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# CHILD FEEDING BEHAVIOUR, NUTRITIONAL STATUS, AND FOOD AND NUTRITION SECURITY AMONG PRESCHOOLERS IN A SOCIALLY VULNERABLE AREA

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**Abstract:** Food insecurity (FI) can directly impact children's eating behaviour and nutritional status, potentially leading to long-term health issues. This study aimed to examine the relationship between children's eating behaviour, nutritional status, and FI among preschoolers in a socially vulnerable area of a municipality in Southern Brazil. A cross-sectional, quantitative study was conducted involving children aged 2 to 5 who were beneficiaries of the Bolsa Família Program (BFP). Data were collected using the Child Eating Behavior Questionnaire (CEBQ) and the Brazilian Food Insecurity Scale (EBIA). Nutritional status was classified using height-for-age and BMI-for-age indices. The study comprised 90 children, with 59.0% experiencing food insecurity. Girls exhibited a higher average score of disordered eating behaviour compared to boys, indicating a stronger interest in food. Nutritional status analysis revealed a high prevalence of overweight risk (43.30%), particularly among boys. A significant association was observed between BMI-for-age (eutrophy) and food insecurity (p=0.003). The majority of eutrophic children also experience food insecurity. There is a need to carry out research on similar topics in order to support the development of public policies on food and nutritional security.

**Keywords:** feeding behavior; food security; nutritional status; child nutrition sciences.

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## 1 INTRODUCTION

Eating behaviour can be defined as all the ways in which people interact with food, resulting from a set of collective and individual actions and habits. As such, it concerns the process of choosing food, the way it is prepared, taking into account culture and food beliefs, as well as the way an individual consumes food (Souza *et al.*, 2020).

It is in early childhood, the period between conception and the sixth year of life, that children's eating behaviour is formed, influenced by various factors, such as the family and school environment, local culture, socioeconomic conditions, parental influence, among others (Muller, 2017; Santos, 2020). Throughout life, eating behaviour is influenced by globalisation and modernity, resulting in changes in eating habits and practices, and consequently, the quality of diet (Melo, 2017).

Factors such as changes in the child's appetite, which usually occur in the preschool phase, and changes in the family and school environment can contribute to the appearance of disordered eating behaviours or eating difficulties (Muller, 2017).

According to the American Psychiatric Association (2013), disordered eating behaviours are characterised as risk factors for eating disorders and eating-related problems, including episodes of binge eating disorder, food restriction, emotional eating, urgent desire for palatable foods, and unhealthy eating behaviours for weight loss. These behaviours are highly prevalent and can negatively affect individuals (Mortas, 2023).

Studies have shown that children's eating behaviour is directly related to their nutritional status, such as the appearance of overweight and obesity. The Covid-19 pandemic has led to a rise in food insecurity (FI), meaning many people are not getting enough food. This affects how people eat and their nutritional health, leading to issues like overweight, obesity, and malnutrition, especially among children and adolescents (Melo, 2017; Barros, 2022; Favoni, 2022).

Brazilian reports indicate that the Covid-19 pandemic has aggravated the FI situation in the country. This scenario impacts both food supply and demand. It reduces people's purchasing power and the capacity for food production and distribution. As a result, it harms particularly the most vulnerable groups (Alpino, 2020). The II Brazilian National Survey on Food Insecurity in the context of the Covid-19 pandemic found that 15.5% of Brazilian families were in a condition of severe FI, 30.7% in moderate FI, and 28.8% in mild FI (Rede Penssan, 2022).

In this sense, the situation of FI can impact directly on children's nutritional status and eating behaviour. This can result in the emergence of pathologies during childhood and adulthood, with a consequent worsening of life (Lima *et al.*, 2022).

Given this scenario, the aim of this study was to verify the association between children's eating behaviour, nutritional status and food and nutritional insecurity among preschoolers in an area of social vulnerability in a municipality in Southern Brazil.

## 2 DEVELOPMENT

### 2.1 Material and methods

This research is part of the project entitled "Food insecurity among children in municipalities in Paraná". It is a descriptive, quantitative, cross-sectional study. The aims of cross-sectional studies are to observe variables at a single point in time, with the advantages of direct observation of the phenomena being researched, as well as collecting data in a short period of time without the need to follow up participants (Zangirolami-Raimundo, 2018).

Piraquara city belongs to the g100, a group of the hundred Brazilian cities with characteristics of higher socio-economic vulnerability, occupying 89th place in the ranking (Piraquara, 2017). The city is organized in three regional health: Central, Guarituba, and East Contour. The Guarituba regional centre concentrates most of the municipality's population and is the region with the higher socio-economic vulnerability. In 2023, Piraquara had a population of 6,891 children aged 2 to 5 (Ipardes, 2024). We investigated preschool children aged between 2 and 5 who were beneficiaries of the *Bolsa Família* Programme (PBF, Portuguese acronym to *Programa Bolsa Família*) and were following up on health at two Primary Healthcare Centers (UBS) in the Guarituba regional health, between April 2022 and September 2023.

The PBF is a Brazilian cash transfer programme established in 2003 and restructured in 2023. Its primary aim is to provide a basic income for impoverished families, integrating public policies to enhance families' access to fundamental rights such as education, health, and social assistance (Brazil, 2023).

Data collection was carried out by trained researchers on a convenience sample, by measuring weight and height of the children, and by interviewing the mothers, fathers, or responsible persons for the children on PBF's follow up days. The persons responsible for the children were invited to take part in the research and were informed about the research procedures. Those who agreed to take part signed an informed consent form. The research instruments used were the following: the Child Eating Behaviour Questionnaire (CEBQ), the Brazilian Food Insecurity Scale (Portuguese acronym, EBIA) and the Socioeconomic and Demographic Questionnaire.

The children's anthropometric measurements (weight and height) were taken during the PBF follow up at the UBS and followed the technical standards of the Brazilian Food and Nutrition Surveillance System. Height was measured

using a stadiometer or vertical anthropometer, with the child in a standing position, leaning against a wall, barefoot, with their legs in parallel, their head free of accessories, positioned in the centre of the equipment and with the child's arms stretched out along their body. To measure weight, an Avanutri® digital electronic scale was used, with the child barefoot, light clothing, positioned in the centre of the equipment, with their feet together and arms stretched out along their body (Brazil, 2011). Nutritional status was assessed using the height-for-age (H/A) and body mass index-for-age (BMI/A) indices, based on the child growth standards recommended by the World Health Organization (WHO) and the Brazilian Ministry of Health (Who, 2006).

Children's eating behaviour was assessed through parents' subjective perception of their children's eating behaviour. We used the Child Eating Behaviour Questionnaire (CEBQ), translated and validated for Portuguese. The CEBQ consists of 35 questions about the child's appetite. The questions are divided into 8 categories, four related to the interest in food (food responsiveness (FR), enjoyment of food (EF), emotional overeating (EOE) and desire to drink (DD)), and four related to disinterest in food (emotional undereating (EUE), slow eating (SE), food selectivity (FF) and satiety responsiveness (SR))[18,19]. Within the set of categories that assess interest in food, enjoyment of food (EF) and food responsiveness (FR) specifically assess a greater interest in food and a greater external response related to it. Desire to drink (DD) assesses the high consumption of sweetened drinks, such as soft drinks and sweetened juices, and emotional overeating (EOE) is associated with emotions linked to eating, which can cause individual to lose control of satiety and increase food consumption. To assess disinterest in food, the following categories are used: satiety responsiveness (SR), which reflects the difficulty in recognising internal signs of satiety; slow eating (SE), characterised by a lack of pleasure when eating; food selectivity (FF), demonstrating a lack of interest in food, and emotional under-eating (EUE) linked to emotional reactivity to food, caused by stressful situations at mealtimes and food restrictions (Wardle, 2001; Viana, 2008).

The CEBQ questions were answered dichotomously (yes and no), with a score of zero for no answers and one for yes answers, according to the objective of each question. However, five questions that present inverse notions scored one for no answers and zero for yes answers. In the end, the number of points is added up to give each individual a final score, which could vary from zero to thirty-five. To obtain each category results, mean and standard deviation were calculated (Wardle, 2001; Viana, 2008). Given that a higher score is indicative of higher perception of child's disordered eating behaviour, the total CEBQ score was further divided into tertiles to identify groups with less disordered eating behaviour (1st tertile) and more disordered eating behaviour (3rd tertile).

The EBIA was the instrument used to assess the situation of FI. This scale is made up of 14 dichotomous questions (yes or no) and assesses the

access to food of families within 3 months before the form application. Each positive answer pointed one. The sum of the points generates a final score that classifies the household's food insecurity situation: Food Security (zero points, when there were no positive responses); Mild Food Insecurity (from 1 to 4 positive responses); Moderate Food Insecurity (from 5 to 9 positive responses); and Severe Food Insecurity (from 10 to 14 positive responses) (Brazil, 2014).

To characterise the sample, the following socioeconomic and demographic data was collected: gender, schooling, and occupation of the household head; current housing conditions; and access and frequency of the family to public tools of food and nutritional security (Brazil, 2014; Araújo, 2021).

The data collected was grouped in a *Microsoft Excel*® spreadsheet and double-typed for checking. All children with complete data for anthropometry, food insecurity and eating behaviour were included in the study. The children's anthropometric data, gender and age were added to the *WHO Anthro*® programme to assess nutritional status. Children with implausible data for nutritional status (z-score <-6.0 or >+6.0) were excluded.

Descriptive and inferential statistics were carried out in *Stata*®, version 14.0. The association between the exposure (FI) and the outcomes (eating behaviour and nutritional status) was investigated using logistic regression. A p-value of <0.05 was used for statistical significance.

This study was approved by the Committee on Ethics in Research in Human Beings of the Health Sciences Sector of the Federal University of Paraná (number 4.434.404), and authorised by the Municipal Health Department of Piraquara-PR.

## 3 RESULTS

We had 91 children with complete data for anthropometry, FI and eating behaviour taking part in the study. However, one child was excluded due to implausible anthropometric data (z-score E/I > +6.0). Thus, the final sample consisted of 90 children with a mean age of 34.90 ± 13.47 months. Of these, 52.00% (n=47) were female.

Most of the children's responsible persons were unemployed (n=69; 76.67%) and most of the families were headed by women (n=60; 66.67%). Among the female household heads, 75.41% (n=46) were unemployed. Regarding the level of education of household heads, 50.00% (n=45) had completed high school. We also found that 60.00% (n=54) of the families lived in their own home.

The prevalence of FI was 59.00% (n=53), with 45.60% (n=41) of the families having mild FI. The prevalence of FI was higher among male children (60.47%; n=26). When asked about the use of public food and nutrition security (FNS) tools, 11.00% (n=10) said they had access to popular restaurants and/

or popular markets. There was no statistically significant association between FI and sociodemographic variables. The sample characteristics and the FI situation are shown in Table 1.

Table 1 – Sociodemographic characteristics of children aged 2 to 5 beneficiaries of the Bolsa Família Programme. Piraquara, Paraná, 2022-2023.

| **Characteristics** | **FNS** | | **FI** | | ***p*-value*** |
|---|---|---|---|---|---|
| **Sex** | (n) | % | (n) | % | |
| Female | 20 | 42.55 | 27 | 57.45 | 0.771 |
| Male | 17 | 39.53 | 26 | 60.47 | |
| **Sex of head of household**++ | | | | | |
| Female | 21 | 35.00 | 39 | 65.00 | 0.065 |
| Male | 0 | 0.00 | 1 | 100.00 | |
| **Responsible person's education** | | | | | |
| No schooling | 1 | 1.00 | 0 | 0.00 | 0.719 |
| Incomplete primary education | 3 | 23.08 | 10 | 76.92 | |
| Complete primary education | 3 | 50.00 | 3 | 50.00 | |
| High school incomplete | 12 | 52.17 | 11 | 47.83 | |
| Completed high school | 17 | 37.78 | 28 | 62.22 | |
| Higher education completed | 1 | 50.00 | 1 | 50.00 | |
| **Income status** | | | | | |
| Unemployed | 26 | 37.68 | 43 | 62.32 | 0.234 |
| Employee/self-employed or retired/ pensioner | 11 | 52.38 | 10 | 47.62 | |
| **Housing condition** | | | | | |
| Rented | 6 | 35.29 | 11 | 64.71 | 0.606 |
| Own | 26 | 48.15 | 28 | 51.85 | |
| Ceded | 4 | 23.53 | 13 | 76.74 | |
| Occupation area | 1 | 50.00 | 1 | 50.00 | |
| **Food Insecurity** | | | | | |
| Food security | 37 | 41.11 | - | - | - |
| Mild FI | - | - | 41 | 45.56 | |
| Moderate FI | - | - | 6 | 6.67 | |
| Severe FI | - | - | 6 | 6.67 | |

FNS: food and nutrition security. FI: insecurity food. %: percentage. N: number of subjects.
*p-value for the bivariate analysis (logistic regression) between the variable and food insecurity status.
++variable with missing data. Source: Authors (2023).

With regard to children's eating behaviour according to their parents perception, we found that the enjoyment of food subscale had the highest mean score, followed by food responsiveness. Regarding categories reflecting disinterest in food, satiety responsiveness and slow eating had higher scores. The emotional eating category had the lowest score, followed by emotional

undereating. The categories in the disinterest in food group had a higher mean score than the interest in food group, totalling 8.96 ± 3.8 *versus* 8.11 ± 3.3.

According to the CEBQ category scores by gender and BMI/A, girls had a higher mean score than boys (17.47 ± 4.23 versus 16.77 ± 4.35) in relation to disordered eating behaviour, while normal weight and overweight children had similar mean score values (Table 2).

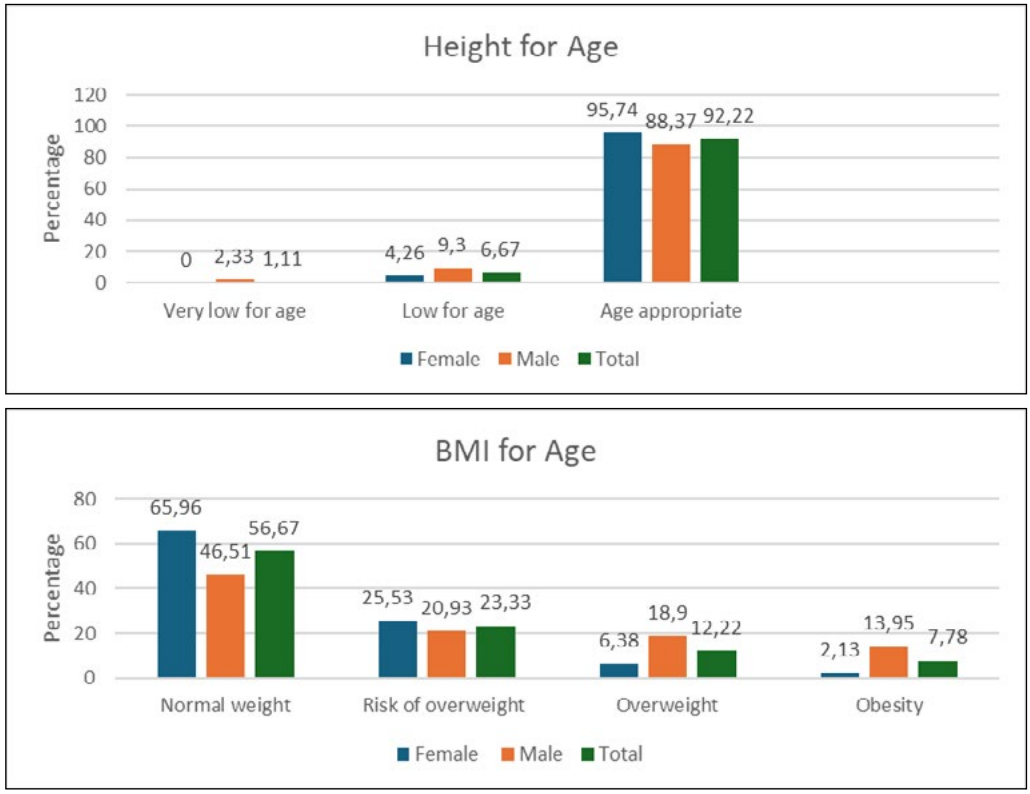
Table 2 – Scores for the categories of the Children's Eating Behaviour Questionnaire (CEBQ) scale in general, by gender and by weight status (BMI/A) of children aged 2 to 5 beneficiaries of the Bolsa Familia Programme. Piraquara, Paraná, 2022-2023.

| **Characteristics** | **CEBQ** | |
|---|---|---|
| | **Mean** | **SD** |
| **Food Interest Score** | | |
| Enjoyment of food (EF) | 3.17 | 1.38 |
| Food responsiveness (FR) | 2.50 | 1.80 |
| Desire to drink (DD) | 1.67 | 1.32 |
| Emotional overeating (EOE) | 0.77 | 1.21 |
| **Disinterest in Food Score** | | |
| Satiety responsiveness (SR) | 2.70 | 1.58 |
| Slow eating (SE) | 2.66 | 1.35 |
| Food selectivity (FF) | 2.14 | 2.05 |
| Emotional undereating (EUE) | 1.46 | 1.49 |
| **Total CEBQ Score** | 17.13 | 4.28 |
| **BMI/Age** | | |
| Normal weight | 17.08 | 4.07 |
| Excessive weight+ | 17.21 | 4.59 |
| **Sex** | | |
| Female | 17.47 | 4.23 |
| Male | 16.77 | 4.35 |

CEBQ: Children's Eating Behaviour; SD: Standard deviation; BMI: body mass index.
*Excessive weight category includes risk of overweight, overweight, and obesity. Source: Authors (2023).

When analysing nutritional status, we found that 43.30% (n=39) of the children were excess weight (at risk of being overweight, overweight, or obese), with boys having the highest prevalence (53.49%). In the H/A category, 92.00% of the children (n=83) had adequate height (Graphic 1).

Graphic 1 – Nutritional status according to sex of children aged 2 to 5 beneficiaries of the Bolsa Família Programme.




BMI: body mass index. Source: Authors (2023).

When analysing eating behaviour and FI status, we observe that 41.50% (n=22) of the children who were in the 3rd tertile of eating behaviour (most disordered behaviours) were in FI, as well as 30.20% (n=16) of the excess weight children. There was no statistically significant association between the eating behaviour score tertiles and FI (p=0.927). There was a statistically significant association between BMI/A and FI (OR=0.236; 95%CI=0.109-0.639) (Table 3).

Table 3 – Situation of food and nutritional insecurity by tertiles of eating behaviour and nutritional status of children aged 2 to 5 beneficiaries of the Bolsa Família Programme. Piraquara, Paraná, 2022-2023.

| Characteristics | Situation of Food Insecurity | | | | | | |
|---|---|---|---|---|---|---|---|
| | FNS | | FI | | OR | CI 95% | p-value* |
| **Eating Behaviour** | (n) | % | (n) | % | | | |
| 1° tercile | 10 | 27.03 | 18 | 34.00 | 1.041 | 0.443-2.445 | 0.927 |
| 2° tercile | 12 | 32.43 | 13 | 24.50 | | | |
| 3° tercile | 15 | 40.54 | 22 | 41.50 | | | |
| **BMI/Age** | | | | | | | |
| Normal Weight | 14 | 37.84 | 37 | 69.81 | 0.263 | 0.108-0.639 | 0.003 |
| Excessive weight++ | 23 | 62.16 | 16 | 30.19 | | | |
| **Height/Age** | | | | | | | |
| Low or very low height | 3 | 8.1 | 4 | 7.6 | 0.925 | 0.194-4.401 | 0.922 |
| Adequate height | 34 | 91.9 | 49 | 92.4 | | | |

*p-value referring to the bivariate analysis (logistic regression) between the variable and food insecurity situation. FNS: food and nutrition security. FI: food insecurity. OR: odds ratio. CI: confidence interval. %: percentage. N: number of subjects. ++Excessive weight category includes risk of overweight, overweight, and obesity. Source: Authors (2023).

## 4 DISCUSSION

This study gives attention at the relationship between children's eating behaviour, nutritional status and food and nutritional insecurity among preschoolers in an area of social vulnerability in a municipality in Southern Brazil. The relevance of this study is that we assessed children's eating behaviour in a group living in an area with both high vulnerability to food insecurity and showing changes in eating behaviour, such as food selectivity. Identifying food insecurity in socially vulnerable areas and linking it with the nutritional status and eating habits of preschool-age children is vital. This information helps advance scientific understanding and offers opportunities for targeted preventive measures in those communities, informing nutrition and public health strategies.

Studies reporting children's eating behaviour have shown similar results to the present study, such as the high mean score in the enjoyment of food (EF) category in relation to the other categories. These results reflect a propensity to increase food consumption and interest in food. That can lead to a disturbed lifelong relationship with both the food and the body, resulting in overweight (Vale *et al.*, 2021). We also found a high prevalence of FI, with a statistically significant association between FI and normal weight, according

to the BMI/A index. No significant association was found between children's eating behaviour and nutritional status.

In a study carried out during the Covid-19 pandemic with children aged 5 to 10, students from municipal schools in Brazil had the highest mean for enjoyment of food category (EF) and the lowest for emotional overeating (EOE) (Sant'Anna, 2023). These findings may be a result of the lockdown caused by the pandemic, which led to consequences such as lack of social interaction, difficulty in engaging in physical and leisure activities, causing emotional impact and leading to excessive food consumption in pursuit of pleasure. Huçalo and Ivatiuk (2017) found higher mean scores in the EF category when assessing children aged between 8 and 10 in a municipality in the Southern region of Brazil. They also noted a correlation between negative parental practices during meals and unhealthy child eating behaviours.

Passos *et al.* (2015*)* found similar results to the eating behaviour of girls and boys, as well as finding no significant difference between eating behaviour and gender, just like our study. In the same way, studies carried out in England, China and Switzerland with children found no significant differences between eating behaviour and gender (Wardle, 2001; Zhou, 2021; Leuba *et al.* 2023).

McCurdy *et al.* (2022), carried out a study with Hispanic families and found that children in FI situations had higher levels of EF and FR compared to children living in FNS households. They found a significant association between FI and the categories EF, FR and SR. The pleasure in eating increase may result from dietary restrictions or low nutritional quality, which can lead to difficulty in regulating internal hunger and satiety signals. This can result in increased overeating, reflecting on the individual's nutritional status (Souza *et al.,* 2020; Viana, 2008; McCurdy *et al.,* 2022).

More than half of the families enrolled in our study had some degree of FI. Our findings were higher than the prevalence of FI in families with children under 4 years old in another municipality in southern Brazil (30.3%), and close to the numbers found in PBF beneficiary families with children under five living in the north-eastern region of the country (Stavski, 2022; Pedraza, 2021). FI has an impact on increased social vulnerability, reflecting uncertainty about future access to food for affected families. This can affect nutritional quality and jeopardise access to other basic needs (Favoni *et al.,* 2022). Prolonged FI can impact the academic performance of children and adolescents, hinder longitudinal growth, and elevate the risk of overweight, obesity and cardiovascular diseases due to poor nutritional quality of families in social vulnerability (Monteiro *et al.,* 2014; Wroblevski, 2020; Bezerra *et al.,* 2020).

The 2017-2018 Family Budget Survey (POF) showed that 36.7% of households in Brazil had some degree of FI, 24% of which had mild FI. It can be seen that from 2017 to 2022 there will be a 40% increase in FI in Brazil (Rede Penssan, 2022; IBGE, 2020). Studies have shown an association between increased FI and the Covid-19 pandemic, as well as changes in adult eating

behaviour due to social isolation, disruptions, fears, and insecurities (Barbosa, 2021). According to the Brazilian National Survey on Food Insecurity in the context of the Covid-19 pandemic, launched in May 2022, 30.7% of Brazilian households lived in moderate or severe FI, with 15.5% of families facing hunger (Rede Penssan, 2022).

The Covid-19 pandemic has significantly increased gender inequality, hunger, and unemployment, mainly affecting women, who are the most vulnerable to FI, domestic violence, and social isolation (Rede Penssan, 2022; Souza, 2021). A study carried out in a state in Southern Brazil analysed gender inequality and the labour market between 2019 and 2022, and showed that women still have unequal salaries, a higher unemployment rate and an overload of household chores, even though they have a higher education rate than men (Bueno, 2022). Bortolanza *et al.* (2023), identified a prevalence of 88.7% of FI in families headed by women beneficiaries of the PBF in a suburb of the municipality of Guarapuava-PR. These data corroborate our study, which showed a high prevalence of women as household heads, as well as a high rate of both unemployment and FI. However, no significant difference was found between FI and sociodemographic variables.

Given the increase in food insecurity in Brazil, the importance of government subsidized public FNS tools, such as popular restaurants, popular grocery stores, popular markets, popular fruit and vegetable stands, among others, is highlighted. These aim to ensure the right to food for socially vulnerable populations who face difficulties in accessing adequate and healthy food. In the present study, it was observed that only 11% of families have had or currently have access to popular restaurants and/or popular markets/fruit and vegetable stands, establishments considered healthy and contributing to adequate diet for the beneficiary population. The municipality of Piraquara-PR is lacking in terms of public FNS tools, especially in the Guarituba region where the data were collected.

The food environment of the region enrolled in this study had only 9.8% of establishments considered healthy (such as fruit and vegetable stands, butchers, and health food shops). On the other hand, 62.3% of the region's establishments were characterised as unhealthy (ice cream parlours, ultraprocessed food shops - snack bars, drinks distributors, and bars) (Amancio, 2023). Food environment is characterised by the combination of availability and accessibility to food (Amancio, 2023). These findings show that the area offers an unhealthy food environment that does not favour proper eating practices and characterises the region as a "food desert" due to the low number of healthy establishments and the large number of establishments selling ultraprocessed foods, which have a high influence on people's eating behaviour and could increase excess weight (Amancio, 2023). It is clear that since the 1990s, unhealthy establishments have expanded in the region, making it easier for the population to access ultraprocessed foods and attracting the attention of people, including children.

According to data from the Atlas of Childhood Obesity, released in 2019, around 14.3% of children aged 2 to 4 were overweight in Brazil, a result close to that of the present study, which found that 12% of children are overweight (Brazil, 2019). Also in 2019, the Brazilian National Food and Nutrition Study (Enani, 2019) showed a prevalence of 18.3% of risk of overweight among children under 5, with the South (22.2%) and Southeast (18.4%) Brazil regions recording the highest rates (Enani, 2019). In this way, we observed a higher prevalence of the risk of overweight in our study, than the previous publications. The presence of excess weight in children is associated with an increased prevalence of cardiovascular diseases during childhood, and especially in adulthood (Ferreira, 2015).

Another study aimed at understanding the nutritional and dietary profile of schoolchildren enrolled in a municipal school in a municipality in Southern Brazil found a high prevalence of overweight (30.1%) among children beneficiaries of PBF and belonging to lower economic classes. This study identified a relationship between FI and overweight/obesity (Coleone, 2017). In contrast, the present study yielded different results regarding FI and BMI/A, showing a statistically significant association between these variables. It was observed that children experiencing FI may have lower odds of being overweight, as 69.8% (n=37) were classified as normal weight. However, overweight was prevalent among children in FNS.

A study examining the nutritional profile and FI of vulnerable children presented similar findings to the present study. The BMI/A indicator showed a high percentage of normal weight children, both for those classified as FNS and those in FI (Bergjohann, 2020). The authors discuss that these results are related to the phenomenon called nutritional transition, characterised by a decrease in cases of malnutrition and nutritional deficiencies and an increase in the prevalence of overweight and obesity. In Brazil, between 2000-2016, there was a decline in the incidence of malnutrition and a trend towards an increase in the prevalence of obesity, indicating changes in the population's nutritional pattern (Martins,2021).

The limitations of this study include its cross-sectional design, which makes causal analyses impossible, and the fact that the findings were restricted to the territory investigated and cannot be extrapolated. Another limitation was the low adherence of the beneficiary population to the PBF follow up, which occurred once a month, at one of the investigated UBS, directly impacting the study sample size. We would like to highlight that the children's eating behaviour was assessed based on parents' or guardians' perceptions using a questionnaire validated for Portuguese, not Brazilian, children. Despite these limitations, this is the first study to investigate the relationship between children's eating behaviour, nutritional status and food and nutritional insecurity in preschoolers in an area of extreme vulnerability. Further studies on this topic are needed to obtain more robust evidence in the field of research.

The study's strengths include the use of indicators such as children's eating behaviour and complementary indirect indicators of FI (socioeconomic and demographic variables and nutritional status), highlighting the complexity of the issue. As a result, it is essential for municipal management to create and implement food and nutrition education initiatives targeting children in primary healthcare centers and educational institutions. This aims to provide information on adequate and healthy food and nutrition, as well as the human right to quality food.

## 5 CONCLUSION

Our analysis revealed higher disordered eating behaviour, particularly in the category of enjoyment of food, among children. Girls scored significantly higher than boys in disordered eating behaviours. With regard to nutritional status, we found a high prevalence of overweight children, most of whom had FNS. We also identified an association between FI and BMI/A, indicating that children in food insecure households may not necessarily be underweight or overweight.

It is crucial to carry out research on similar topics to inform the development of public policies on food and nutrition security, poverty alleviation and the implementation of well-structured government programmes and interventions aimed at families in situations of social vulnerability and FI. This includes initiatives such as expanding public FNS tools in the community and strengthening food and nutrition policies.

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