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FOOD INSECURITY AND SOCIAL INEQUALITIES IN A BRAZILIAN METROPOLITAN REGION

INSEGURANÇA ALIMENTAR E DESIGUALDADES SOCIAIS EM UMA REGIÃO METROPOLITANA BRASILEIRA

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ABSTRACT: To describe the prevalence of food insecurity (FI) in the Metropolitan Region of Recife (MRR) and associated factors in 2019. FI was the dependent variable, associated with socioeconomic, demographic, lifestyle, nutritional, and food consumption information, considering statistical significance when p<0.05 and borderline when p≥0.05 and <0.1. Of the 446 individuals evaluated, 71.7% were in a situation of FI. There was an association between FI and occupation (p=0.07), years of schooling (p=0.05), race/color (p=0.03), water treatment (p=0.06) and food quality self-assessment (p=0.05). A high prevalence of FI was identified in the MRR prior to the worsening observed during the Covid-19 pandemic, following the national trend of involution of food and nutrition security observed since 2016. As a way to overcome such disparities, the need for a change at the structural level is emphasized, considering intersectoriality as a basis for the development of public policies.

KEYWORDS: Food Security. Hunger. Social Determinants of Health.

RESUMO: Descrever a prevalência de insegurança alimentar (IA) na Região Metropolitana do Recife (RMR) e fatores associados em 2019. A IA foi a variável dependente, posteriormente associada com informações socioeconômicas, demográficas, de estilo de vida, nutricionais e sobre consumo alimentar, considerando significância estatística quando p<0,05 e limítrofe quando p≥0,05 e <0,1. Dos 446 indivíduos avaliados, 71,7% encontravam-se em situação de IA. Houve associação entre IA e ocupação (p=0,07), anos de estudo (p=0,05), raça/cor (p=0,03), tratamento da água (p=0,06) e autoavaliação da qualidade da alimentação (p=0,05). Identificou-se alta prevalência de IA na RMR anterior ao agravamento observado durante a pandemia de Covid-19, acompanhando a tendência nacional de involução da segurança alimentar e nutricional observada desde 2016. Como forma de superar tais disparidades, enfatiza-se a necessidade de uma mudança a nível estrutural, considerando a intersetorialidade como base para o desenvolvimento de políticas públicas.

PALAVRAS-CHAVE: Determinantes Sociais da Saúde. Fome. Segurança Alimentar.

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INTRODUCTION

The state of food and nutritional security (FNS) is defined as regular and permanent access to food in sufficient quantity and quality, without compromising other essential needs, while the interruption or difficulty in this access characterizes food insecurity (FI) related to multiple factors such as home location, family income, race/color, level of education, among others.[1,2] In Brazil, the Brazilian Household Food Insecurity Measurement Scale (In Portuguese, *Escala Brasileira de Food insecurity* - EBIA) is a validated instrument for assessing this condition, and its application is recommended for urban, rural and specific populations, such as *quilombolas* and indigenous peoples.[3]

The Brazilian National Household Sample Survey, which used EBIA as a collection instrument in three editions (2004, 2009 and 2013), found that the problem is distributed unevenly in the country: states with the highest prevalence of FI were located in the Northeast (Maranhão: 64.6% and Piauí: 58.6%) and North (Roraima: 47.6% and Acre: 47.5%) regions, with an inversely proportional relationship to the index of a decrease over the years. Although they followed the national trend in the period studied, the levels remained higher than those in the South, Southeast and Midwest regions.[4, 5]

In Pernambuco, almost half of the state's total population (48.3%) was assessed as being in a FI situation in 2017-2018. In the following years, the difficulty of accessing food was observed to worsen nationwide, even before other critical events that impacted the country.[6] Given the above, this study aimed to describe the prevalence of FI in adults as well as to verify factors associated with this condition in the Metropolitan Region of Recife (MRR), Pernambuco in 2019.

METHODOLOGY

This is a cross-sectional, descriptive and analytical study carried out using the database of the II State Survey on Chronic Diseases and Non-Communicable Diseases, from the IV State Health and Nutrition Survey (In Portuguese, *Pesquisa Estadual de Saúde e Nutrição* - PESN), conducted in 2019. Data related to individuals aged between 20 and 59 years old, of both sexes, residing in the MRR were considered. Data with incompletely completed EBIA questionnaires were excluded.

The state of Pernambuco is located in northeastern Brazil. It is divided into 12 development regions, including the MRR, which is home to 15 municipalities totaling just over 4 million inhabitants, 42% of which are located in the capital of Pernambuco, Recife.[7] The MRR is the fourth most unequal metropolis in the country.[8] For this study, data were collected from five municipalities in the MRR, such as Cabo de Santo Agostinho, Jaboatão dos Guararapes, Olinda, Paulista and Recife. Sample size calculation was performed a posteriori with the help of Epi Info version 6.04. To this end, the prevalence of 48.3% of households in a FI situation in the state of Pernambuco was considered according to data from the Household Budget Survey (HBS) 2017-2018[4], a confidence level of 95%, a margin of error of 5.7% and a correction for the design effect of 1.5.

FOOD SECURITY/INSECURITY SITUATION

The dependent variable was the FI condition, measured according to EBIA, an instrument capable of assessing the food dimension in terms of access to inputs at home, through objective questions (yes or no) about access to and availability of food.[9] The questionnaire allows classifying FI into three levels: mild, moderate or severe. To this end, it is important to consider the presence or

absence of residents under the age of 18 in the household, since the number of questions to be asked varies according to this condition. When all residents of the household had reached the age of majority, eight questions were answered. Otherwise, EBIA was answered in full (14 questions). In both circumstances, just one positive response is indicative of a household in a food insecurity situation. The number of "yes" responses is proportional to food insecurity severity, i.e., the more positive responses, the more severe the food insecurity situation of the household in question. For analytical purposes, two categories were established: 1) food security; and 2) FI, a combination of the FI categories (mild, moderate and severe).

SOCIOECONOMIC, DEMOGRAPHIC AND ENVIRONMENTAL VARIABLES

Information regarding monthly family income, occupation, education, race/color, sex, age, and number of people in the household was collected. Family income was categorized considering the minimum wage (MW) in effect in 2019, which was R$998.00. Thus, the classification was established as: "up to 1/2 MW (R$0.00 to R$449.00)"; "from 1/2 to 1 MW (R$449.01 to R$998.00)"; ">1 MW (≥R$998.01)". The level of employment was categorized as: has formal employment (student who works or employee with or without a formal employment contract); does not have formal employment (self-employed, odd-job worker, street vendor or occasional worker); does not work/beneficiary of some social program (unemployed, student who does not work, retired, pensioner or beneficiary of government social programs).

The level of education was categorized according to the years of study: 0 to 3 years (for those who never attended school or attended up to incomplete elementary school 1); 4 to 10 years (for those with complete elementary school 1 up to incomplete high school); and 11 years or more (for those with complete high school or complete or incomplete higher education). Sex was categorized as male and female; age was divided into 20 to 39 years and 40 to 59 years; skin color was grouped into white, black and brown/other. The "other" category corresponds to individuals who self-identified as Asian or indigenous, who were added to the last group for analytical reasons, as they presented similar prevalences. The number of people in the household was categorized as "1 to 4 people" and "5 or more people".

To compose the environmental profile, the following variables were collected: waste disposal, categorized as "general sewage system" and "others" (covered or rudimentary septic tank, watercourses); waste disposal, categorized as "collected" or "not collected" (burned, buried, dumpster, vacant lot and others); water supply, categorized as "with internal piping", "with piping to the backyard" or "without piping"; and water treatment, categorized as "treated" (includes the variables boiled, filtered, strained and mineral) and "untreated".

LIFESTYLE

Information was collected regarding alcohol consumption (alcoholism), smoking and physical activity level. Alcoholism was assessed according to the intake of alcoholic beverages in the 30 days prior to data collection, with the answers "yes" or "no" being considered. Smoking was classified as "smoker and former smoker" (individual who reported the habit of smoking and individual who reported the habit at some point in their life, but no longer does so) and "non-smoker" (individual who reported never having smoked).

Concerning physical activity, the short version of the International Physical Activity Questionnaire (IPAQ), translated and validated for the Brazilian population, was used.[10] The instrument

addresses the four dimensions of physical activity (commuting, leisure, domestic activities and work activities) and classifies as inactive or insufficiently active individuals those who perform less than 150 minutes of physical activity per week and those with physical activity time greater than 150 minutes per week are categorized as “active” or “very active”.

FOOD CONSUMPTION ASSESSMENT

To investigate the habits related to food consumption of the population studied, a Food Frequency Questionnaire (FFQ) was used for the study of diet and chronic non-communicable diseases (NCDs),[11] adapted to the context of the population studied. In this questionnaire, respondents were able to indicate the frequency (daily, weekly, monthly or annually) of consumption of 122 food items belonging to the following groups: cereals and derivatives; roots and tubers; legumes; dairy products; meat, fish and eggs; vegetables; fruits; fats; sugars/sweets; miscellaneous; and beverages.

The frequency reported was then transformed into a consumption index (CI), calculated using the following equation: CI = number of times the food was consumed/consumption frequency. An index was assigned to each food consumed by participants. Items were grouped, according to the CI, into six categories: never; less than or equal to once a month; once a week; 2 to 4 times a week; 5 to 7 times a week; and 2 or more times a day. The items were separated into three groups according to the level of processing: natural and minimally processed foods; processed foods; and ultra-processed foods (UPF).[12] For statistical analysis, the consumption of food groups was converted into quartiles (Q1, Q2, Q3 and Q4), with Q1 being equivalent to the lowest consumption of the given food group and Q4 referring to the highest consumption of foods belonging to the category.

Individuals were also asked about the quality of their family’s diet. By asking “regarding the quality of your family’s diet, would you say it is?”, respondents could choose one of five possible options: very good; good; average; poor; and very poor. For analytical purposes, the variables were grouped into three categories: 1) very good/good; 2) average; 3) poor/very poor.

ANTHROPOMETRIC ASSESSMENT

Anthropometric measurements such as weight (kg), height (cm), and waist circumference (WC) were measured. A digital scale (Model TANITA – BF-683 w/UM028 3601) with a capacity of 150 kg and a scale of 100 grams was used to measure weight. Individuals were weighed barefoot and wearing light clothing. Height was measured with a portable stadiometer (Alturaexata, Ltda) with 1 mm graduations throughout its length. Each volunteer was positioned in the center of the equipment, upright, with feet together, arms extended at the sides of the body, barefoot, with head raised and free of accessories.[13] Height was measured twice, and in case of a difference of ≥0.5 cm between measurements, a third measurement was performed, and the mean of the two closest measurements was considered. These measurements allowed the calculation and categorization of the Body Mass Index (BMI), in which the cut-off points recommended by the World Health Organization (WHO) were considered.14For statistical analysis, the categories were grouped and classified as follows: without excess weight (BMI ≤24.9 kg/m²); and with excess weight (BMI ≥25 kg/m²).

WC was measured using an inelastic tape measure measuring 2 m long and graduated in 1 mm increments along its entire length, positioned midway between the last rib and the iliac crest.[13] Measurement was collected in duplicate and a protocol similar to that for height measurement was followed in case of a difference of ≥0.5 cm between measurements. The unadjusted WC value allowed

the categorization of cardiovascular risk in individuals, considering the cut-off points that consider high risk when ≥80 cm in women and ≥94 cm in men.[15] Furthermore, the aforementioned measurements allowed calculating the Waist-to-Height Ratio (WHtR), used to indicate central adiposity and obtained by dividing WC (cm) by the height (cm), considering increased cardiovascular risk when the values are higher than 0.52 in men and 0.53 in women.[16]

DATA PROCESSING AND STATISTICAL ANALYSIS

The data obtained were tabulated in double entry in Epi Info version 3.5.4, and then the Validate module was applied to check the typing consistency and correction of possible errors. The analyses were performed using Statistical Package for the Social Sciences (SPSS) version 13.0. Quantitative variables were tested for normality using the Kolmogorov-Smirnov test. Associations between explanatory variables and dependent variable were tested using Pearson's chi-square test and the chi-square test for trend. Results were described in absolute and relative frequencies, and a 95% Confidence Interval and statistical significance were considered when $p<0.05$.

Subsequently, associations with p-value <0.20 were included in multivariate analysis using binary logistic regression, also in SPSS. At this stage, the variables were grouped into four hierarchical chunks: 1) socioeconomic and demographic variables; 2) environmental variables; 3) lifestyle and food consumption variables; 4) anthropometric variables. The results were expressed as prevalence ratios, with a 95% Confidence Interval and statistical significance considered when $p<0.05$ and borderline significance when $p\geq0.05$ and ≤0.10.

ETHICAL ASPECTS

The present study and the II State Survey on Chronic Diseases and Non-Communicable Injuries, a project from which this study is derived, were submitted to the Research Ethics Committee (REC) and approved (CAAE 07803512.9.0000.5208 and CAAE 50356021.0.0000.5208) in accordance with the Brazilian National Health Council Resolution 466/2012 guidelines.

RESULTS

The final study sample consisted of 446 individuals, 67.0% of whom were female. Concerning race/color, 75.8% (n=323) self-declared to be black or brown, yellow or indigenous, and 24.2% (n=108) were white. As for education, 43.6% (n=193) of interviewees stated that they had completed at least high school. Furthermore, 63 individuals (14.1%) had formal employment. Regarding income, 82.6% (n=338) of the total individuals received up to one minimum wage.

Regarding safety and FI situations, only 28.3% of individuals (n=126) met the food safety criteria, while 71.7% (n=320) were in an FI situation (mild: 33.6%, moderate: 23.8%, severe: 14.3%).

For the univariate and multivariate analyses presented below, only individuals in a situation of FI (n=320) were considered. It is worth noting that some variables had their data not answered or answered incompletely, which justifies n<320. Table 1 describes the result of the associations between the dependent variable and socioeconomic, demographic and environmental variables, in which it was possible to observe a statistically significant difference between FI and monthly family income (p=0.002), occupation (p=0.001), years of education (p=0.002), race/color (p=0.04) and water treatment (p=0.008).

Table 1. Distribution of food insecurity according to socioeconomic, demographic and environmental variables among adults in the Metropolitan Region of Recife. Pernambuco, 2019

Variables	Total		Food insecurity				p-value
			Yes		No		
	n	%	n	%	n	%	
Chunk 1: socioeconomic and demographic variables							
Monthly family income (minimum wages)							0.002§
>1 MW	71	17.4	40	56.3	31	43.7	
From ½ to 1 MW	85	20.7	61	71.8	24	28.2	
Up to ½ MW	253	61.9	192	75.9	61	24.1	
Occupation							0.001‡
Has formal employment	63	14.1	33	52.4	30	47.6	
Does not have formal employment	138	31.0	100	72.5	38	27.5	
Does not work/beneficiary of any social program	245	54.9	187	76.3	58	23.7	
Years of study							0.002§
0 to 3 years	46	10.4	40	87.0	6	13.0	
4 to 10 years	204	46.0	151	74.0	53	26.0	
11 years or more	193	43.6	126	65.3	67	34.7	
Race/color							0.04‡
White	108	24.2	69	63.9	39	36.1	
Brown and black/other	338	75.8	251	74.3	87	25.7	
Sex							0.32‡
Male	147	33.0	101	68.7	46	31.3	
Female	299	67.0	219	73.2	80	26.8	
Age (years)							0.92‡
20 to 39	200	44.8	143	71.5	57	28.5	
40 to 59	246	55.2	177	72.0	69	28.0	
Number of people in the household							0.23‡
1-4	333	74.7	234	70.3	99	29.7	
≥5	113	25.3	86	76.1	27	23.9	
Chunk 2: environmental variables							
Waste disposal							0.19‡
General sewage system	247	55.4	171	69.2	76	30.8	
Others	199	44.6	149	74.9	50	25.1	
Garbage disposal							0.32‡
Collected	438	98.2	313	71.5	125	28.5	
Not collected	8	1.8	7	87.5	1	12.5	
Water supply							0.20‡
With internal piping	371	83.2	260	70.1	111	29.9	
With piping to the yard	67	15.0	53	79.1	14	20.9	
Without piping	8	1.8	7	87.5	1	12.5	
Water treatment							0.008‡
Treated	374	83.9	259	69.3	115	30.7	
Untreated	72	16.1	61	84.7	11	15.3	

‡Pearson's chi-square test; §Chi-square test for trend.

In relation to lifestyle factors, smoking was the only variable that was significantly related to FI (p= 0.02). Regarding food consumption, there was a statistically significant inverse association between FI and the consumption of natural/minimally processed foods (p= 0.02) and processed foods (p=0.02) as well as a direct association with self-assessment of diet quality (p= 0.002) (Table 2).

Table 2. Distribution of food insecurity according to lifestyle and food consumption among adults in the Metropolitan Region of Recife. Pernambuco, 2019

Variables	Total		Food insecurity				p-value
			Yes		No		
	n	%	n	%	N	%	
Chunk 3: lifestyle and food consumption							
Alcohol consumption in the last month							0.50‡
Yes	297	71.3	215	72.4	82	27.6	
No	120	28.7	83	69.2	37	30.8	
Smoking							0.02‡
Non-smoker	323	72.6	222	68.7	101	31.3	
Former smoker and smoker	122	27.4	97	79.5	25	20.5	
Physical activity level							0.60‡
Inactive/insufficiently active	216	70.4	163	75.5	53	24.5	
Active/very active	91	29.6	66	72.5	25	27.5	
Food consumption by level of food processing							
Natural and minimally processed							0.02‡
Q4	101	24.9	61	60.4	40	39.6	
Q3	102	25.3	76	74.5	26	25.5	
Q2	101	24.9	78	77.2	23	22.8	
Q1	101	24.9	78	77.2	23	22.8	
Processed							0.02‡
Q4	105	25.9	68	64.8	37	35.2	
Q3	102	25.1	74	72.5	28	27.5	
Q2	97	23.9	68	70.1	29	29.9	
Q1	102	25.1	85	83.3	17	16.7	
Ultra-processed							0.965‡
Q4	105	25.1	76	72.4	29	27.6	
Q3	103	24.7	73	70.9	30	29.1	
Q2	105	25.1	77	73.3	28	26.7	
Q1	105	25.1	74	70.5	31	29.5	
Food quality self-assessment							0.002‡
Good or very good	235	52.9	152	64.7	83	35.3	
Average	192	43.1	152	79.2	40	20.8	
Poor or very poor/does not know/did not answer	18	4.0	15	83.3	3	16.7	

‡Pearson's chi-square test.

Among the anthropometric variables, excess weight and waist-to-height ratio were relevant in the univariate analysis (p= 0.03 and p= 0.04, respectively), with a direct association between variables. These data can be seen in Table 3 below.

Table 3. Distribution of food insecurity according to anthropometric variables in adults in the Metropolitan Region of Recife. Pernambuco, 2019

Variables	Total		Food insecurity				p-value
			Yes		No		
	N	%	n	%	N	%	
Chunk 4: anthropometric variables							
Excess weight							0.03‡
No	117	29.1	77	65.8	40	34.2	
Yes	285	70.9	217	76.1	68	23.9	
Waist circumference							0.678‡
Low risk	112	28.1	79	70.5	33	29.5	
High risk	285	71.6	210	73.7	75	26.3	
Waist-to-height ratio							0.04‡
Low risk	96	24.2	62	64.6	34	35.4	
High risk	301	75.8	227	75.4	74	24.6	

‡Pearson's chi-square test.

In multivariate analysis, the associations that remained after adjustment were occupation (p=0.07), with a higher risk of FI being observed among individuals who do not work or receive any social benefit (PR: 2.33), although individuals without formal employment presented PR = 2.17, a fact that deserves to be highlighted. Furthermore, the association between FI and years of study remained (p=0.05), with emphasis on the PR of 3.1 among individuals with 0 to 3 years of study, race/color (p=0.03), with a higher risk of FI in the black and brown/other population group (PR: 1.74), water treatment (p=0.06), with greater susceptibility among those who consumed untreated water (PR: 1.98), and food quality self-assessment (p=0.05), in which those who consider their own diet as "regular" have a higher risk of FI (PR: 1.77; p=0.03), as shown in Tables 4 and 5.

Table 4. Unadjusted and adjusted prevalence ratios of food insecurity according to explanatory variables (socioeconomic, demographic and environmental) in adults from the Metropolitan Region of Recife, 2019

Variables	Food insecurity (mild, moderate and severe)					
	Unadjusted analysis			Adjusted analysis		
	PR	95%CI	p-value§	PR	95%CI	p-value
Chunk 1: socioeconomic and demographic variables						
Monthly family income (minimum wages)			***0.06***			
>1 MW	1.0					
From ½ to 1 MW	1.97	1.01–3.83	0.05			
Up to ½ MW	2.43	1.41–4.23	0.001			
Occupation			***0.001***			***0.07****
Has formal employment	1.0			1.0		
Does not have formal employment	2.39	1.29–4.45	0.006	2.17	1.07–4.43	0.03
Does not work/beneficiary of any social program	2.93	1.65–5.21	<0.001	2.33	1.05–5.18	0.04
Years of study			***0.01***			***0.05****
11 years or more	1.0			1.0		
4 to 10 years	1.52	0.99–2.33	0.06	1.34	0.83–2.15	0.23
0 to 3 years	3.54	1.43–8.79	0.006	3.10	1.22–7.91	0.18
Race/colorμ			***0.04***			***0.03***
White	1.0			1.0		
Brown and black/others	1.63	1.03–2.59		1.74	1.06–2.88	
Chunk 2: environmental variables						
Waste disposal			***0.19***			
General sewage system	1.0					
Others	1.32	0.87–2.01				
Water supply			***0.21***			
With internal piping	1.0					
With piping to the yard	1.61	0.86–3.03	0.14			
Without piping	3.0	0.36–24.6	0.31			
Water treatment			***0.009***			***0.06****
Treated	1.0			1.0		
Untreated	2.46	1.25–4.85		1.98	0.98–4.00	

PR: Prevalence Ratio; PR= 1.0 - reference; 95%CI - 95% Confidence Interval; *Borderline significance.

Table 5. Unadjusted and adjusted prevalence ratios of food insecurity according to explanatory variables (lifestyle, food consumption and anthropometrics) in adults in the Metropolitan Region of Recife. Pernambuco, 2019

Variables	Food insecurity (mild, moderate and severe)					
	Unadjusted analysis			Adjusted analysis		
	PR	95%CI	PR	95%CI	PR	95%CI
Chunk 3: lifestyle and food consumption						
Smoking			***0.03***			
Non-smoker	1.0					
Former smoker and smoker	1.76	1.07–2.90				
Food consumption by level of food processing						
Natural and minimally processed			***0.02***			
Q4	1.0					
Q3	1.91	1.05–3.49	0.03			
Q2	2.22	1.21–4.10	0.01			
Q1	2.22	1.21–4.10	0.01			
Processed			***0.03***			
Q4	1.0					
Q3	1.44	0.80–2.60	0.23			
Q2	1.28	0.71–2.30	0.42			
Q1	2.72	1.41–5.25	0.003			
Food quality self-assessment			***0.03***			***0.05****
Good or very good	1.0			1.0		
Average	2.08	1.34–3.22	0.001	1.77	1.06–2.96	0.03
Poor or very poor/do not know/did not answer	2.73	0.77–9.70	0.12	3.16	0.64–15.5	0.16
Chunk 4: anthropometric variables						
Excess weight			***0.03***			
No	1.0					
Yes	1.66	1.04–2.65				
Waist-to-height ratio			***0.04***			
Low risk	1.0					
High risk	1.68	1.03–2.76				

PR: Prevalence Ratio; PR= 1.0 - reference; 95%CI - 95% Confidence Interval; *Borderline significance.

DISCUSSION

The high prevalence of FI found in this study (71.7%) was higher than the national (36.7%), regional (50.3%) and state (48.3%) averages, according to the 2017-2018 HBS.[4] The data collected by the survey already warned of a possible return of the country to the Hunger Map, and in 2019 the MRR already presented alarming evidence of restricted access to food. Moreover, it was possible to observe an 11.6% increase in FI in the MRR in relation to the IV PESN carried out in 2015-2016.[17]

Since 2004, the year in which EBIA began to be used as an instrument for measuring FI in national surveys, there has been a constant profile of individuals most vulnerable to the disease. Despite a significant drop in the prevalence of FI observed between 2004 and 2013, which culminated in Brazil's removal from the UN Hunger Map,[18] residents of the North and Northeast regions, with low levels of education, black and brown people and without employment contracts continued to show a greater association with FI over the years.[5] Conducted in 2019 and derived from the IV State Health and Nutrition Survey, the present study follows this historical trend.

As mentioned above, the results support the findings of scientific literature at the national level[3,5] and, above all, the results of the IV PESN.[17] The same inequities have persisted over the years, which reaffirms the social discrepancy in MRR, ranking as the fourth most unequal metropolis in the

country, according to a quarterly survey carried out by the *Pontifícia Universidade Católica do Rio Grande do Sul* (PUCRS) Observatory of Metropolises.[8]

Currently, black or brown individuals have a higher prevalence of FI compared to those with white skin (65.0% versus 46.8%, respectively).[6] Race/color has always been a factor associated with more severe levels of FI, especially in households headed by women.[19-21] Ethnic-racial disparities can also be studied in relation to education and occupation, both associated with FI. Despite constituting the majority of the Brazilian population, black people have twice the illiteracy rate compared to the white population. In terms of employment, they occupy the majority of informal positions and the minority of leadership positions, which have the best wages.[22]

Just like education, vulnerability caused by the lack of employment is a determining factor in access to food. Therefore, it is necessary to understand the cyclical perspective of FI: formal employments, which are related to the higher prevalence of FNS,[6] are directly proportional to the years of study, i.e., the higher the level of education, the greater the chances of individuals being in a FNS situation.[19] However, it is important to emphasize that FI manifests itself in different ways in social groups. As a consequence of structural racism, the wage gap between white and black/brown individuals for performing exactly the same function is still a reality in Brazil,[22] which may explain why black women are more susceptible to FI, even if they have a high level of education and higher income.[21]

Still in line with the results of the IV PESN 2015-2016,[17] the lowest level of education was associated with FI. Several studies replicate these findings, explaining that the risk of individuals with lower education levels presenting FI can be about 3 times higher depending on the location of the residence.[5,19,20] In the Northeast region, for instance, it was observed that FI presents different prevalence ratios at its different levels, with the greatest risk observed in urban areas, regardless of the FI severity.[20]

Like unemployed individuals, those who defined their occupation as beneficiaries of social programs presented the greatest risk of FI,[17] even if the benefit income was primarily intended for the purchase of food. However, studies highlight the importance of income transfer programs as a protective factor against FI, especially in its most severe form,[20] highlighting the need to maintain and expand such strategies.[20,23,24]

Hence, the need for a change at a structural level is emphasized, considering intersectorality as the basis for the development of public policies that identify and respect the particularities of social groups in vulnerable situations. To this end, it is necessary that not only hunger, but all inequalities that lead to this outcome be prioritized. As an example in Brazil, during the two terms of then President Luiz Inácio Lula da Silva (2003-2010), the fight against hunger was listed as the government's main mission. Over the eight years he was in charge of the Executive Branch, a series of intersectoral strategies were created and strengthened in order to guarantee FNS to Brazilians, proving the effectiveness of public policies in addressing vulnerabilities and combating hunger.[24,25]

Strategies such as the Zero Hunger Program, the Family Allowance Program (In Portuguese, *Programa Bolsa Família* - PBF), the One Million Cisterns Program and a series of structural and local public policies, in addition to the creation of new federal universities, have allowed for an increase in per capita income and the social development of a representative portion of the Brazilian population, with a consequent escape from poverty and extreme poverty.[24,26,27] Moreover, it was also during the Lula government that the term "food and nutritional security" was centralized and assumed greater complexity, encompassing the dimension of quality and not just access to food.[25] Thus, it is worth highlighting the greater risk of FI associated with those who self-assessed their diet as "regular".

It is important to emphasize that food consumption goes beyond a matter of individual choice. Knowing which foods are of better quality is different from accessing them, after all, ensuring adequate nutrition is also linked to economic conditions and the availability of food in the surrounding area. In the municipalities of the MRR that comprised this study, for instance, it was identified that the predominant purchases of inputs by commercial establishments are, for the most part, UPF.[28]

Furthermore, locations in the MRR where UPF outlets predominate have a higher probability of overweight individuals, which suggests a syndemic of overweight and FI influenced by the food environment.[29] It is worth noting that the greater consumption of UPF is related not only to excess weight, given the high caloric value and low nutritional value of this type of product, but also to malnutrition, specific nutritional deficiencies and chronic non-communicable diseases.[30]

The decrease in purchasing power and high food inflation experienced during the period analyzed end up leading to more affordable and less healthy choices, which goes against the qualitative dimension of food security. In this regard, it is the role of the State to develop regulatory public policies that favor access to better quality food, with the aim of promoting food sovereignty and guaranteeing the human right to adequate food (HRAF).

Considering the above, the priority of this discussion is to highlight that despite the prospect of growth in FNS observed in the early years of the 20th century, the known inequities remain as challenges to be solved and deserving of a close and intersectoral look. In other words, the guarantee of social rights to historically oppressed groups was, is and will be a challenge and such guarantee must be treated as a priority in the fight for the universality of the human right to adequate food and nutrition.

This study has some limitations. Due to its cross-sectional design, it is not possible to identify a causal relationship between variables. Furthermore, considering the range of factors involved in FNS, it is important to highlight the need to investigate those that may (or may not) influence the dependent variable, such as food availability and production, in addition to cultural aspects. Furthermore, it is important to investigate the relationship between FI and various forms of mental distress, such as anxiety and depression.

The execution of this study proved to be important in revealing the serious situation of FI in the fourth largest metropolis in the country. A metropolitan region marked by visible disparities, marked not only by the contrast of immense skyscrapers neighboring areas of extreme poverty, but also in the intimate sphere of the home.

The implications of this research highlight the need for public policies aimed at reducing inequities that intensify FI in MRR. The findings suggest that structural interventions should prioritize improving socioeconomic conditions, particularly among the most vulnerable groups, such as people with low levels of education, those without jobs, and those of black and brown race/color. It is essential to expand income transfer programs, together with policies for access to healthy foods, to mitigate the observed impacts. Furthermore, it is necessary to strengthen health promotion strategies, including food and nutrition education, which, combined with the regulation of the urban food environment, can promote access to information about the benefits of consuming natural and minimally processed foods. Integrated and intersectoral actions are essential to mitigate social and health inequalities, aligning disease prevention and health promotion as public health priorities.

CONCLUSION

The present study identified a high prevalence of FI in the MRR following a historical trend of FNS regression observed since 2016. There was an association between FI and race/color, low level of education, lack of employment and receipt of social benefits, water treatment and food quality. Over the years in which EBIA was used as the main data collection instrument in national surveys, although the FNS situation improved between 2004 and 2013, this study found the maintenance of the same vulnerability profile and an increase in the prevalence of the condition, i.e., hunger has color, social class and address.

It is worth highlighting the association between FI and diet self-assessment as "regular", highlighting the fragility in access to quality food, which is reflected in the greater consumption of ultra-processed products and lower consumption of natural and minimally processed foods, highlighting the need for regulatory policies for the distribution and marketing of food products and types. The importance of the Executive Branch's commitment to guaranteeing social rights is highlighted, through the creation, maintenance and strengthening of public policies to reduce social inequities.

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