
Parental Attitudes and High Caloric Share of Ultra-processed Foods in Children's Lunchboxes

Atitudes parentais e a alta participação calórica de alimentos ultraprocessados em lancheiras infantis

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RESUMO

Este estudo analisou a participação calórica de alimentos ultraprocessados nas lancheiras de pré-escolares e atitudes parentais associadas. Os lanches foram registrados e classificados de acordo com a classificação NOVA: Alimentos *in natura* ou Minimamente Processados; Alimentos processados; Alimentos Ultraprocessados e Ingredientes Culinários. Entrevistamos os pais para identificar as atitudes parentais. Utilizamos testes qui-quadrado de Pearson, t de Student e modelos de regressão Beta. A participação calórica dos alimentos ultraprocessados nas lancheiras foi de 55% e 7% *in natura*. Houve associação entre participação calórica dos alimentos ultraprocessados e: enviar apenas lanches que as crianças gostam($p=0,005$), escolher alimentos com personagens preferidos da TV($p=0,03$), praticidade($p=0,01$), comprar todos os lanches no supermercado($p=0,002$), não ler rótulo dos alimentos($p=0,025$), não ter informações para preparar lancheira saudável($p=0,016$) e a mãe não ser a pessoa que prepara a lancheira($p=0,002$). Atitudes parentais estão associadas aos hábitos alimentares das crianças, sendo importante fortalecer políticas públicas que regulamentem a oferta de alimentos ultraprocessados.

Palavras-chaves: Crianças; Lancheira; Pais.

ABSTRACT

This study analyzed the caloric share of ultra-processed foods in preschoolers' lunchboxes and associated parental attitudes. The snacks were registered and classified according to the NOVA classification: *In Natura* or Minimally Processed Foods; Processed Foods; Ultra-processed Foods and Culinary Ingredients. A questionnaire was applied to the parents to identify parental attitudes. Pearson's Chi-Square, Student's t-tests, and Beta regression models were used. The caloric share of ultra-processed Food in lunchboxes was 55%, being 7% for *In Natura* or minimally processed foods. There was a significant association between the caloric share of ultra-processed food and parental attitudes: only sending snacks that kids like ($p=0,005$), choosing foods with the child's favorite TV characters($p=0,03$), convenience($p=0,01$), being able to buy all snacks at the supermarket($p=0,002$), not reading the food label($p=0,025$), not having information to prepare a healthy lunchbox($p=0,016$), and the mother not being the person who prepares the lunchbox($p=0,002$). Parental attitudes are strongly associated with the children's eating habits, which is why it is important strengthening public policies that regulate the provision of ultra-processed foods.

Keywords: Children; Lunchbox; Parents.

INTRODUÇÃO

The dietary pattern of the Brazilian population has been modified, with an increasing presence of ultra-processed foods (UPFs). Nevertheless, studies have pointed out the harm caused by the excessive consumption of these foods, such as weight gain and chronic non-communicable diseases. In addition to the poor nutritional composition, UPFs have an impact on culture, social life, and the environment (BRASIL, 2014; FIOLET *et al.* 2018; NERI *et al.* 2022).

The literature points out that the consumption of UPFs by children has been increasing. Studies with Brazilian children have shown that the caloric share of UPFs can reach 24.5% of the daily intake. These signs raise concerns for public health due to the negative consequences already mentioned brought about by the presence of these foods in their diets [BATALHA *et al.* 2017; KARNOPP *et al.* 2017; LOUZADA *et al.* 2021].

The construction of the dietary habits of children is composed of several factors, with the family playing an important role in the development of eating behavior, especially among preschoolers, who are strictly dependent on their parents [SILVA *et al.* 2016]. Studies show that parents' eating habits have a strong influence on their children's food intake, and these eating habits acquired in the preschool stage potentially influence eating preferences in adulthood [POWELL *et al.* 2018; WALTON *et al.* 2019].

Blaine *et al.* (2015) affirms that the factors that permeate the relationship of parents with the provision of morning or afternoon snacks to children are still not well understood, requiring studies to investigate them.

According to Keener *et al.* (2009) snacks are an important target to improve children's diets, containing the potential to reduce childhood obesity. Improving children's snacks with the inclusion of preparations based on fresh foods can reduce the excessive energy supply and increase the intake of healthier foods. Lalchandani *et al.* (2023) also reinforces that there are few studies in the literature focusing on children's school lunchboxes, emphasising that lunchboxes contents have a relevant impact not only on children's health, but also on the environment. In addition, in the national literature, no studies were found that evaluated lunchboxes related to parental informations.

Therefore, considering the high presence of UPFs in the children's diet described in the literature, as well as the gaps described above, this study analyzed the association between parental attitudes and the offer of UPFs in the lunch boxes of students enrolled in Early Childhood Education programs from private schools.

METHODS

A cross-sectional study was carried out in two private schools, sampled by convenience, located in the state of Sergipe (Brazil), with students enrolled in Early Childhood Education programs, aged 2 to 6 years (BRASIL, 2012).

Of those students who were allowed to participate in the study (n=389), were excluded those who did not have their lunch box evaluated for 3 days, whose parents were unable to establish telephone contact for the application of the questionnaire, who presenting some type of food restriction could interfere with the preparation of the lunch box. Autistic children (data reported by parents) were also excluded because, according to the literature (ALMEIDA *et al.* 2018), these children are naturally selective with their diet. The final sample resulted in 241 preschoolers.

Socioeconomic data, information regarding the children's dietary difficulties, the nutritional knowledge, eating habits of the parentes, proposed by Brazilian Ministry of Health (BRASIL, 2015), and possible obstacles/difficulties faced by parents to send snacks to school were obtained from parents, using a telephone questionnaire.

The elaboration of questions regarding parental attitudes and their criteria for choosing food for school snacks was based on the obstacles to healthy eating presented in the Food Guide for the Brazilian Population (BRASIL, 2014).

To evaluate the lunchbox, a form was used containing a record of three non-consecutive days of the food contained in the lunch box, and their respective brands and quantities in grams or homemade measures.

A pilot study was carried out in a school, selected by convenience, to adjust the collection instruments and improve logistics.

The telephone questionnaires were tabulated in Microsoft Excel®. The records of lunch boxes were later standardized as to the type and preparation of food and homemade measures and the conversion to weight in grams. Food information was entered into the Brasil Nutri software (2015) and had its nutritional composition calculated from the table used by the Pesquisa de Orçamentos Familiares de 2008/2009 (POF, 2008/2009 Family Budget Survey), Instituto Brasileiro de Geografia e Estatística [Brazilian Institute of Geography and Statistics] (IBGE, 2011). For food classification, the POF food bank was classified according to the NOVA classification in 04 groups: *In Natura* (IN) or Minimally Processed (MP) Foods and Culinary Preparations based in IN/MP foods;

Processed Foods (PFs) and Culinary Preparations based on PFs; UPFs and culinary preparations based on UPFs; Culinary ingredients.

From the database containing the information for the three days of collection, an analysis of variance (one-way ANOVA) was performed to calculate the between and within-person variability of energy and nutrients and subsequent adjustment of the data distribution by within-person variability according to the method proposed by Hoffmann *et al.* (2002). The average amounts (Kcal) were calculated for each group proposed in the NOVA classification (MONTEIRO *et al.* 2010).

Then, variables were created with the caloric share (percentage) of each of the four NOVA classification (MONTEIRO *et al.* 2010) groups in the total Kcal of the lunch box.

Categorical variables were analyzed using absolute (n) and relative (%) frequency. Pearson's chi-square or Fisher's exact tests were applied. To verify the existence of significant differences between the caloric share (%) of UPFs and categorical variables, Student's t-test for independent samples was applied, since this dependent variable had a normal distribution. The independent variables that presented more than two categories of response were recategorized or dichotomized. Spearman's correlation coefficient was used to verify the relationship between quantitative variables.

For the multivariate analysis, a Beta regression model was used, considering the proportion of calories in lunch boxes from UPFs as a dependent variable. The independent variables tested were socioeconomic, demographic, nutritional status, and difficulties faced by those responsible for preparing lunchbox, and those with $p < 0.20$ in the bivariate analyzes were entered into a multivariate regression model.

The Stepwise algorithm was used to choose the best model; the Akaike selection criterion (AIC) was used as a statistic for comparing models.

A statistical significance level of $p < 0.05$ was considered in all tests. The R software, version 3.6.1, was used for Beta regression.

The research project was submitted to and approved by the Ethics Committee on Research with Human Beings, opinion number 2.701.571. All ethical principles contained in resolution 466 of the National Health Council (2012) were followed.

RESULTS

Of the 241 preschoolers analyzed, the average age presented was 4.2 ± 0.99 years; 53.1% of them were boys, 51% enrolled in the morning classes, 17.8% of which were overweight.

Regarding socioeconomic data, 50.2% of parents had finished high school. About 50% of the interviewed parents reported a monthly family income of less than two minimum salaries. There were no statistically significant associations between these socioeconomic variables and the average caloric share of UPFs.

It was observed that the person responsible for preparing the child's lunch box most often was the mother (85.9%).

When analyzing the caloric share of food groups in lunch boxes, it was observed that about half of the calories in lunch boxes (55.0%) came from UPFs, while the caloric share of IN/MP foods was only 7.4%.

When evaluating whether the average caloric share of UPFs differs according to sociodemographic characteristics and parental attitudes (table 1), higher percentages of UPFs were observed in lunch boxes that were not prepared by the children's mothers ($p=0.002$) and in lunch boxes of students who were not firstborn children ($p=0.008$).

Table 1: Distribution of the average caloric share of UPFs in the lunch boxes of students enrolled in Early Childhood Education programs, according to the presence or absence of factors that may interfere with the preparation of the lunch box. Brazil, 2019.

Parental attitudes and characteristics	Average caloric share of UPFs (%) \pm SD*(%)		p value
	Yes	No	
The mother prepares the lunch box	54.2 \pm 15.7	59.8 \pm 15.1	0.002
Has enough information to prepare a healthy lunchbox	53.6 \pm 15.4	57.6 \pm 15.9	0.016
Little time to prepare the lunch box	55.2 \pm 16.0	54.5 \pm 15.3	0.198
Cooks for the family	54.7 \pm 15.5	54.9 \pm 16.3	0.401
Knows how to cook	57.0 \pm 15.7	54.9 \pm 15.8	0.196
Educational level (complete elementary school)	57.2 \pm 13.4	54.8 \pm 15.8	0.291

Chooses lunch box food according to child's favorite TV characters	57.8±15.7	53.6±15.4	0.030
Buys all lunch box food at the supermarket	57.1±15.7	51.1±15.2	0.005
Buys lunch box food in street fairs	54.3±15.5	56.4±15.8	0.122
Price influences on purchase of snacks	57.2±15.3	53.8±15.8	0.097
Reads the information on the label	53.0±14.8	57.6±16.4	0.025
Looks for convenience when choosing child's snacks	57.2±15.9	51.7±14.7	0.010
Sends food that child likes	56.9±15.8	50.3±14.4	0.003
Has his or her meals using electronics	56.3±16.1	53.5±15.2	0.355
Plans to purchase and prepare food	54.2±14.9	57.4±17.5	0.089
Allows child to participate in the choice of snacks	55.9±13.8	51.6±16.0	0.019
Firstborn child	53.5±15.2	57.1±16.2	0.008
Child has eating problems	55.0±16.2	54.9±14.9	0.466

Source: Andrade *et al.* (2023)

*SD=Standard Deviation

The caloric share of UPFs was also greater in the group whose parents reported choosing foods with the child's favorite TV characters on the label/package ($p=0.03$); for those whose parents reported not reading the food label ($p=0.025$); and for those who reported not having enough information to prepare a healthy lunchbox ($p=0.016$). Parents who buy all the food in supermarkets, due to the greater convenience of these places, and who provide only the foods that the child likes, were also significantly associated with a greater caloric share of UPFs (57.1%, 57.2%; 56, 9%, respectively).

When all these factors were considered in the beta regression analysis to estimate the caloric share of UPFs in the lunch box (table 2), it was noted that those children who were not firstborn had values 24.1% higher than firstborn children.

Table 2: Coefficients of the multiple beta regression model for the caloric share of UPFs in the lunch box for preschoolers. Sergipe, Brazil, 2019.

Parental attitudes and characteristics	Estimated parameter	Standard error	Exponentiated parameters	CI (95%)	P-value
Intercept	-0.038	0.195	-	-	0.858
The parents buy all food from lunch box in supermarkets	0.188	0.082	1.207	(1.027; 1.419)	0.022
Send in the lunch box only foods that the child likes	0.184	0.089	1.202	(1.010; 1.432)	0.039
Have enough information to prepare a healthy lunchbox	-0.202	0.084	0.817	(0.693; 0.963)	0.016
The mother prepares the lunch box	-0.258	0.114	0.773	(0.618; 0.967)	0.024
Allows the child to participate in the choice of snack	0.191	0.097	1.211	(1.000; 1.466)	0.049
The child is not the firstborn	0.216	0.082	1.241	(1.057; 1.457)	0.008
Female child	-0.128	0.078	0.880	(0.755; 1.026)	0.103

Source: Andrade *et al.* (2023)

The same can be observed for those whose parents allowed the child's participation in the choice of food to be sent in the lunch box (21.1%), who reported buying all their food in supermarkets (20.7%) and who reported choosing only foods that the child likes (20.2%). The fact that parents agree that they have enough information to prepare a healthy lunch box contributed to caloric share values of UPFs 18.3% lower than the levels observed among those who said they were unable to do so. The mother being the responsible for preparing the lunch box also contributed to lower caloric share values of UPFs (22.7%) than those observed in lunch boxes prepared by other family members.

DISCUSSION

The caloric share from UPFs found in lunch boxes (55%) corresponded to almost eight times the value of the caloric share from IN/MP (7.4%). This result contradicts the main orientation of the Food Guide for the Brazilian Population¹ (BRASIL, 2014), which advises the population to prefer IN/MP foods and culinary preparations to UPFs. Similar to the present study, research carried out by Sparrenberger *et al.* (2015), investigated the contribution of UPFs to the eating habits of 204 children aged 2 to 9 years in the southern region of Brazil and the results showed that 47% of the average energy consumption was from UPFs.

In another longitudinal study carried out by Rauber *et al.* (2015), children between 3 and 4 years old up to 7-8 years of age were followed-up to evaluate the presence of UPFs in the eating habits of children. It was observed that, at pre-school age, UPFs contributed 33.9% of the total energy, while at school age, this percentage increased to 37.9%.

A cross-sectional study among Dutch children from seven primary schools developed by Rongen *et al.* (2022) evaluated lunchboxes content and the results showed that almost half of children (42,9%) brought sweetened drinks whereas only 5% of the lunchboxes contained fruits and 6% contained vegetables.

The fact that the person who most often prepares the lunch box is the mother of the child shows that women are still in the role of provider of the child's food even in today's world. Data from the literature indicate that mothers still play a central role in the education and eating habits of their children, having a greater concern in providing healthy foods to ensure the development and healthy growth of their children, especially when they are younger (BROILO *et al.* 2017; LÓPEZ-CONTRERAS *et al.* 2020). Despite this, recognizing the need to promote a fair division of household chores, including childcare, is necessary to reduce the workload placed on mothers.

As for the positive association found in this study between “sending in the lunch box only what the child likes” and the greater caloric share of UPFs in lunch boxes, it can be justified by the characteristics of greater palatability and sweet flavor of these foods, having the preference of children. In addition to this, there is also the influence of food labeling and advertising that is directed at children and other innate characteristics of the child's eating behavior in this preschool phase that generate eating difficulties such as selectivity and food neophobia. A study by Russel and Worsley (2013) in Australia

investigated the parents' beliefs about changing the eating habits of preschool children. The results showed that the parents reported believing that the children's eating behavior is greatly influenced by their individual characteristics as a neophobia, however the authors pointed out that the children's food preferences change over time and these can be influenced by socialization experiences with the parents.

The factor “buying lunch box foods in supermarkets” was positively associated with the presence of UPFs in lunch boxes and can be inferred as a factor linked to convenience, since supermarkets have a wide variety of foods in one place.

Associated with the factors described above, the parents' lack of knowledge to prepare a healthy lunchbox can contribute to the purchase of UPFs, since because they do not have enough information about healthy eating, parents can be more easily influenced by the media and other factors such as convenience. In the present study, a positive association was found between “not having enough information to prepare a healthy lunchbox” and the presence of UPFs in lunch boxes. Studies show that the positive encouragement of parents is associated with the practice of healthy eating habits in preschool children, emphasizing the need for interventions that teach parents the importance of healthy eating (WALTON et al. 2019; HOLLEY et al. 2015).

The method of evaluating lunch box foods has limitations related to measurement errors associated with data standardization, such as conversion of homemade measures to grams such as the selection of the food to be entered into the system and the nutritional composition available in tables. However, the method of food registration does not invalidate the results of this study, having been used in several population surveys. In addition, the standardization of the observation of lunchbox with the application of a manual and training, as well as the weight displayed in the packages, may have contributed to minimize this limitation.

Another limiting factor for the study's discussion is the few references found that deal with morning/afternoon snacks in schools. This meal has great importance for the contribution of children's daily nutritional needs, especially when the caloric contribution of UPFs is high in this small meal.

Considering the findings of the present study and the fact that there are few studies focused on this type of investigation, there is an urgent need to expand the debate on recommendations for school snacks (especially for private schools), as well as investing in interventions with clear guidelines especially for parents of the provision of food to

children, who are in the process of consolidating their eating habits. Although, nowadays, important debates have been made about the implication of high consumption of UPFs and agri-food systems (impacts on the environment), there is a gap in the discussion for the age group studied here. It is essential to understand children as future adults and part of the agri-food system, and to investigate their food consumption considering that UPFs are factors that can change not only individual health, but socio-environmental, cultural, and regional issues.

According to Lalchandani et al. (2023) young children have high awareness potential, therefore it would be promising to motivate them to get healthier eating habits through interventions within their food environment which involves parents, teachers and community, all of them supported by politicals that can provide children access to more nutritious foods.

CONCLUSION

Caloric share of UPFs in children's lunch boxes is high, disagreeing with the recommendations of the Food Guide for the Brazilian Population¹. This high caloric share of UPFs in lunch boxes is associated with parental attitudes such as buying all the lunch box food in supermarkets, sending in the lunch box only the foods that the child likes, and letting the kids determine the composition of the lunch box. The fact that it is the mother who prepares the lunch box is associated with a lower caloric share of UPFs in lunchbox.

It is observed the importance of Food and Nutritional Education actions with the parents of these children since the parental attitudes are strongly associated with the children's eating habits. It is also important to strengthen public policies that regulate advertising and the provision of UPFs inside and outside the school environment.

This study was financed in part by the Fundação de Apoio à Pesquisa e a Inovação Tecnológica do Estado de Sergipe (FAPITEC/SE) – Brasil and the Coordenação de Aperfeiçoamento de Pessoal e Nível Superior – Brasil (CAPES – Finance Code001).

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