days and white mothers at 190 days. Adolescent parents offered ultra-processed

sweetened drinks much earlier compared to adults, with medians of 150 days and 270 days, respectively. This factor was also related to the introduction of ultra-processed dairy products, which adolescent parents offered to their children 45 days earlier, at 150 days (median age), while adult parents introduced them at 195 days (figure 2).

Figure 3. Kaplan-Meier survival curves according to sociodemographic factors, 2015-2016.



Living without a partner led to the lowest median age introduction of margarine and spreads, 280 days, while mothers living with a partner did so later (median age was 300 days). This factor was also related to earlier introduction of ultra-processed dairy products (cheese, yogurt and *petit suisse* cheese), with a median age of 190 days for infants whose mothers did not live with a partner and 230 days for the others.

Parity also influenced on age of introduction of UPFs. Primiparous mothers introduced ultra-processed dairy products earlier, with a median age of 190 days; whereas the median age for infants with multiparous mothers was 240 days. Primiparity was also associated with the

introduction of milk flours, children's cereals and powdered chocolate, with a median age of 290 days, while multiparous mothers introduced them at 320 days (figure 3).

DISCUSSION

This study shows that the age of introduction of UPFs in the first year of life varied according to socioeconomic and demographic factors: mothers in unfavorable social situations, such as those who are adolescents, non-white, primiparous or did not live with a partner, introduced UPF earlier to their kids' diet. It was also important to note the high proportion of infants who had UPFs introduced to their diets in the first year of life. This confirms the introduction of UPFs in infant feeding as an unequal public health problem, that is, it affects the most socially vulnerable populations more severely. These results represent an important contribution to knowledge about the social determination of inappropriate eating practices in childhood.

In cities with a similar profile to the study's municipality, like most medium-sized cities in the Southeast and South of Brazil, the results obtained with the present study have a probability of being valid. This indicates that a high share of infants consuming UPFs in their first year of life could be a broader phenomenon throughout the country. The identification of priority population groups to target with campaigns on the harmful effects of UPFs, especially at such an early age, represents another of this study's important contributions.

Sociodemographic factors stood out as influencing the introduction of UPFs to infants during their first year of life, confirming the social determination of eating practices.[8,13,18,19] Although several of these factors, such as skin color and maternal marital status, are not subject to change by health actions, these results are an useful tool in the characterization of the infants most vulnerable to undesirable eating practices, who can be prioritized in interventions.

A recent American study pointed to the mother's skin color as a social marker associated with poorer health outcomes in infants. Non-white mothers (Hispanic-African, African-American, non-white Hispanics) in the USA also introduced UPFs earlier and more often.[8] Our results also confirm the mother's skin color as a marker of unfavorable social status, which can influence the age of introduction of UPFs.

UPFs are rich in sugars, sodium, fats and chemicals such as dyes and preservatives, substances which, if consumed regularly from early childhood, have a harmful potential on health. Recent studies associate the consumption of these products in childhood with obesity, diabetes, metabolic syndromes, and cardiovascular health risks in adulthood.[20-22] A systematic

review involving 26 studies found a positive association between UPF intake and body fat in childhood and adolescence. [23]

It is well known that teenage mothers tend to introduce complementary feeding at an inappropriate age (before six months old).[24] In addition to this, the present study indicates that adolescents introduced UPFs to their children's' diets earlier, and two other recent studies showed similar results. [25,26] This confirms that infants whose mothers are adolescents are vulnerable to early nutritional and health problems.

One possible way to understand this association is that the consumption of soft drinks and processed juices, yogurts and dairy drinks is characteristic of adolescents' eating habits[27] and, therefore, teenage mothers would be more likely to offer these foods to their babies. This suggests that maternal feeding, especially of adolescent mothers, should also be addressed in interventions aimed at promoting healthy eating in childhood.

Several studies have indicated that the presence of a partner in the home is a factor that interferes with the maintenance of breastfeeding and the proper introduction of food.[26-30] This variable, the presence or absence of a partner living with the mother, even partially, allows us to evaluate the possible effect of social support, since the father/husband is the main provider of maternal support. [31] Our results indicate that the absence of a partner residing with the mother favored the early introduction of UPFs, especially ultra-processed dairy products and margarines/spreads. Therefore, interventions aimed at strengthening the bond between father and child and their insertion in child care, even when they do not live with the mother, deserve to be tested in future studies. The effects can be positive on eating practices.

Another feature that influenced the early introduction of UPFs was parity, a complex and still poorly understood relationship. A Brazilian cross-sectional study conducted in Porto Alegre-RS found multiparous women offering more ultra-processed foods to infants than primiparous women,[32] which differs from the results obtained in our study. Thus, in future studies, this issue should be studied in more depth. We suggest that maternal motivations for introducing different groups of ultra-processed foods into their children's diets should be investigated, and qualitative studies would be particularly appropriate for this purpose.

In this study, we did not detect any association between income, education and maternal employment status with the age of introduction of UPFs, a finding that differs from the literature,[11,19] which shows an inverse relationship between maternal socioeconomic status and UPF consumption by infants. In the context of our study, some sociodemographic variables (age,

parity, skin color and marital status) influenced the age of UPF introduction, a result which needs to be confirmed by studies in other locations.

In summary, our results indicate that most of the infants in the cohort studied had UPFs introduced in their diets in the first year of life, contrary to the recommendations of international[33] and Brazilian health authorities,[34] who advocate for exclusive breastfeeding in the first six months of life. After this period, it should be gradually complemented, predominantly with fresh foods, obtained directly from plants and animals, such as fruits, vegetables, eggs, meat, tubers, grains and cereals. Another important recommendation not practiced by a significant share of the study's cohort, is that the consumption of UPFs, such as soda, processed juices, snacks, sausages and sweets, should be avoided before the age of two, since the consumption of these foods is associated with anemia, excess weight and food allergies.[34]

Besides the divergence between the dietary practices identified in the cohort and these recommendations, it is important to consider that the first thousand days of life (which include pregnancy and the first two years of life) are the most sensitive period for the establishment of metabolic, nutritional and eating patterns, which may predispose a child to chronic noncommunicable diseases such as diabetes, hypertension and obesity at later ages.[35] It is also known that unhealthy eating habits established in childhood tend to last a lifetime. [36, 37]

Considering the recommendations and our results, there is a need for a clearer way to approach the population about the harmful effects of infant UPF consumption. As these are increasingly accessible and hyperpalatable foods,[10] it is up to health professionals, managers and health and nutrition policy makers to address this major challenge. The reasons why these foods are unsuitable for infants and families need to be widely disseminated. Furthermore, mothers and fathers should be supported so that they are not easily targeted by advertising, and restrictions should be placed on the association of UPFs as foods for children or infants.

The low rate of refusals, losses and missing information, common events in prospective cohort studies, supports the validity of our results. We also highlight the frequent interviews during the infant's first year of life, which decreased the chances of mothers' memory bias, which could affect the accuracy of the estimated age of UPF introduction. Another advantage of the present study, compared to some previous studies, is its prospective design, allowing the establishment of a chronology between exposure variables and the studied outcomes.

On the other hand, we recognize that our data had some limitations that may have affected the classification of foods as processed or ultra-processed. The food questionnaire used, although broad (with 48 food items), did not have a high degree of detail, such as the brand of

food offered to the infant or its origin, that is, whether it was made at home or bought ready. There are still some difficulties in classifying some foods according to the extent and purpose of processing through the NOVA classification system. This explains the fact that the same food is classified in different ways in different studies, as in the case of "French" bread.[38,39] We sought to limit this possible problem by following the most current recommendations of this classification system[5,6] and by considering the experience of the researchers in the assessment of food consumption in the municipality's maternal and child population. Based on this, in the present study "French" bread was considered a processed food, since the most consumed kind, locally, is made in bakeries with flour, water, salt and yeast; Cheeses and yogurts were categorized as ultra-processed because they took into account the composition of the different brands available in local commerce, most of which contained more than milk, yeast, salt or sugar.

CONCLUSIONS

A large share of infants had UPFs introduced to their diet in their first year of life. The most frequent were ultra-processed dairy products (sweetened yoghurt/dairy drinks/cheese, especially petit suisse); sandwich cookies and sweet or savory snacks; milk flours, children's cereals and powdered chocolate; ultra-processed breads and cookies.

The offer of UPFs in the first year of life was thus identified as a public health problem at the study location. In addition, significant sociodemographic differences were detected in the age of introduction of UPFs, with unfavorable results (earlier introduction) for infants whose mothers were non-white, adolescents, primiparous and not living with a partner.

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Colaboradores

Almeida MAM participated in study conception and design; data collection, analysis and interpretations; review and approval of final version of this manuscript. Gomes CB participated in data analysis and interpretation; review and approval of the final version of this manuscript. Carvalhaes MABL participated in study conception and design; writing; data analysis and interpretation; review and approval of the final version of this manuscript.

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