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Association between food insecurity and food intake

Melissa Luciana de Araújo M.Sc. [a], Raquel de Deus Mendonça Ph.D. [b], José Divino Lopes Filho Ph.D. [c], Aline Cristine Souza Lopes Ph.D. [c,*]

[a] Program in Nursing, Federal University of Minas Gerais, Research Group on Nutrition Interventions, Belo Horizonte, Brazil
[b] Federal University of Minas Gerais, Research Group on Nutrition Interventions, Belo Horizonte, Brazil
[c] Nutrition Department, Federal University of Minas Gerais, Belo Horizonte, Brazil

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ABSTRACT

Background: We aim to identify the prevalence of food insecurity and to ascertain the association between food insecurity and food intake.
Method: A cross-sectional survey.
Setting: The study included users of a primary healthcare service in Belo Horizonte, Brazil, from 2013 to 2014. Socioeconomic, health, and food intake data were gathered using a questionnaire and the Brazilian Food Insecurity Scale.
Subjects: Individuals 20 years old or older (n = 2817).
Results: The prevalence of food insecurity among families with individuals under 18 years was 41.0%, and 26.4% in other households. After adjusting for potential confounders, the households in food insecurity with members under 18 years old, the consumption of fruits and vegetables (RP = 0.70, 95%IC: 0.58–0.84), and fruits (RP = 0.74, 95%IC: 0.59–0.93) was lower; and consumption of beans was higher (RP = 1.49, 95%IC: 1.06–2.09) compared to those with food security. In households without members under 18 years old, the consumption of fruits and vegetables (RP = 0.68, 95%IC: 0.58–0.79), fruits (RP = 0.61, 95%IC: 0.50–0.74), and beans (RP = 0.78, 95%IC: 0.63–0.97) was lower; and the consumption of tubers (RP = 1.36, 95%IC: 1.03–1.79) was higher. However, the state of food insecurity did not affect the consumption of ultraprocessed foods, independently of age, sex, marital status, educational level, and employed status.
Conclusion: Food insecurity negatively affected the fruit and vegetable consumption in both types of families tested. The consumption of beans was higher in households with children and adolescents, and the consumption of tubers was higher in households without children and adolescents. However, food insecurity did not change the intake of ultraprocessed foods.

Introduction

The World Health Organization (WHO) has proposed that there is a need to improve global food standards to prevent non-communicable health problems [1]. To do so, the WHO suggests having available dietary guides that stimulate the consumption of *in natura* or minimally processed foods, rather than ultraprocessed foods [2].

Fruits, vegetables, beans, and fish are *in natura* or minimally processed foods and are recognized as markers of healthy eating because of their nutrient profiles and because they are low-energy density foods [2,3]. Ultraprocessed foods are considered markers of unhealthy eating because they contain high amounts of fat, sugar, and salt; are high-energy density foods; and have low fiber content [3]. The determinants of the consumption of these foods have been investigated in studies; however, consumer food security has been neglected in such studies [4–6].

The United Nations Food and Agriculture Organization (FAO) defines food security as physical, social, and economic access to food that is safe and sufficient to meet nutritional needs [7]. The FAO estimates that 805 million people worldwide have sufficient daily food intake to be considered food secure and, thus,

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* Corresponding author. Tel.: +55 31 3409 9179; fax: +55 31 3409 9860.
E-mail address: alinelopesenf@gmail.com (A. C. S. Lopes).

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can maintain an active and healthy life [8]. In the adult population, food insecurity may be associated with poor dietary choices with higher consumption of unhealthy food [9].

To our knowledge, no studies have yet investigated the relationship between food security and the consumption of *in natura*, minimally processed, and ultraprocessed foods. Few studies have explored the relationship between food security and the consumption of healthy and unhealthy food in the adult population attending a healthcare service. Thus, the present study aimed to identify the prevalence of food insecurity among the families of public health care service users of a developing country and its association with food intake.

Material and methods

Health academy program and type of study

This study was conducted in the city of Belo Horizonte, the capital of Minas Gerais, from February 2013 to June 2014. Belo Horizonte is located in southeastern Brazil, and is the sixth largest Brazilian city, with a population of 2,479,165 inhabitants [10]. It has a municipal human development index (HDI) of 0.810, and Gini of 0.6106 (the Gini index is an economic metric used to assess the distribution of income among a nation's residents) [11].

Belo Horizonte was chosen as a field of research to present a broader view of health care through what is known as the Health Academy Program (HAP). HAP is integrated into the primary health care of the national health care system. HAP includes public spaces constructed for the promotion of healthy living by offering opportunities for regular physical exercise classes, healthy eating, and community education activities at no cost [12]. HAP centers are primarily located in vulnerable areas [13].

A cross-sectional study was conducted on a representative conglomerate sample in 18 units of the HAP, with ~104 to 294 participants in each center. Of the 50 HAP units operating during the sampling time, 42 were eligible. The 18 units were representative of the HAP units, with 95% confidence and 1.4% error based on an estimation of the population proportion. Details of the sampling process are available from a previous study [14]. *The research* was approved by our institution's Research Ethics Committee and was recorded in the Brazilian Registry of Clinical Trials.

Study participants

All HAP users ≥20 y of age were eligible for inclusion. The exclusion criteria consisted of being pregnant, having impaired mental health that prevented answering the questionnaire, or failing to attend three scheduled interviews.

Among the 3414 respondents, individuals were excluded if they were not responsible for food purchase and preparation (n = 314), which is an important requirement for answering questions about food security. Individuals also were excluded if they did not answer the question concerning food purchase or preparation at home (n = 110); if they had chronic kidney disease as this would interfere with food consumption, especially for fruits and vegetables, which are sources of the micronutrient potassium (n = 21); if they did not answer the questionnaire about food security (n = 24); or if they lived in the same household as another respondent, to avoid duplication of household data (n = 128) [15]. After these exclusions, 2817 participants remained and were included in the final analysis.

Food insecurity

Data were obtained using face-to-face interviews with HAP users. The Brazilian Food Insecurity Scale (EBIA) was used to evaluate the food insecurity of participants' families. This is an adapted, Brazilian version of the Household Food Security Survey Module (HFSSM) [16,17]. The EBIA consists of 15 closed questions (yes/no), 7 of which relate to family members <18 y of age, and a score of 1 was given for each positive answer (yes). Therefore, households with children/adolescents answered 15 questions and other households answered 8. Households were then classified into four levels: food security, mild food insecurity (i.e., fear of suffering food insecurity in the near future), moderate food insecurity (i.e., restriction of the quantity of food for the family), and severe food insecurity (i.e., hunger among adults and/or children in the family) [16].

For analysis purposes, the final EBIA score was categorized as food security or insecurity, which included situations of mild, moderate, or severe food insecurity. A subdivision was made, according to the presence or absence of individuals <18 y of age.

Food consumption

Food intake was assessed by daily or weekly frequency of consumption of healthy foods (*in natura* and minimally processed foods) and unhealthy food markers (ultraprocessed foods). We considered as regular consumption of healthy markers the following *in natura* and minimally processed foods: fruits and vegetables (five or more daily portions, not including juices and tubers); fruits (three daily portions, not including juices); vegetables (four daily portions, not including tubers); beans (five or more days per week); fish (one or more days per week); meat (five or more days per week); and tubers (five or more days per week) [3,18,19]. For the unhealthy food markers, we considered the regular consumption of ultraprocessed foods: cookies, sweets, processed meat, fried food, sugar-sweetened beverages, and salty snack foods (one or more days per week) [3].

Socioeconomic and demographic characteristics

The sociodemographic variables investigated were sex, age, per capita monthly income (family income divided by the number of household members), marital status (married/common-law marriage, separated/divorced/widowed, or single), and main occupation (housewife, retired/pensioner, unemployed, or employed). We also consideerd educational level, sex education level of the head of the household, receipt of government benefits, and number of residents <18 and >60 y of age.

Statistical analysis

All analyses were performed using the Stata version 14 (Stata Corp, Dallas, TX), and the statistical significance was set at 5%.

Differences in sociodemographic characteristics and food intake of households with and without food insecurity were assessed using the χ^2 test.

Multivariate analyses, investigating the association between food intake and food insecurity, were performed using prevalence ratios (PRs) and their 95% confidence intervals (CIs) through Poisson regression models. For this, we used food security as the reference category. The estimated PRs from the Poisson regression models were adjusted for age, sex, marital status, household educational attainment, and employed status.

Results

Among the households surveyed with members <18 y of age, 59% were in a situation of food security compared with 73.6% of those without members <18 y. Among the different levels, mild food insecurity had the highest prevalence (Fig. 1). Food insecurity (mild, moderate, or severe) was present in 41% of the households among members <18 y of age and in 26.4% of the remaining households.

In households with food insecurity without individuals <18 y, most of the members >60 y of age were retirees or pensioners. In both classification of food-insecure families, the highest percentage were married, the man was the head of the family, and the family had a lower level of education and per-capita monthly income (Table 1).

The prevalence of food intake among study participants and by food security classification is displayed in Table 2. We detected differences in the consumption of healthy food markers. Compared with food-secure households, those families with members <18 y of age and with food insecurity reported lower regular consumption of fruits and vegetables, but a higher intake of beans. When comparing food-secure and food-insecure families in households without members <18 y, we detected a lower consumption of fruits and vegetables, fruits, and beans and a higher consumption of tubers (Table 2).

In the multivariate models, after adjusting for sociodemographic characteristics (Fig. 2), regular food consumption was associated with a food-insecure classification in households with members <18 y of age and demonstrated lower consumption of fruits and vegetables (PR, 0.70; 95% CI, 0.58–0.84) and fruits (PR, 0.74; 95% CI, 0.59–0.93), but a higher bean consumption (PR, 1.49; 95% CI, 1.06–2.09). In the households without members <18 y of

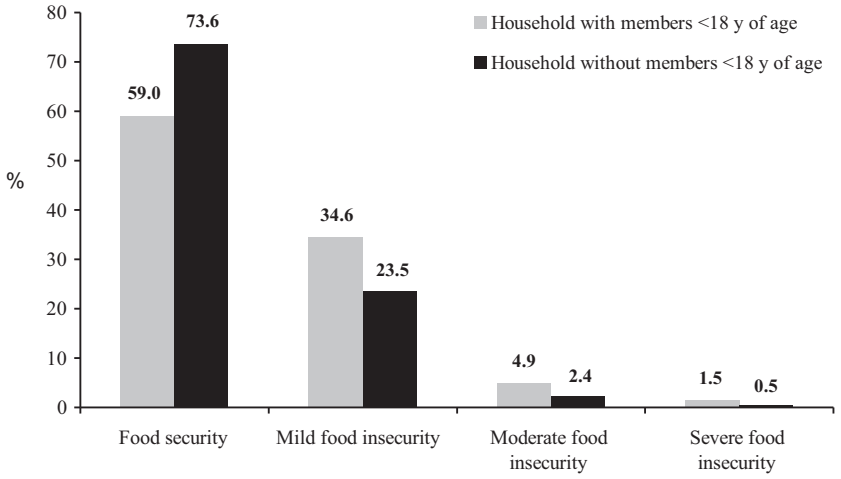

Fig. 1. Levels of food insecurity (N = 2817) in Belo Horizonte, Brazil, 2013–2014 (χ^2 test for linear trend $P < 0.0001$).

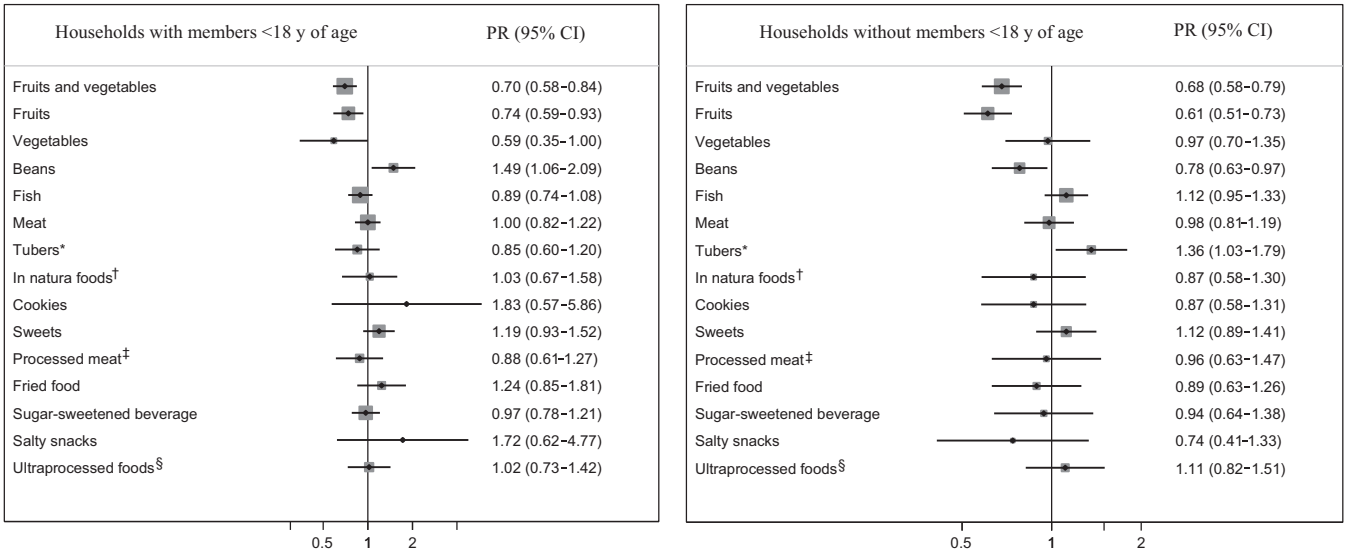

Fig. 2. Multivariate analysis of food consumption according to food insecurity classification in Belo Horizonte, Brazil, 2013–2014. PR (95% CI) = prevalence ratio and their 95% confidence intervals. Adjusted for age, sex, marital status, household educational attainment and employment status. Food insecurity included mild, moderate, and severe. *Included potatoes, manioc, *mandioquinha*, sweet potatoes, and/or yams. †Included fruits, vegetables, beans, milk, fish, meat, and tubers. ‡Included fish "nuggets" and "sticks"; sausages, burgers, hot dogs, and other reconstituted meat products. §Included cookies, sweets, processed meat, fried food, sugar-sweetened beverages, and salty snacks foods.

age, fruit and vegetable (PR, 0.68; 95% CI, 0.58–0.79), fruit (PR, 0.61; 95% CI, 0.50–0.74), and bean (PR, 0.78; 95% CI, 0.63–0.97) consumption was lower; whereas tuber consumption was higher (PR, 1.36; 95% CI, 1.03–1.79).

Discussion

The key finding from the present study was that individuals in households identified as being food insecure do not change their consumption to ultraprocessed foods but instead change their consumption of healthy foods. These results corroborate the importance of investigating this topic among different population groups and the effect on diet, given its complexity, singularity, and the intrinsic relation with the alimentary systems of the urban context of the metropolis.

The prevalence of food insecurity identified in this study is worrisome. It was more common among households with children than those without children and was higher than in the Mexico, and Colombia [20,21]. This prevalence was also above average in Brazil, approaching values found in the poorest regions of the country [4,22,23].

Food insecurity has been investigated in several distinct populations. Families with higher proportions of food insecurity are those with lower monthly per-capita income, less desirable occupations, poor living conditions, female heads of household, and lower levels of education. These factors contribute toward poor access to and less availability of food [5,24].

To our knowledge, no study has been performed to evaluate the relationship between food insecurity and *in natura*/minimally processed and ultraprocessed foods among adults. In the United

Table 1
Sociodemographic characteristics according to status food security in households (N = 2817) in Belo Horizonte, Brazil, 2013–2014

	All % (95% CI)	Households with members <18 y			Households without members under 18		
		FS	FI*	*P* value†	FS	FI*	*P* value†
		% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)	
Age (y)				0.308			0.004
<60	56.3 (54.4–58.1)	79.2 (75.5–82.4)	76.3 (71.7–80.4)		44.2 (41.6–46.8)	51.6 (47.2–55.9)	
≥60	43.7 (41.9–45.6)	20.8 (17.6–24.5)	23.7 (19.6–28.3)		55.8 (53.2–58.4)	48.4 (44.1–52.8)	
Marital status				<0.001			0.004
Married/ stable union	61.9 (60.1–63.7)	76.7 (72.1–80.1)	62.9 (57.9–67.9)		59.9 (57.3–62.4)	51.4 (47–55.7)	
Separate/divorced/widowed	25.5 (23.9–27.1)	14.2 (11.5–17.5)	25.1 (20.9–29.8)		27.2 (25–29.6)	32.7 (28.7–36.9)	
Single	12.6 (11.4–13.9)	9.1 (6.9–11.9)	12 (9–15.7)		12.9 (11.2–14.7)	15.9 (13–19.4)	
Employment status				0.14			<0.001
Housewife	29.7 (28.5–31.5)	33.9 (30–38.1)	34.6 (29.9–39.6)		26.2 (24–28.6)	31.7 (27.8–35.9)	
Retired/pensioner	36.7 (35–38.5)	18.6 (15.5–22.1)	21.8 (17.9–26.3)		47.0 (44.4–49.6)	37.8 (33.7–42.1)	
Unemployed	1.8 (1.4–2.4)	2.1 (1.2–3.7)	4.1 (2.5–6.7)		0.8 (0.5–1.5)	2.6 (1.5–4.4)	
Employed	31.7 (30–33.4)	45.5 (41.2–49.7)	39.5 (34.6–44.6)		25.9 (23.7–28.2)	28 (24.2–32)	
Head of the family				0.004			0.001
Male	59.6 (57.8–61.4)	73.7 (69.7–77.3)	64.6 (59.5–69.3)		57.0 (54.4–59.6)	51.4 (47–55.7)	
Female	40.4 (38.6–42.2)	26.3 (22.7–30.3)	35.4 (30.7–40.5)		43.0 (40.4–45.6)	48.6 (44.3–53)	
Education (y)				<0.001			<0.001
1–3	16 (14.7–17.4)	8.5 (6.4–11.2)	16.9 (13.4–21.1)		15.8 (14–17.8)	23.8 (20.3–27.7)	
4–7	34.5 (32.8–36.8)	26.1 (22.6–30.1)	33.5 (28.8–38.5)		35.5 (33–38)	41.3 (37.1–45.7)	
8–10	16.8 (15.4–18.2)	18.9 (15.8–22.5)	18.8 (15.1–23.1)		17.1 (15.2–19.2)	12.0 (9.4–15.1)	
>10	32.7 (31–34.4)	46.4 (42.2–50.7)	30.8 (26.3–35.7)		31.5 (29.2–34)	22.8 (19.4–26.7)	
Education of head of family (y)				0.048			<0.001
1–3	16 (14.7–17.4)	9.5 (7.3–12.4)	12.8 (9.8–16.7)		16.1 (14.3–18.2)	24.7 (21.1–28.7)	
4–7	33.5 (31.8–35.3)	28.2 (24.5–32.2)	34.2 (29.5–39.2)		33.7 (31.3–36.2)	38.2 (34.1–42.6)	
8–10	16.5 (15.1–17.9)	20.4 (17.1–24.1)	16.9 (13.4–21.2)		15.7 (13.9–17.7)	14.1 (11.4–17.5)	
>10	34 (32.3–35.8)	41.9 (37.7–46.2)	36.1 (31.3–41.1)		34.5 (32–37)	22.9 (19.4–26.8)	
Number of household members <18 y				0.001			
1–3	97.4 (96.1–98.2)	98.8 (97.4–99.5)	95.3 (92.6–97.1)		–	–	
4–6	2.6 (1.8–3.9)	1.2 (0.1–0.3)	4.7 (2.9–7.4)		–	–	
Number of household members >60 y				0.686			0.008
Absent	44.5 (42.6–46.3)	67.2 (63.1–71.1)	65.9 (60.9–70.6)		32.3 (29.7–34.6)	39.4 (35.2–43.7)	
1–3	55.5 (53.6–57.3)	32.8 (28.9–36.9)	34.1 (29.4–39.1)		67.3 (65.2–70.1)	60.6 (56.3–64.8)	
Monthly per-capita family income				<0.001			<0.001
0–$49.70	2.2 (1.7–2.8)	4.3 (2.8–6.4)	6.6 (4.4– 9.8)		0.5 (0.2–1)	1.5 (1–3.2)	
>$49.70–$99.41	14.8 (13.4–16.2)	18.4 (15.2–22.1)	38.8 (33.7–44.2)		6.5 (5.3–8)	16.7 (13.5–20.4)	
>$99.41–$198.82	34.4 (32.6–36.3)	38.9 (34.6–43.3)	41.8 (36.6–47.2)		28.0 (25.6–30.5)	42.4 (38–47)	
>$198.82	48.6 (46.7–50.6)	38.5 (34.3–42.8)	12.8 (9.6–16.9)		65.0 (62.4–67.6)	39.4 (35–43.9)	

FI, food insecurity; FS, food security.
* Food insecurity included included mild, moderate. and severe.
† χ^2 test.

States, an assessment of food consumption and quality among low-income non-institutionalized adults who were classified as presenting food insecurity, showed that they had higher consumption of highly palatable foods, including high-fat dairy products, sugary drinks, processed red meat, beans, and snacks, and lower consumption of vegetables compared with low-income adults who were classified as being food secure. Regarding consumption of fruits, juices, refined grains, whole foods, fish/seafood and dairy products, no differences were observed [25].

In a Brazilian study, households with some degree of food insecurity had a more monotonous diet, composed mainly of high energy foods, thus affecting the consumption of healthy foods such as fruits and vegetables. Representatives of households with mild food insecurity reported that their families had low consumption of vegetables, such that 35% of the respondents did not include these foods in their daily diet and 56.2% did not consume fruit daily. For households with moderate and severe food insecurity, insufficient proportional consumption of fruit and vegetables increased to 88.6% and 58%, respectively [4].

Our findings showed that the consumption of *in natura* and minimally processed foods is reduced in food-insecure households; however, the consumption of ultraprocessed food is unaffected. This can be explained by income and purchase issues. Healthy foods often are more expensive and less available within the total food purchases in households that have lower income. Moreover, a higher proportion of the per-capita monthly income is involved in purchasing these foods, particularly among families at the poverty line [26]. It is likely that due to financial constraints, food-insecure urban households may opt for unhealthy foods, such as ultraprocessed foods. Ultraprocessed foods tend to be nutritionally unbalanced, with high amounts of fat, sugar, and salt; high-energy density; and low fiber content. Furthermore, they are extremely palatable foods, ready-to-heat or eat, heavily advertised, and lower priced than healthier food choices [3].

Another important point is the difference in the consumption of beans among the families. Although the consumption is high throughout the sample, families with members <18 y of age consume more beans. This may be suggestive of the traditional Brazilian eating habits and concern about eating healthy foods, unlike that of other families without children or adolescents.

The association of food insecurity to healthy food consumption is relevant and modifiable, especially considering access to and quality of the food offered. Public policies for food and nutrition should guide strategies to improve access to good-quality healthy food, including aspects such as price, availability,

Table 2
Food consumption of participants according to food security classification (N = 2817) in Belo Horizonte, Brazil, 2013–2014

Consumption	All % (95% CI)	Households with members <18 y			Households without members <18 y		
		FS	FI*	*P* value†	FS	FI*	*P* value†
		% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)	
Healthy food							
Fruits and vegetables				<0.001			<0.001
Regular	43.2 (41.4–45.1)	41.1 (37–45.4)	28.1 (23.7–32.9)		50.5 (47.9–53.1)	36.2 (32.1–40.5)	
Sporadic	56.8 (54.9–58.6)	58.9 (54.6–63)	71.9 (67.1–76.3)		49.5 (47.9–53.1)	63.8 (59.5–67.9)	
Fruits				0.011			<0.001
Regular	26.4 (24.8–28)	21.8 (18.5–25.6)	15 (11.7–19.1)		33.1 (30.7–35.7)	20.4 (17.1–24.2)	
Sporadic	73.6 (72–75.2)	78.2 (74.4–81.5)	85 (80.9–88.3)		66.9 (64.3–69.3)	79.6 (75.8–82.9)	
Vegetables				0.036			0.650
Regular	5.3 (4.6–6.2)	5.7 (4–8)	2.7 (1.5–5)		5.9 (4.8–7.2)	5.3 (3.7–7.6)	
Sporadic	94.7 (93.8–95.4)	94.3 (92–96)	97.3 (95–98.5)		94.1 (92.8–95.2)	94.7 (92.3–96.3)	
Beans				0.011			0.037
Regular	90.7 (89.6–91.7)	88.4 (85.3–90.9)	93.5 (90.4–95.7)		91.6 (90.1–93)	88.5 (85.3–91)	
Sporadic	9.3 (8.3–10.4)	11.6 (9.1–14.7)	6.5 (4.3–9.6)		8.4 (7–9.9)	11.5 (9–14.7)	
Fish				0.342			0.244
Regular	24.5 (22.9–26.1)	25 (21.5–29)	22.3 (18.2–26.9)		24.0 (21.8–26.4)	26.7 (22.9– 30.8)	
Sporadic	75.5 (73.9–77.1)	75.0 (71–78.5)	77.7 (73.1–81.8)		76 (73.6–78.2)	73.3 (69.2–77.1)	
Meat				0.623			0.937
Regular	82.8 (81.4–84.4)	83.5 (80.1–86.5)	82.3 (77.9–85.9)		82.8 (80.7–84.7)	82.6 (79–85.7)	
Sporadic	17.2 (15.8–18.6)	16.5 (13.5–19.9)	17.7 (14.1–22.1)		17.2 (15.3–19.3)	17.4 (14.3–21)	
Tubers‡				0.502			0.032
Regular	5.9 (5.1–6.9)	6.8 (4.9–9.3)	5.6 (3.7–8.6)		5.1 (4.0–6.3)	7.7 (5.6–10.4)	
Sporadic	94.1 (93.1–94.9)	93.2 (4.9–9.3)	94.4 (91.4–96.3)		94.9 (93.7–96)	92.3 (89.6–94.4)	
In natura foods§				0.964			0.499
Regular	96.9 (96.2–97.5)	96.4 (94.4–97.7)	96.5 (94–97.9)		97.2 (96.2–98)	96.7 (94.7–97.9)	
Sporadic	3.1 (2.5–3.8)	3.6 (2.3–5.6)	3.5 (2.1–6)		2.8 (2–3.8)	3.3 (2.1–5.3)	
Unhealthy food							
Cookies (biscuits)				0.263			0.479
Regular	2.2 (1.8–2.9)	1.4 (0.6–2.8)	0.6 (0.1–2.3)		2.6 (1.9–3.6)	3.3 (2–5.3)	
Sporadic	97.8 (97.1–98.2)	98.6 (97.2–99.4)	99.4 (97.7–99.9)		97.4 (96.4–98.1)	96.7 (94.7–98.0)	
Sweets				0.199			0.277
Regular	13.2 (12–14.6)	15 (12.1–18.3)	11.9 (8.9–15.7)		13.5 (11.8–15.4)	11.6 (9.0–14.7)	
Sporadic	86.8 (85.4–88)	85 (81.7–87.9)	88.1 (84.3–91.1)		86.5 (84.6–88.2)	88.4 (85.3–91)	
Processed meat‖				0.414			0.738
Regular	3.4 (2.8–4.1)	3.7 (2.4–5.7)	4.8 (3.0–7.6)		2.9 (2.2–4)	3.2 (2.0–5.2)	
Sporadic	96.6 (95.9–97.2)	96.3 (94.3–97.6)	95.2 (92.4–97)		97.1 (96–97.8)	96.8 (94.8–98)	
Fried food				0.266			0.813
Regular	4.9 (4.2–5.8)	6.6 (4.8–9.1)	4.8 (3–7.6)		4.4 (3.4–5.6)	4.7 (3.1–6.9)	
Sporadic	95.1 (94.2–95.8)	93.4 (90.9–95.2)	95.2 (92.4–97)		95.6 (94.4–96.6)	95.3 (93.1–96.9)	
Sugar-sweetened beverage				0.636			0.504
Regular	13.2 (12–14.5)	13 (10.4–16.2)	14.1 (10.9–18.2)		12.8 (11.1–14.6)	13.9 (11.1–17.3)	
Sporadic	86.8 (85.5–88)	87.0 (83.8–89.6)	85.9 (81.8–89.1)		87.2 (85.4–88.9)	86.1 (82.7–88.9)	
Salty snack				0.265			0.306
Regular	1.1 (0.8–1.6)	1.7 (0.9–3.3)	0.8 (0.3–2.6)		0.9 (0.5–1.5)	1.4 (0.7–3)	
Sporadic	98.9 (98.4–99.2)	98.3 (96.7–99.1)	99.2 (97.4–99.7)		99.1 (98.5–99.5)	98.6 (97–99.3)	
Ultraprocessed foods¶				0.860			0.941
Regular	94.1 (93.1–94.9)	93.2 (90.7–95.1)	93.5 (90.4–95.7)		94.4 (93.1–95.5)	94.3 (91.9–96.1)	
Sporadic	5.9 (5.1–6.9)	6.8 (4.9–9.3)	6.5 (4.3–9.6)		5.6 (4.5–6.9)	5.7 (3.9–8.1)	

FI, food insecurity; FS, food security.
* Food insecurity included included mild, moderate, and severe.
† χ^2 test.
‡ Included potatoes, manioc, *mandioquinha*, sweet potatoes, and/or yams.
§ Included fruits, vegetables, beans, milk, fish, meat, and tubers.
‖ Included fish "nuggets" and "sticks"; sausages, burgers, hot dogs, and other reconstituted meat products.
¶ Included cookies, sweets, processed meat, fried food, sugar-sweetened beverages, and salty snacks foods.

and displacement of people. Furthermore, these policies also may contribute toward better food consumption and consequently better supplies of quality food for low-income populations [27]. Actions such as implementing public, specialized fruit and vegetable markets, open-air food markets, organic markets, and community gardens are essential in improving access to and direct purchase of food for the population, especially for individuals in vulnerable situations [28]. This will consequently reduce the effects of food insecurity on households. Food and nutritional care actions urgently need to be expanded, and inequities need to be reduced.

In the United Kingdom, some municipal localities have a practice of offering land allotments at a low cost for city dwellers who want to cultivate vegetables, fruits, and herbs for their consumption, as well as flowers. More than 300 000 urban allotments are available for this purpose [29]. Another initiative promoting access to healthy food systems has been developed in the city of New York, with incentives for plant cultivation programs, in community gardens, vegetable gardens, and urban farms [30].

Brazil also offers public policies of this nature to encourage these practices and promote a healthier urban environment. These

activities include the promotion of community gardens, open-air food markets, and organic fairs. Backyard gardening is encouraged in vulnerable regions, providing access to food without food expenses [31].

We found important results regarding the contribution of food insecurity to less healthy food consumption practices. To our knowledge, this is the first study to address food insecurity levels and their association with *in natura*, minimally, and ultraprocessed food consumption. This study also provided important information to support planning and restructuring of food and nutritional actions.

Some limitations of this study need to be considered. The instrument used to assess food insecurity (EBIA) takes into account restricted access and household food availability but does not include other aspects of food and nutritional security relating to the nutritional status and the health quality of food consumed by individuals. However, it is used internationally and has been validated in Brazil, thus enabling data comparisons [15]. We recognize that generalizations are typically accompanied by a margin of uncertainty. However, we believed that the results from this study can be extrapolated to other populations of primary health care users and people living in situations of social vulnerability.

Another issue to be considered is the cross-sectional design that was used, which did not allow temporal inferences to be made in relation to the factors investigated. Additionally, to our knowledge, no studies have investigated the association of processed foods, thus making it difficult to compare the results.

Conclusion

The prevalence of food insecurity identified in the present study was worrisome and more common among households with children than in those without children. This food insecurity reduced the consumption of healthy food, but did not relate to the consumption of ultraprocessed foods. Based on these results, we propose that it is necessary to develop actions to reduce social inequities so that it is possible to promote healthy food intake.

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