

## ORIGINAL ARTICLE

## BELIEFS AND ATTITUDES OF CAREGIVERS REGARDING INFANT FEEDING AND WEIGHT DEVELOPMENT IN THE COVID-19 PANDEMIC \*

### HIGHLIGHTS

1. High percentage of caregivers and overweight children.
2. Caregivers with less schooling have a lower perception of and concern about the child's weight.
3. The caregivers were focused on feeding and monitoring the children during the pandemic.
4. Post-pandemic nutritional intervention programs should take this data into account.

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### ABSTRACT

**Objective:** To investigate the beliefs and attitudes of caregivers concerning the diet and weight development of children aged 5-7. **Method:** Descriptive study, 218 caregivers/children, carried out in eight USFs in São Carlos-SP, Brazil, in 2020/2021. Anthropometric data, sociodemographic information, health history/lifestyle habits, and the child's feeding questionnaire were analyzed. JASP® was used for statistical analysis, significance  $p < 0.05$ . **Results:** Scores were higher in the perception of responsibility for the child's diet ( $p < 0.0001$ ), and lower in the perception and concern about the child's weight ( $p < 0.0001$ ). Positive correlation: BMI children X perception and concern about the child's weight ( $p < 0.0001$ ); lower schooling X lower perception and concern about the child's weight ( $p = 0.034$ ). **Conclusion:** This study made it possible to analyze the beliefs/attitudes of caregivers regarding the diet/weight gain of their children during the pandemic, and can serve as a reference for future studies and the development of nutritional education strategies for this pediatric population.

**Keywords:** Eating Behavior; Anthropometry; Caregivers; Children; Covid-19.

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## INTRODUCTION

Excess weight is a multifactorial phenomenon with global dimensions and repercussions, currently affecting around a third of the world's population<sup>1</sup>. Its prevalence has increased over the last few decades and can start as early as the first years of life, influenced by factors such as an unbalanced diet, physical inactivity, and dysfunctions in the food environment<sup>2</sup>. The environment in which children live can hinder the adoption of healthy habits and represent a barrier to maintaining a healthy weight throughout life. In Brazil, few studies focus on this issue from the perspective of child nutrition as part of the family dynamic, especially the caregiver-child binomial, with its complex interactions.

The COVID-19 pandemic has led to social isolation measures as a strategy to prevent the spread of the virus. The prolonged closure of schools, nurseries, and commercial establishments has worsened social vulnerability and food shortages<sup>3</sup>. Families already in a vulnerable context, the focus of the Family and Community Medicine strategy, experienced a reduction in their already limited purchasing power due to rising prices and the loss of their jobs, which led to a restriction, especially of nutritionally adequate food. This has increased food insecurity, with the consequent development of a phenomenon called hidden hunger, in which the individual is overweight in the face of malnutrition due to a lack of micronutrients<sup>4</sup>. Families' food quality has been particularly affected, with a significant increase in the consumption of ultra-processed foods that are low cost, easy to access, have a higher energy density, and low nutritional value<sup>5</sup>.

The changes in children's lifestyles caused by the pandemic, such as the substantial increase in daily screen time and the reduction in physical activity, added to a diet lacking in nutrients, can result in damage not only to the dietary pattern and weight development of these individuals but also to their psychosocial development<sup>6-7</sup>.

The role of the family in shaping children's eating patterns was also strengthened during the pandemic by the increased proximity and interaction between mothers and children. Maternal beliefs and attitudes towards food and the nutritional status of their children have become even more important in the development of eating patterns and the nutritional status of these children<sup>8</sup>. A maternal stance that is overly focused on weight can, under these conditions, trigger misguided strategies for intervening in children's diets and, subsequently, the normalization of practices that overvalue ideals of thinness and stigmas associated with excess weight, which are risk factors for eating disorders, especially among girls. On the other hand, in pre-pubertal children, unstructured maternal nutritional interventions, or those not accompanied by a multidisciplinary team, can lead to important risks for children's proper growth and development<sup>9-10</sup>.

The child's eating behavior results from the parents' attitudes as nutritional educators. Specifically, the different strategies they use at mealtimes, aimed at teaching their children what and how much to eat, play an important role in children's eating patterns, with a positive correlation between their nutritional status and that of their parents<sup>11</sup>. A Child Feeding Questionnaire (CFQ)<sup>12</sup>, validated for the Brazilian population<sup>13</sup>, was developed to assess caregivers' beliefs, attitudes, and practices regarding feeding and the evolution of children's weight. Its construction was based on the Obesity Propensity Model<sup>14</sup> which described, in the area of child nutrition, how parental control can negatively influence a child's ability to self-regulate their energy intake. The CFQ proved suitable for research with caregivers of children with adequate development who are chronologically between two and 11 years old.

With this in mind, this study aims to investigate the beliefs and attitudes of caregivers on the diet and weight development of children aged five to seven. In addition, we sought to analyze the role of sociodemographic determinants, health history, and lifestyle habits on these beliefs and attitudes in the context of the COVID-19 pandemic.

## METHODS

This was a descriptive, quantitative, cross-sectional study carried out in eight Family Health Units (USF) representing the four regions (north, south, east, and west) of the municipality of São Carlos, a city in the state of São Paulo. The convenience sample was selected from the population covered by the eight USFs. It consisted of 218 healthy prepubescent children aged between five and seven years and 11 months and their caregivers, who said they were responsible for the care and feeding of the children, 77% of whom were mothers and 23% grandmothers. This age group was chosen because it is fundamental for forming eating habits. Excluded from the sample were children who were not physically able to take the necessary measurements, had a history of eating disorders, were underweight; pubescent children; children in whom only the father was available to take part in the study; caregivers who did not have the cognitive capacity to understand the research or answer the questionnaires; pregnant caregivers; caregivers who were underweight.

Collection occurred at the children's homes or the USF at a time scheduled by mutual agreement, in compliance with the biosafety measures recommended for the COVID-19 pandemic. The children and their caregivers had their weight measured on a digital scale, accurate to 100g, with a capacity of 180 kg and INMETRO certification. Height was measured using a portable stadiometer (SECA®), accurate to 0.1cm and 200cm of total capacity. For the anthropometric classification of the individuals, the Body Mass Index (BMI) was calculated using the formula  $\text{weight}/\text{height}^2$  and the WHO WhoAnthro® program, considering BMI/I for the children and only BMI for the caregivers. The children were classified by inserting the BMI value into the age- and sex-specific growth curve (BMI/A)<sup>15</sup> classified according to the Z Score. Eutrophic children were defined as having a BMI/A between Z score  $\geq -2$  and  $< +2$  and overweight were defined as children with a BMI/A for age greater than 1 SD above the mean of the WHO reference curve. As for the caregivers, those with a  $\text{BMI} \leq 24.9 \text{ kg/m}^2$  were classified as eutrophic, and those with a  $\text{BMI} \geq 25 \text{ kg/m}^2$  as overweight<sup>16</sup>.

Confirmation of the children's pubertal stage was based on information from the caregivers concerning the Tanner figures that represent the different pubertal stages in females and males<sup>17</sup>.

Two data collection instruments were used: a specific semi-structured form drawn up by the researchers to collect sociodemographic data, health history, and lifestyle habits (Appendix 1) and the *Child Feeding Questionnaire* (CFQ) (Appendix 2)<sup>12</sup>. The CFQ contains 31 items grouped into seven sub-scales: 1) Perceived responsibility (PR): quantifies parents' perception of their responsibility for the child's diet; 2) Perceived parental weight (PPW): quantifies whether parents perceive their actual weight and any excess weight; 3) Perceived child weight (PCW): quantifies whether parents perceive their child's actual weight and any excess weight; 4) Concern about the child's weight (CW): quantifies the degree to which parents are concerned about the child's weight and weight development; 5) Restriction (R), which quantifies the restrictive measures applied by parents to the child's diet; 6) Pressure to eat (PE): quantifies the degree to which parents pressure the child to eat a certain quantity or quality of food; and 7) Monitoring (M): quantifies the degree to which parents monitor their children's diet. For each of the questions, there are five answer options (Likert scale from 1 to 5). A higher score on a given subscale translates into greater concern about the aspect being researched, more frequent use of a given dietary strategy, or higher levels of participation and involvement by caregivers in feeding and monitoring children's weight.

The results were presented as  $\text{mean} \pm \text{SD}$  for continuous quantitative variables and mean, median, minimum, and maximum for discrete quantitative variables. The nominal qualitative variables were described by absolute frequency and percentage. The children and their caregivers were divided into two groups: 1) Eutrophic (adequate weight) and 2) Overweight (overweight + obese). The group of children was then divided into male

and female subgroups. Statistical analyses were carried out using JASP® 0.16.3<sup>18</sup> statistical software. The subscale scores were not normally distributed according to the *Kolmogorov-Smirnoff* test and were therefore analyzed using non-parametric tests. The statistical significance of the differences between the two groups was determined using the *Mann-Whitney* test.

*Spearman's* test assessed the binary correlation coefficient ( $\rho$ ) between the variables; the correlation intensity was classified as  $\rho > 0.70$ =strong,  $\rho 0.70-0.30$ =moderate or  $\rho < 0.30$ =weak. The association between categorical variables was analyzed using the Chi-square test. To determine the factors capable of significantly modifying the score of the CFQ subscales (Expected outcome: score above average), the variables described in the sociodemographic questionnaire, health history, and lifestyle habits were included in the logistic regression analysis for each subscale. In the exploratory logistic regression analysis, the independent variables were entered at once in the initial model (ENTER mode). All the logistic regression analysis models had a VIF < 5. The significance level adopted was 95% ( $p < 0.05$ ).

The institution's Research Ethics Committee approved the project under opinion No. 4.211.811.

## RESULTS

The study sample consisted of 218 caregiver-child pairs, totaling 436 individuals. The mean $\pm$ SD age (months) of the girls was 77.21 $\pm$ 10.7, of the boys 78.13 $\pm$ 10.3 and of the caregivers 38 $\pm$ 11 years. The sociodemographic data, health history, habits of the children and caregivers, and the mean $\pm$ SD weight and height of the children and caregivers are described in Chart 1. The distribution of the children's BMI/A and the caregivers' BMI/A is shown in Figure 1. All the caregivers in the sample said they were responsible for feeding their children, and 79% were overweight. The weight and height of the children in the overweight group were significantly higher, regardless of gender ( $p < 0.001$ ). In addition, all the caregivers in the sample said they were responsible for feeding their children. There was a significant association between overweight and birth by cesarean section ( $\chi^2=4.599$ ,  $p=0.032$ ), and overweight and having no siblings ( $\chi^2=4.298$ ,  $p=0.038$ ), in both sexes. There was no significant association between the other data on the form and the anthropometric classification of the children. There was no association with the child's sex.

**Chart 1-** Sociodemographic data, health history and habits, weight, height, and anthropometric classification of the children divided by gender and the caregivers. São Carlos, SP, Brazil, 2023.

| CHILDREN   |        |     |    | CAREGIVERS  |                   |     |    |
|--|--------|-----|----|---|-------------------|-----|----|
| Sociodemographic variables, health history, and lifestyle habits |        | n   | %  | Sociodemographic variables, health history and lifestyle habits |                   | n   | %  |
| Sex  | Male   | 115 | 53 | Education   | High School       | 74  | 34 |
|  | Female | 103 | 47 |   | Elementary School | 144 | 66 |
| Having siblings  | No     | 32  | 47 | Diet history  | No                | 107 | 49 |
|  | Yes    | 186 | 85 |   | Yes               | 111 | 51 |

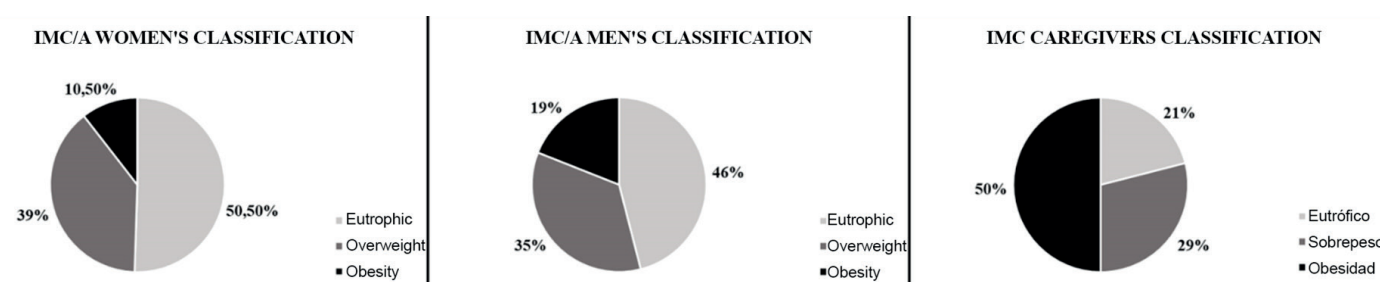
|                             |                  |     |    |
|-----------------------------|------------------|-----|----|
| Type of birth               | Normal           | 62  | 28 |
|                             | Cesarean section | 156 | 72 |
| Gestational age at birth    | Pre-term         | 62  | 28 |
|                             | Term             | 156 | 72 |
| Diagnosable chronic disease | No               | 179 | 82 |
|                             | Yes              | 39  | 18 |
| Exclusive breastfeeding     | No               | 28  | 13 |
|                             | Yes              | 190 | 87 |
| Screen time                 | Suitable         | 43  | 20 |
|                             | Increased        | 175 | 80 |
| Both parents live at home   | No               | 24  | 11 |
|                             | Yes              | 194 | 89 |

| Anthropometric variables |        |                               |         |                    | Anthropometric variables |                               |         |                    |  |
|--------------------------|--------|-------------------------------|---------|--------------------|--------------------------|-------------------------------|---------|--------------------|--|
|                          | Sex    | Anthropometric Classification | Average | Standard Deviation |                          | Anthropometric Classification | Average | Standard Deviation |  |
| Weight                   | Male   | Eutrophic                     | 22.64   | 2.99               | Weight                   | Eutrophic                     | 58.44   | 5.80               |  |
|                          |        | Excess weight                 | 31.15   | 5.53               |                          | Excess weight                 | 84.25   | 15.90              |  |
|                          | Female | Eutrophic                     | 21.96   | 3.24               | Height                   | Eutrophic                     | 1.58    | 0.06               |  |
|                          |        | Excess weight                 | 32.22   | 7.05               |                          | Excess weight                 | 1.59    | 0.07               |  |
| Height                   | Male   | Eutrophic                     | 1.20    | 0.07               |                          |                               |         |                    |  |
|                          |        | Excess weight                 | 1.23    | 0.07               |                          |                               |         |                    |  |
|                          | Female | Eutrophic                     | 1.19    | 0.07               |                          |                               |         |                    |  |
|                          |        | Excess weight                 | 1.23    | 0.07               |                          |                               |         |                    |  |

Note: According to the Brazilian Society of Pediatrics, increased screen time for children aged 2 to 5 years over 1 hour and children aged 6 to 10 years over two hours<sup>19</sup>.

Source: Authors (2023).



**Figure 1-** Classification of the BMI/A of the children divided by sex and the BMI of the caregivers. São Carlos, Brazil, 2023

Source: Authors (2023).

Table 1 shows the distribution of the score values for the seven subscales of the CFQ questionnaire for children divided by gender and anthropometric classification. The PR and M values were significantly higher than those of the other subscales in both sexes ( $p < 0.001$ ). On the other hand, the PCW and CW scores were the lowest ( $p < 0.001$ ), also in both sexes.

**Table 1** - CFQ subscale scores for groups divided according to gender and children's BMI classification. São Carlos, SP, Brazil, 2023.

|               | Anthropometric classification of children | Sex of the child | N  | Average | Median | Minimum | Maximum |
|---------------|---|------------------|----|---------|--------|---------|---------|
| Sub-scale PR  | Eutrophic                                 | Male             | 53 | 4.26    | 4.67   | 2.00    | 5.00    |
|               |   | Female           | 52 | 4.23    | 4.50   | 1.00    | 5.00    |
|               | Excess weight                             | Male             | 62 | 4.32    | 5.00   | 2.00    | 5.00    |
|               |   | Female           | 51 | 4.22    | 5.00   | 1.67    | 5.00    |
| Sub-scale PPW | Eutrophic                                 | Male             | 53 | 3.18    | 3.25   | 1.50    | 4.25    |
|               |   | Female           | 52 | 3.13    | 3.25   | 1.25    | 4.25    |
|               | Excess weight                             | Male             | 62 | 3.32    | 3.25   | 2.00    | 4.50    |
|               |   | Female           | 51 | 3.24    | 3.25   | 1.00    | 5.00    |
| Sub-scale PCW | Eutrophic                                 | Male             | 53 | 2.87    | 3.00   | 1.25    | 4.33    |
|               |   | Female           | 52 | 3.04    | 3.00   | 2.00    | 4.00    |
|               | Excess weight                             | Male             | 62 | 3.08    | 3.00   | 1.67    | 4.33    |
|               |   | Female           | 51 | 3.16    | 3.00   | 2.00    | 4.00    |
| Sub-scale CW  | Eutrophic                                 | Male             | 53 | 1.79    | 1.67   | 1.00    | 4.33    |
|               |   | Female           | 52 | 2.08    | 2.00   | 1.00    | 5.00    |
|               | Excess weight                             | Male             | 62 | 2.89    | 3.00   | 1.00    | 5.00    |
|               |   | Female           | 51 | 2.69    | 2.67   | 1.00    | 5.00    |
| Sub-scale R   | Eutrophic                                 | Male             | 53 | 3.27    | 3.50   | 1.00    | 5.00    |
|               |   | Female           | 52 | 3.31    | 3.50   | 1.00    | 5.00    |
|               | Excess weight                             | Male             | 62 | 3.32    | 3.50   | 1.00    | 5.00    |
|               |   | Female           | 51 | 3.24    | 3.50   | 1.88    | 4.50    |
| Sub-scale PE  | Eutrophic                                 | Male             | 53 | 3.22    | 3.75   | 1.00    | 5.00    |
|               |   | Female           | 52 | 3.57    | 3.88   | 1.00    | 5.00    |
|               | Excess weight                             | Male             | 62 | 3.36    | 4.00   | 1.00    | 5.00    |
|               |   | Female           | 51 | 2.98    | 3.00   | 1.00    | 5.00    |
| Sub-scale M   | Eutrophic                                 | Male             | 53 | 3.69    | 3.67   | 1.00    | 5.00    |
|               |   | Female           | 52 | 3.78    | 4.00   | 1.00    | 5.00    |
|               | Excess weight                             | Male             | 62 | 3.90    | 4.00   | 1.00    | 5.00    |
|               |   | Female           | 51 | 3.46    | 3.67   | 1.00    | 5.00    |

Source: Authors (2023).

A comparison of the scores of the sub-scales of the CFQ questionnaire among the children divided according to anthropometric classification showed that caregivers of overweight children had higher CW ( $p < 0.001$ ), and there was a higher score on the PCW sub-scale ( $p = 0.001$ ). There was no difference between the scores of the groups of children divided according to anthropometric classification in the subscales PR, PPW, R, PCW, and

M. There was no difference in the subscales of the CFQ in children according to gender.

The analysis of the association between the scores of the sub-scales of the CFQ questionnaire (above or below average) and the qualitative variables in Chart 1 showed that PPW was significantly higher in the group of caregivers who were on a diet ( $\chi^2=4.089$ ,  $p=0.043$ ) and when both parents lived at home ( $\chi^2=4.242$ ,  $p=0.039$ ). The child born at term was associated with higher PCW ( $\chi^2=15.578$ ,  $p<0.001$ ). Caregivers of children in whom excessive screen time was detected scored higher on the CW subscale ( $\chi^2=4.927$ ,  $p=0.026$ ). Caregivers reported greater (R) behavior when both parents lived at home ( $\chi^2=7.299$ ,  $p=0.007$ ).

Table 2 shows the correlation coefficients between the BMI/A values of the children divided by gender and the values of the CFQ subscales. There was a significant positive correlation between BMI/A and BWP and BMI/A and BWP in both sexes ( $p<0.001$ ). This shows that caregivers became more aware of the nutritional status and more concerned about their children's weight (boys and girls) as their BMI/A increased (especially in children classified as obese). The correlation between BMI/A and WC was negative and significant in girls ( $\rho=-0.294$ ,  $p=0.002$ ). The correlation between the boys' BMI/A and the PPW subscale was positive and significant ( $\rho=0.360$ ,  $p<0.001$ ), i.e., the caregivers of obese boys showed a greater perception of their excess weight.

**Table 2** - Linear correlation between the BMI/A of the children divided by sex and the CFQ subscales. São Carlos, SP, Brazil, 2023.

| BMI/A X<br>CFQ scale scores           | GIRLS                                 |                   | BOYS                                  |                   |
|---------------------------------------|---------------------------------------|-------------------|---------------------------------------|-------------------|
|                                       | Correlation<br>coefficient ( $\rho$ ) | p                 | Correlation<br>coefficient ( $\rho$ ) | p                 |
| Perceived responsibility (PR)         | -0.03                                 | 0.75              | 0.03                                  | 0.74              |
| Perceived parental weight (PPW)       | 0.04                                  | 0.72              | 0.20                                  | <b>0.03*</b>      |
| Perceived child weight (PCW)          | 0.27                                  | <b>0.005*</b>     | 0.37                                  | <b>&lt;0.001*</b> |
| Concern about the child's weight (CW) | 0.39                                  | <b>&lt;0.001*</b> | 0.49                                  | <b>&lt;0.001*</b> |
| Restriction (R)                       | 0.01                                  | 0.89              | 0.01                                  | 0.89              |
| Pressure to eat (PE)                  | -0.30                                 | <b>0.002*</b>     | -0.02                                 | 0.84              |
| Monitoring (M)                        | -0.07                                 | 0.48              | 0.05                                  | 0.57              |

Source: Authors (2023).

The variables capable of influencing the outcome of each of the CFQ subscales in the total group of children are shown in Table 3. None of the variables in the model significantly influenced the scores on the PE, PR, and M subscales.

**Table 3** - Results of the logistic regression analysis for each CFQ subscale (Expected outcome: "above average score on the subscale") in the group of children not divided by gender. São Carlos, SP, Brazil, 2023.

| Sub-scale | Independent variable               | VIF  | Nagelkerke | Significance of Global model p | ODDS ratio | P      |
|-----------|------------------------------------|------|------------|--------------------------------|------------|--------|
| PPW       | Overweight caregivers              | 1.20 | 0.19       | 0.002                          | 3.27       | 0.003  |
| PCW       | Full-term birth                    | 1.20 | 0.20       | 0.011                          | 5.32       | <0.001 |
| CW        | Overweight caregivers              | 1.23 | 0.31       | <0.001                         | 3.87       | 0.002  |
|           | Overweight children                | 1.07 | 0.31       | <0.001                         | 3.68       | <0.001 |
|           | Child having siblings              | 1.17 | 0.31       | <0.001                         | 2.70       | 0.041  |
|           | Increased screen time              | 1.14 | 0.31       | <0.001                         | 3.51       | 0.003  |
| R         | Caregiver's low level of education | 1.40 | 0.16       | 0.012                          | 0.46       | 0.035  |

Source: Authors (2023).

The logistic regression analysis in the group of girls showed that caregivers with low levels of schooling were less likely to recognize their responsibility for feeding their daughters (PR) (OR= 0.30, p=0.017). Lower schooling among caregivers was also associated with lower PCW (OR=0.07, p=0.008) and lower M (OR=0.36, p=0.041). Full-term birth was associated with higher PCW (OR=10.81, p=0.002). Caregivers with a history of dieting were more likely to recognize their excessive weight (PPW) (OR=3.26, p=0.020). Caregivers who were overweight and whose daughters reported excessive screen time had higher scores on the CW subscale (OR=4.68, p=0.009 and OR=3.70, p=0.041, respectively). Caregivers of overweight girls scored lower on the PE subscale (OR=0.15, p<0.001). None of the model variables significantly influenced the R subscales scores for the group of girls.

In the group of boys, the fact that the caregivers were overweight was associated with higher PPW (OR=11.54, p=0.001) and higher CW (OR=4.80, p=0.040). The fact that the boy was overweight was associated with a higher CW (OR=6.38, p<0.001). Caregivers of boys with increased screen time had higher CW (OR=3.87, p=0.036). Lower education levels among caregivers were associated with lower scores on the R subscale (OR=0.22, p=0.016). None of the variables selected in the model significantly influenced the scores of the M, PE, PR, and PCW subscales.

## DISCUSSION

This study found a high prevalence of overweight among children aged between 5 and 7 years and 11 months, despite their caregivers being concerned and committed to their children's diet. Social isolation due to the COVID-19 pandemic has led to major changes in children's routines, with reduced physical activity can result in a higher BMI/A<sup>20</sup>.

The caregivers reported being mainly responsible for the child's daily care and



feeding. Thus, although both parents also influence the construction of their children's eating habits, the role of the female figure is still decisive in shaping the child's nutritional pattern<sup>11</sup>. Thus, practices and strategies employed by caregivers in the daily context of feeding their children are important for guiding nutritionally adequate food choices. The family context, however, has numerous other factors that can influence children's weight and eating patterns, including family income, parents' perception of children's nutritional status, parents' schooling, and parental weight<sup>21</sup>.

The PR subscale of the CFQ achieved the highest scores. These data align with recent studies that have applied the CFQ to other populations with similar sample numbers<sup>22</sup>. There was no significant difference in the scores of the different sub-scales of the CFQ according to the sex of the children, which means that the trends pointed out in this research apply to both boys and girls. The results show that caregivers are concerned and committed to feeding their children, in terms of dietary decisions and portion sizes, in the face of a pandemic scenario in which it has become more difficult to acquire nutritionally adequate food<sup>23</sup>. During the COVID-19 pandemic, the importance of proper nutrition was reinforced, and the concept that good nutrition could help improve children's health and immune system, protecting them from the risks of COVID-19 infection, was repeatedly publicized in the media<sup>24</sup>, which may have contributed to the high score on the PR subscale.

On the other hand, some subscales, such as PCW and CW, obtained the lowest scores, even though it was widely reported that excess weight, in the context of the COVID-19 pandemic, could lead to an increase in the severity, length of hospitalization, complications, and mortality of the disease<sup>25</sup>. This lack of awareness on the part of caregivers about their children's excessive weight may reflect a tendency, described in current scientific literature, especially in low-income and low-schooling populations, to normalize the obese body<sup>26</sup>. A recent study<sup>11</sup> showed a significant association between higher levels of schooling among guardians and a more reliable perception of children's body weight. On the other hand, as in this study, caregivers with low education levels reported difficulty recognizing the excess weight of their offspring in the same age group. It's important to emphasize that not recognizing the child's nutritional status can lead to parental attitudes towards feeding their children that can aggravate both situations of over- and under-nutrition.

The literature reinforces that many parents don't see the real weight of their children, especially those who are only overweight and belong to younger age groups. They often characterize these children as "strong" and "well-nourished"<sup>27</sup>. In a survey carried out in north-eastern Brazil, parents described their overweight children as having "large frames", "strong bodies" and "big bones". The caregivers said that the children were active and had no need for nutritional interventions since they had no health-related complaints and were still going to grow<sup>28</sup>.

On the other hand, caregivers who recognized that their children were overweight were more concerned about their children's weight. Recognizing that being overweight entails progressive health risks can motivate parents to seek out and become actively involved in structured, multidisciplinary proposals for children's nutritional education. On the other hand, parental practices aimed at excessive control over children's diets, with restrictions on unhealthy foods and portion control, can lead to greater consumption of ultra-processed foods when they are available, as well as interfering with internal hunger and satiety signals and, consequently, the child's self-regulation of appetite<sup>29</sup>.

Concern about the child's weight was also higher when guardians had an increased BMI. Those responsible may be more aware of the physical and psychosocial consequences of being overweight since they experience its negative effects daily. On the other hand, although concern about the child's weight may indicate a greater level of parental involvement in the nutrition and care of their overweight children, this practice carries potential long-term negative effects, such as the possibility of stigmatizing the child. It is well known that children and adolescents can suffer verbal and physical abuse associated with being overweight, leading to marginalization, exclusion, and social discrimination. The individual consequences of stigmatization can be low self-esteem, rejection of the real

body, eating disorders, lower school performance, depression, increased compensatory food intake, and reduced physical activity to reduce exposure to one's body<sup>30</sup>.

Therefore, the parental style in educating children about nutrition and the degree of food control differs, depending on the parents' and guardians' values, personal experiences, communication skills, and consumption patterns. This study showed that data from the children's personal history, such as premature birth, can influence how caregivers see their children throughout childhood, making it difficult to perceive excess weight in their prematurely born children. The caregivers in this study also revealed that they put pressure on their eutrophic daughters to make healthy eating choices and to regulate the amount of food they eat, which can potentiate the emergence of eating disorders in this particularly susceptible population. Still on maternal attitudes, caregivers of children with screen time above that recommended by the Brazilian Society of Pediatrics, aware of the consumerist pressure conveyed by the media, reported greater concern about their children's weight and more food restriction interventions, especially if supported by the father figure at home, as has also been described in the literature<sup>31</sup>.

The limitation of this study is that it only carried out an indirect assessment of the parents' dietary practices and beliefs based on reports rather than direct observation of the food context during family mealtimes, which could lead to biases. In addition, the study sample was made up predominantly of families enrolled in USFs located in areas of social vulnerability, a fact that may limit extrapolations to the general population. It is therefore recommended that new studies be carried out comparing populations with different economic and social profiles and using different tools and methods to collect and analyze data, thereby increasing the analytical and inferential power of the results.

Despite the limitations, this is an important study because it enables the analysis of data on the beliefs and attitudes of caregivers about the diet and weight development of their children during the pandemic, which can serve as a reference for future studies and the development of nutritional education strategies aimed at the pediatric population.

## CONCLUSION

Regarding caregivers' beliefs and attitudes about food and children's weight development, the perception that caregivers were mainly concerned with their children's nutrition during the pandemic could lead to greater adherence to various aspects of children's nutritional care in the post-pandemic period. These programs, aimed at the pediatric population as a whole, regardless of parents' recognition of their children's anthropometric classification and the stigmatization of excess weight, can result in important long-term health benefits for this population, especially when designed and monitored by a multidisciplinary team.

Concerning the role of sociodemographic determinants, health history, and lifestyle habits, we should consider the possibility that the caregivers' emphasis on food and its monitoring described in this study may also be the result of the impoverishment of the population due to the pandemic and the difficulty in providing children with minimally adequate nutrition, which needs to be taken into account when designing public policies aimed at the health of these children.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Oliveira GL de, Saraiva TS**, Drafting the work or revising it critically for important intellectual content - **Del Vale GF, Kishi RGB, Melo DG, Avó LR de, Germano, CMR**. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Del Vale GF**. All authors approved the final version of the text.

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