ORIGINAL ARTICLE

SOCIAL PROTECTION MEASURES AS DETERMINANTS OF FOOD [IN]SECURITY IN HOUSEHOLDS OF PUBLIC SCHOOL STUDENTS DURING THE COVID-19 PANDEMIC

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Higlights: (1) Over 80% of households with public school students experienced food insecurity. (2) Households receiving two or more social protection measures had higher risk of food insecurity, highlighting the need to monitor benefits. (3) Findings provide a basis for integrated policies promoting food security and the right to adequate food.

PRE-PROOF

(as accepted)

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SOCIAL PROTECTION MEASURES AS DETERMINANTS OF FOOD [IN]SECURITY IN HOUSEHOLDS OF PUBLIC SCHOOL STUDENTS DURING THE COVID-19 PANDEMIC

ABSTRACT

The objective of this study was to evaluate the association between the co-occurrence of social protection measures and food insecurity in households of public school students from two municipalities in Minas Gerais. This was a cross-sectional study, conducted through telephone interviews in June/July 2020, with household heads of students enrolled in basic education in the municipalities of Ouro Preto and Mariana, Minas Gerais, Brazil. Data on the receipt of social protection measures were collected: Bolsa Família, Emergency Aid, and access to government food baskets. Food insecurity (FI) was assessed using the Brazilian Food Insecurity Scale. Descriptive analyses, Pearson's Chi-square test, and univariate and multivariate logistic regression were performed, adjusting for household head's educational level and type of street pavement. Among the 542 households evaluated, 82.0% were in a situation of food insecurity, 63.0% received Emergency Aid, and 23.0% received all three social protection measures. Households receiving two and three social protection measures were 2.05 (95% CI: 1.01–4.15) and 2.85 (95% CI: 1.31–6.16) times more likely to experience food insecurity, respectively, compared to those receiving none. These findings indicate that families experiencing food insecurity were reached by social protection policies and measures; however, these measures were not sufficient to ensure the Human Right to Adequate Food and Food and Nutrition Security.

Keywords: Social distancing; Food security; Hunger; Social protection.

1 INTRODUCTION

The COVID-19 pandemic was characterized by the spread of the SARS-CoV-2 virus, responsible for severe acute respiratory syndrome, across several countries beginning in 2020. As a containment strategy to reduce the transmission of the virus, it became necessary to implement social restrictions, such as the suspension of in-person classes in schools and universities and the closure of commercial establishments(1,2). Although these measures contributed to controlling the spread of the virus, they also intensified pre-existing social challenges, including unemployment, socioeconomic vulnerability, and food insecurity (FI)(3).

FI is associated with the difficulty of regular and permanent access to food, experienced

through both qualitative and quantitative restriction of food(3,4). Moreover, it has its roots in economic disparities, social inequalities, and the fragility of food systems. Thus, when simultaneous, these elements are capable of influencing access to food and food choices, since these depend on the family's financial condition; therefore, households living below the poverty line have difficulty acquiring food products and consumer goods, a situation that results in the experience of FI(3,5).

Considering these complexities, during the pandemic period, the government in different governmental spheres adopted measures such as conditional cash transfer programs, with the aim of ensuring Food and Nutrition Security (FNS) and thus the Human Right to Adequate Food (HRAF). These measures were intended to provide immediate poverty relief and ensure access to basic rights in the areas of education, health, and social assistance, supported by complementary actions and programs(4,6).

In this context, and recognizing the perspectives proposed by the Decade of Action on Nutrition 2016–2025 and the Sustainable Development Goals (SDGs) for addressing inequities, the present study sought to evaluate the association between the co-occurrence of social protection measures and Food (In)Security in households of public school students in two Brazilian municipalities during the COVID-19 pandemic.

2 METHODS

2.1 Study Population

This is a cross-sectional study referring to the baseline of the project entitled "Study of Food and Nutrition Security during the COVID-19 Pandemic (ESANP)", conducted with the guardians of students enrolled in public basic education in the municipalities of Ouro Preto and Mariana, Minas Gerais.

The sample size was calculated using proportional stratification representative of the categories of early childhood education and elementary education in the municipalities, including early childhood education (daycare centers and preschool) and elementary education (I and II), considering the total number of students enrolled in the second semester of 2020

(n=13,219). Adopting a 95% significance level and considering a food insecurity prevalence of 36%, according to the 2017/18 Household Budget Survey (POF), the minimum sample size for this study should be 374 participants, with an additional 60% added due to the longitudinal design of the study.

The Research Ethics Committee for Human Subjects approved the study under opinion number 4.046.719 and CAAE 32005120.6.0000.5150. Informed consent was obtained verbally from all participants and recorded in mp4 format.

2.2 Data collection

Data collection was conducted between June and July 2020, under the coordination of graduate students, who recruited and trained undergraduate students two months in advance to participate in the process. Interviews were conducted by telephone, with an average duration of 20 to 25 minutes. Eligible participants were those responsible for acquiring or preparing meals in households of students enrolled in basic education, aged ≥18 years, residing in the same household as the student, and who consented to participate in the study.

Contacts for which no communication was successful after five attempts on different days and times were excluded, as well as those in which contact with the responsible person was not possible. In these circumstances, to avoid compromising the sample, new draws were conducted to fill the missing quota.

2.3 Food and Nutrition [In]Security

Household FI was assessed using the Brazilian Food Insecurity Scale (EBIA), a validated and adapted instrument for the Brazilian population(7). The EBIA consists of 14 questions for households with children under 18 years, with dichotomous answers (yes/no) that capture information from the past three months regarding access to food at home. Through this instrument, it is possible to estimate the prevalence of household food insecurity based on the final score, with each affirmative answer scoring one point and each negative answer scoring zero points. Accordingly, households can be classified into four levels: food security (0 points), mild food insecurity (1–5 points), moderate food insecurity (6–10 points), and severe food

insecurity (10–14 points)(7).

For inferential analyses, the degrees of FI were dichotomized into food security and food insecurity, which included the categories mild, moderate, and severe food insecurity.

2.4 Social protection measures (SPMs)

SPMs were assessed through a questionnaire containing questions adapted from national surveys(8,9). Receipt of Bolsa Família (yes/no), Emergency Aid (yes/no), and access to a basic food basket or meal kit (yes/no) provided by the municipalities in June/July 2020 was considered, due to school closures during the pandemic. The variables were analyzed individually and subsequently grouped into households that received up to two social protection measures and those that received up to three social protection measures, referred to as the co-occurrence of social protection measures variable.

2.5 Covariates

The covariates assessed were: sex (female/male), age of the household head, skin color/race, marital status, educational level of the household head, paid employment, household income, and housing characteristics.

Age was recorded in completed years and subsequently analyzed in a dichotomized form (≤38 years and ≥39 years). Skin color/race was self-reported according to the Brazilian Census categories: white, brown (pardo), black, yellow (Asian), and Indigenous. For bivariate analysis, self-reported skin color/race was dichotomized into non-white (black/brown/yellow) and white. Marital status was recorded as single, married/stable union, widowed, or separated/divorced. For analysis purposes, these were grouped into two categories: single (single/widowed/separated/divorced) and married (married/stable union). Educational level was based on a direct question regarding years of schooling and was dichotomized into less than or equal to incomplete high school (≤9 years) and greater than complete high school (>9 years). Household income reported by participants was grouped into two categories according to the monthly family minimum wage: up to two minimum wages (≤2MW: R$2,090.00) and three or more minimum wages (≥3MW: R$3,135.00). Participants' perception of income

reduction during the pandemic (yes/no) and the impact of income loss on the household were also investigated, with categories for analysis defined as very large/large, medium, and small/no impact. Regarding housing conditions, street pavement type was classified as asphalt/sidewalk or dirt/gravel.

2.5 Statistical analyses

Descriptive analyses were presented as absolute and relative frequencies, and the relationship between social protection measures and covariates was assessed using Pearson's Chi-square test. For this purpose, the receipt of no social protection measure, one social protection measure, two social protection measures (accumulation of at least two social benefits), and three social protection measures (simultaneous accumulation of the three assessed social benefits) was considered individually.

To represent the simultaneous occurrence of social protection measures among households, a Venn diagram was used, which allowed the graphical representation of intersections to observe overlaps among the sets of measures analyzed.

Univariate and multivariate logistic regression analyses were performed. Three models were constructed: Model 1 – no social protection measure versus one social protection measure; Model 2 – no social protection measure versus two social protection measures; and Model 3 – no social protection measure versus three social protection measures. Receipt of no social protection measure was used as the reference category in all models. The final models were adjusted for the educational level of the household head and street pavement type. Categorical variables were described as absolute and percentage frequencies, and odds ratios (ORs) with their respective 95% confidence intervals (CIs) were estimated. Statistical analyses were performed using Stata® version 13.0. The significance level adopted for all analyses was 5%.

3 RESULTS

A total of 542 households were evaluated, of which 82.10% were in a situation of food insecurity, regardless of the receipt of social protection measures. Additionally, 51.50% of the households were headed by men, and 81.50% of the respondents self-identified as non-white;

60.60% were married or living in a stable union, 85.30% had a monthly household income equal to or less than 2 minimum wages, and 50.90% did not engage in paid employment. Regarding housing conditions, 76.00% had streets that were paved or with sidewalks (Table 1).

Table 1: Sociodemographic characteristics according to the receipt of social protection measures by households during the COVID-19 pandemic, June/July 2020.

Variables		Number of social protection measures				
	Total % (n)	**0**	**1**	**2**	**3**	***p-value***
Situação da SA						
Food secure	17.90 (97)	28.16 (29)	20.90 (37)	12.59 (17)	11.02 (14)	**0.002**
Mild food insecurity	65.50 (355)	61.17 (63)	68.36 (121)	64.44 (87)	66.14 (84)	
Moderate food insecurity	11.62 (63)	7.77 (8)	8.47 (15)	15.56 (21)	14.96 (19)	
Severe food insecurity	4.98 (27)	2.91 (3)	2.26 (4)	7.41 (10)	7.87 (10)	
Sex of household head**						
Female	48.46 (205)	34.09 (30)	44.22 (65)	53.54 (53)	64.02 (57)	**<0.001**
Male	52.54 (218)	65.91 (58)	55.78 (82)	46.64 (46)	35.96 (32)	
Age of household head**						
≤38 years	44.55 (188)	35.23 (31)	41.50 (61)	51.02 (50)	51.69 (46)	0.067
≥39 years	55.45 (234)	64.77 (57)	58.50 (86)	48.98 (48)	48.31 (43)	
Self-Declared skin color **						
Non-white	81.47 (343)	86.21 (75)	77.40 (113)	82.83 (82)	82.02 (73)	0.386
White	18.53 (78)	13.79 (12)	22.60 (33)	17.17 (17)	17.98 (16)	
Marital Status **						
Single	39.44 (213)	29.13 (30)	35.59 (63)	42.54 (57)	50.00 (63)	**0.007**
Married/Stable union	60.56 (327)	70.87 (73)	64.41 (114)	57.46 (77)	50.00 (63)	
Educational level of household head **						
≤ 9 years	47.40 (255)	26.21 (27)	33.52 (59)	61.65 (82)	69.05 (87)	**<0.001**
> 9 years	52.60 (283)	73.79 (76)	66.48 (117)	38.85 (51)	30.95 (39)	
Trabalho remunerado						
Não	50.92 (276)	25.24 (26)	42.47 (75)	63.670 (86)	70.08 (89)	**<0.001**
Sim	49.08 (266)	74.76 (77)	57.63 (102)	36.30 (49)	29.92 (38)	
Household income [a] **						
≤ 2 MW	85.27(434)	59.41 (60)	81.93 (136)	98.43 (125)	98.26 (113)	**<0.001**
≥ 3 MW	14.73 (75)	40.59 (41)	18.07 (30)	1.57 (2)	1.74 (2)	
Income reduction during the pandemic						
Yes	67.16 (364)	55.34 (57)	66.67 (118)	70.37 (95)	74.02 (94)	**0.020**
No	32.84 (178)	44.66 (46)	33.33 (59)	29.63 (40)	25.98 (33)	
Impact of income on household						
Very high/High	55.49 (202)	33.33 (19)	57.63 (68)	61.05 (58)	60.64 (57)	**<0.001**
Medium	37.91 (138)	47.37 (27)	37.29 (44)	31.58 (30)	39.36 (37)	
Low/No impact	6.59 (24)	19.30 (11)	5.08 (6)	7.37 (7)	0.00 (0)	

Type of road pavement						
Dirt/Grave	23.99 (130)	19.42 (20)	20.34 (36)	23.70 (32)	33.07 (42)	**0.042**
Asphalt/Sidewalk	76.01 (412)	80.58 (83)	79.66 (141)	76.30 (103)	66.93 (85)	

Note: * FNS: Food and Nutrition Security; ** Data available for assessed characteristics n= < 542; [a]MW: Minimum wage R$1,045.00 in Brazil in 2020; Pearson's Chi-square test; Bold values indicate statistical significance (p <0.05).

When evaluating the prevalence of social protection measures received, the Emergency Aid program was predominant in 63.0% of households, as shown in Figure 1.

Figure 1: Prevalence of receipt of social protection measures in households during the COVID-19 pandemic, June/July 2020.

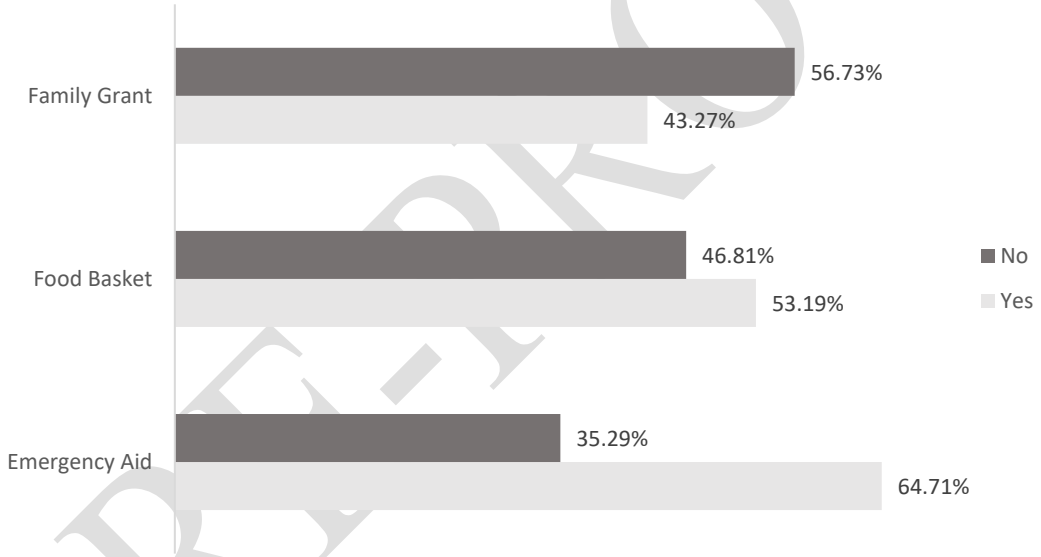
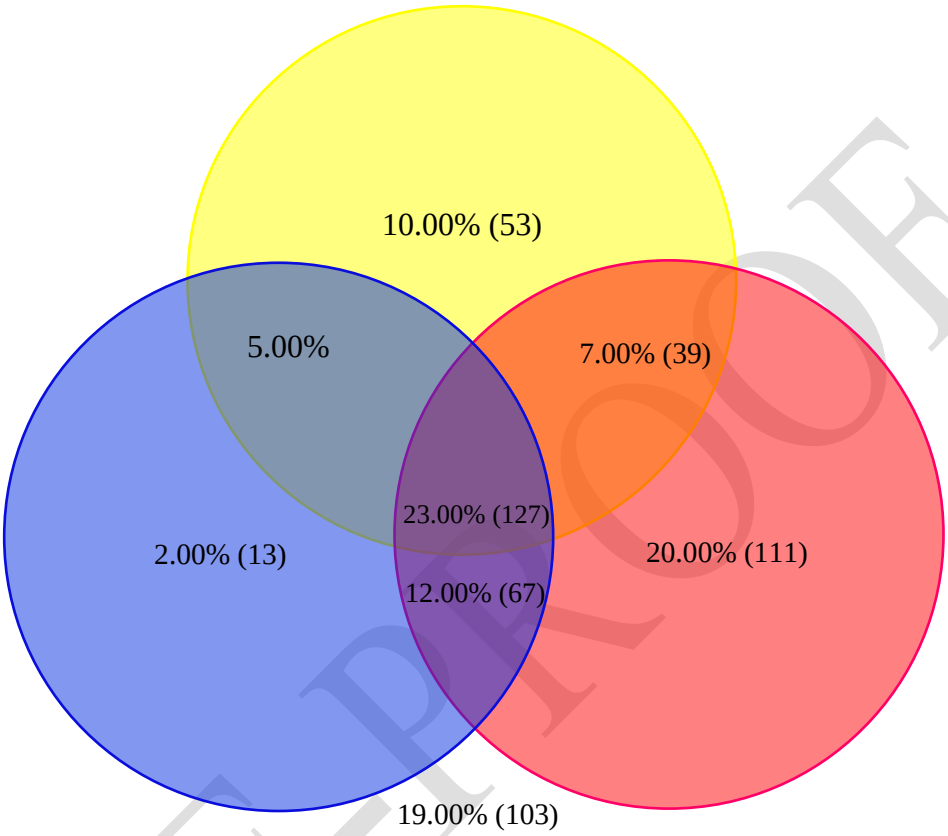


Figure 2 shows the co-occurrence of SPMs, with 23.00% of households receiving the combination of all three SPMs simultaneously (Emergency Aid, Bolsa Família, and food basket), and 19.00% receiving no benefits.

Figura 2: Co-occurrence of social protection measures in households with children and adolescents during the COVID-19 pandemic, June/July 2020.



Legend: The yellow circle represents the food basket variable; the pink circle represents the Emergency Aid variable; and the blue circle represents the Bolsa Família variable.

In the adjusted analysis, households receiving two SPMs (OR: 2.05; 95% CI: 1.01–4.15) and those receiving three SPMs (OR: 2.85; 95% CI: 1.31–6.16) were more likely to experience food insecurity compared to those not receiving any measures (Table 2).

Table 2: Association between food insecurity and the co-occurrence of one or more social protection measures in households with children and adolescents during the COVID-19 pandemic, June/July 2020.

Variables	Unadjusted Analysis			Adjusted Analysis		
	OR	95% CI	*p- value*	OR	95% CI	*p- value*
Model 1*						
No SPMs	1	Ref.	-	1	Ref.	-
Receipt of one SPM	1.48	0.85 - 2.60	0.169	1.48	0.84-2.61	0.176
Model 2[b*]						
No SPMs	1	-	-	1	-	
Receipt of two SPMs	2.72	1.40 – 5.29	**0.003**	2.05	1.01-4.15	**0.046**
Model 3*						
No SPMs	1	-	-	1	-	
Receipt of three SPMs	3.16	1.57 – 6.38	**0.001**	2.85	1.31-6.16	**0.008**

Note: SPM: Social protection measure; OR: Odds ratio; CI: Confidence interval; a: Adjusted for educational level and street pavement type; Bold values indicate statistical significance (p <0.05).

4 DISCUSSION

Our main finding was that, although during the pandemic the SPMs implemented by different levels of the Brazilian government were important for mitigating inequities and reached the most vulnerable families, they were not sufficient to ensure access to adequate and healthy food, and consequently to guarantee the HRAF. To our knowledge, this study is notable for its novelty in evaluating the simultaneous receipt of social protection measures and the prevalence of FI in households of public school students during the COVID-19 pandemic.

In this context, in Brazil, FI had already been worsening since the pre-pandemic period due to the political crisis combined with an economic crisis and the dismantling of social policies, experienced during that time by the extinction of the National Food and Nutrition Security Council (CONSEA) and the weakening of the National Food and Nutrition Security System (SISAN)(10). With the advent of the COVID-19 pandemic, socially vulnerable families became more susceptible to the impacts of the health crisis, as unemployment and formal job losses increased, along with a decline in household income and a significant reduction in purchasing power. This scenario, combined with inflation in the prices of basic foods that make

up the Brazilian diet such as rice, beans, meats, and vegetables led to a decrease in the consumption of fresh and minimally processed foods and an increase in the intake of ultra-processed foods, a situation that is associated with the presence of FI in the household(11,12).

Therefore, it is important to highlight the prevalence of severe FI in 5.7% of the households investigated, indicating the experience of hunger by at least one resident. Hunger is defined by people's experiences of food deprivation, which can occur in distinct stages and intensities(4). This means that before an individual faces the absence of food, this experience is preceded by distressing psychological and physical perceptions, conditioned by uncertainty about whether the available food is sufficient. This condition reinforces the need for intersectoral action as proposed by the Organic Law on Food and Nutrition Security (LOSAN), which envisions dialogue among health, social assistance, and agriculture policies to strengthen access to healthy foods and ensure the HRAF(6,13,14).

Social vulnerability can also be identified through other characteristics investigated in the present sample. In this study, FI was significantly associated with household headship, educational level, paid employment, household income, income reduction during the pandemic, marital status, and housing conditions. It is worth noting that although women have gained more space in society today, many challenges remain. Opportunities across different spheres are not equal between genders, highlighting the responsibility of women to break the cycle of low education, lower income, and poverty, all interconnected with FI(3,15). Furthermore, a low educational level of the household head is an indicator of quality-of-life risk, especially in families with children(16). In this study, almost half of the respondents had completed fewer than nine years of schooling. When compared with the national average, similar results are observed, with FI being more prevalent in households headed by individuals with less than eight years of education(3). Thus, educational level is an important socioeconomic indicator, since lower education reduces opportunities for formal employment with adequate remuneration, perpetuating insufficient and unstable access to quality food(17,18).

The 2020 National Household Sample Survey (PNAD) showed that the average monthly household income at the national level was R$2,618, and in Minas Gerais it was R$2,333(9). In this regard, studies indicate that households with low income, that is, with a family income below two minimum wages, are more vulnerable to food insecurity, since the money available

for food purchases competes with other essential needs such as rent, gas, electricity, water, transportation, among other expenses(14,19,20).

Given the complexities surrounding FI, the government has the responsibility to guarantee the HRAF(6). Thus, SPMs are implemented to help address poverty and inequalities, aiming to promote well-being and protection for the population across different age groups. In this regard, the benefits resulting from the use of SPMs are unquestionable; however, emergency situations require additional efforts and restructuring to ensure FNS(1,21,22).

Such measures strengthen national and local data, in addition to contributing to advances and changes in the systems that currently perpetuate FI. Although families were assisted by SPMs, which contributed to reducing inequities during the pandemic, these were still insufficient to promote FNS.

This demonstrates that, to modify this unequal exposure, which predominantly affects the vulnerable population and beneficiaries of SPMs, innovative and effective intersectoral public policies are necessary, addressing the multidimensionality of FNS. Additionally, the joint implementation of other public policies, such as income generation programs, access to education, and social support, is required to ensure access to food and mitigate the deterioration of FNS in the country(23). Moreover, it is essential that managers from different sectors implement food protection actions, considering that strategies such as family farming, open-air markets, and municipal wholesale markets provide more affordable prices and consequently facilitate access to healthier foods(19,23–25).

Nevertheless, some limitations of this study should be considered. Notably, data collection was conducted via telephone, which prevented capturing nuances of the environment in which individuals were situated, as well as limiting participation to households with telephone access, potentially introducing participation bias. Furthermore, the remote approach hindered the collection of contextual and environmental aspects relevant to understanding participants' living conditions. Despite these limitations, the study stands out for providing original data in the atypical context of a pandemic.Therefore, it is recommended that future studies adopt in-person or population-based data collection strategies, allowing for a more inclusive approach and a more in-depth analysis of FI. It should also be noted that students enrolled in private schools were not included. However, the data obtained can be extrapolated

to all students in the studied population, given the study's sample representativeness and its reproducibility when compared to other findings in the literature conducted with students from both public and private schools((15,26).

The strengths of this study stand out, to our knowledge, for its pioneering investigation of the association between SPMs and FI in the municipalities of Ouro Preto and Mariana. Additionally, the data collected may be used to support the strengthening and structuring of services and programs aimed at combating hunger, promoting health, and ensuring access to adequate and healthy food.

5 CONCLUSION

Households that received two or more SPMs had higher chances of experiencing FI. Therefore, although families in situations of FI were assisted by programs and SPMs, these were not sufficient to ensure FNS and the HRAF. These findings reinforce the need to strengthen and coordinate intersectoral public policies through the expansion of coverage, the increase of transferred amounts, and the incorporation of approaches that consider the multiple dimensions of social vulnerability. This underscores the need for the formulation of more integrated and sustainable policies, capable of ensuring not only regular and permanent access to quality food but also the promotion of equity in the living conditions of the vulnerable population.

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SOCIAL PROTECTION MEASURES AS DETERMINANTS OF FOOD [IN]SECURITY IN HOUSEHOLDS OF PUBLIC SCHOOL STUDENTS DURING THE COVID-19 PANDEMIC

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