Inequalities in food acquisition according to the social profiles of the head of households in Brazil

Desigualdades na aquisição de alimentos de acordo com a renda e os perfis sociais do chefe de família no Brasil

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Abstract *Brazil is characterized by strong social inequalities and differences in access to quality food and sufficient quantities of it, which represent a violation of the human right to adequate food. The aim was to assess food expenditures according to the social profiles of the head of the households. Data from the cross-sectional Brazilian Household Budget Survey (2017/2018) were used with a nationally representative sample of household survey participants (n=52,917). Poisson regression was used to estimate prevalence ratios (PR) to assess the association of different social profiles with the acquisition of food. The profile characterized by woman self-classified as white, with a higher education, which characteristics were positively and significantly associated with more acquisition of fruits (PR=1.22; CI95% 1.09-1.36) and vegetables and greens (PR=1.24; CI95% 1.09-1.41). Black women with low education levels showed a negative association with the consumption of soda (PR=0.53; CI95% 0.45-0.62), and prepared food (PR=0.52; CI95% 0.37-0.74). The results reveal great inequalities in the purchase of food between the social profiles of the heads of the family.*

Key words *Population surveys, Inequalities, Food, Income, Brazil*

Resumo *O Brasil é caracterizado por fortes desigualdades sociais e diferenças no acesso a alimentos de qualidade e em quantidade suficiente, o que representa uma violação do direito humano à alimentação adequada. O objetivo foi avaliar os gastos com alimentação de acordo com o perfil social do responsável pelo domicílio. Dados da Pesquisa de Orçamentos Familiares Brasileiros de corte transversal (2017/2018) foram usados com uma amostra nacionalmente representativa de participantes da pesquisa domiciliar (n=52.917). A regressão de Poisson foi utilizada para estimar razões de prevalência (RP) para avaliar a associação de diferentes perfis sociais com a aquisição de alimentos. O perfil caracterizado pela mulher auto classificada como branca, com maior escolaridade, cujas características estiveram positiva e significativamente associadas a maior aquisição de frutas (RP=1,22; IC95% 1,09-1,36), verduras e legumes (PR=1,24; IC95% 1,09-1,41) e queijo (RP=1,32; IC95% 1,09-1,59). Mulheres negras com baixa escolaridade apresentaram associação negativa com o consumo de refrigerantes (RP=0,53; IC95% 0,45-0,62) e alimentos preparados (RP=0,52; IC95% 0,37-0,74). Os resultados revelam grandes desigualdades na aquisição de alimentos entre os perfis sociais dos chefes de família.*

Palavras-chave *Inquéritos populacionais, Desigualdades, Alimentos, Renda, Brasil*

Introduction

Worldwide, there is evidence of large discrepancies in the availability of foods from different food groups across different income groups. Low-/middle-income countries rely more on staple foods and less on fruits and vegetables and animal-source foods than high-income countries[1]. Brazil, despite being an exception with its diversity of food sources, is characterized by strong social inequalities and differences in access to quality food and sufficient quantities of it between the regions of the country[2,3], which represents a violation of the human right to adequate food[4].

The cost and limited access to fresh food compromise food security and, consequently, the quality of the diet. Thus, the lack of accessibility to healthy foods, such as fruits, vegetables, dairy products and meats, results in the absence of food diversity, potentially leading to malnutrition, overweight and obesity[1]. The greater ease of the acquisition of ultra-processed products, their low cost and their high energy density also contribute to the consumption of these foods and the current panorama of obesity[5,6]. In addition, obesity, unhealthy diets and the harmful consumption of alcohol are one of the main risk factors for the occurrence of chronic non-communicable diseases[7].

The availability of foods in the household is influenced by different factors, such as social, cultural, and economic characteristics[8]. In a study aimed at analysing the frequency of consumption of healthy and unhealthy foods by adults, Durante *et al.*[9] described important differences in food consumption between men and women. According to the authors, the consumption of meat with excess fat was significantly higher among men, and the regular consumption of sweets and the replacement of main meals with snacks was significantly higher among women, both directly associated with schooling years.

The availability of foods in the household is influenced by different factors, such as social, cultural, and economic characteristics[8]. Studies has described important differences in food consumption between men and women[9] and between lower income extracts[10]. This whole context shows a worsening food quality, given income disparities, in the form of a lower consumption of healthy foods, such as fruits, vegetables, grains, tubers, meat, milk and fish[11].

Family Budget Surveys (*Pesquisa de Orçamentos Familiares* - POF) are surveys conducted regularly in Brazil that gather information on the amount and monetary value of all products purchased during a given period by families, which allows the monitoring and evaluation of the food and socioeconomic profile of the population[12]. Comparing the last two POFs conducted in the Brazilian population (POF 2008/2009 and POF 2017/2018), some differences in the patterns of food consumption were observed[13]. The data suggested a reduction in the consumption of fresh and minimally processed foods (rice, beans, fruits and milk and dairy products) and soft drinks, as well as an increase in sandwiches at all income levels[13].

In the scenario of increasing income inequality in the country, it is important to investigate the differences in the acquisition of food and the patterns of food acquisition in the different social profiles at the national level. Therefore, the aim of this study was to assess food expenditures according to the different social profiles of the head of households.

Materials and methods

This analysed data from a nationally representative survey assessing family purchases, including food acquisition, in the Brazilian population in 2017-2018[14]. Details on the sampling designs, the assessment of food expenses and other study variables, and all analytical procedures are detailed below.

Samples

Brazil is a heterogeneous country territorially divided into five sociocultural and economically distinct macro-regions (North, Northeast, Midwest, Southeast and South). The first two regions comprise the country´s least developed municipalities, as shown by their low average household incomes, low levels of education and poor health outcomes compared with those of the South, Southeast and Midwest regions[15]. This study is based on data from POF 2018, carried out by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE). The survey followed best practices, including strong data quality control procedures. Its main purpose is to generate indicators useful for the timely monitoring of the social and economic development of the Brazilian population.

The POF data collection time was 12 months (July 11, 2017, to July 9, 2018) to estimate fami-

ly budgets and possible variations over one year of expenses. The sampling plan involved a stratified, two-stage probabilistic cluster sampling design, with the selection of census tracts as primary sampling units (PSUs) in the 1st stage and households in the 2nd stage. The selection of PSUs considered probabilities that were proportional to the size of the cluster according to the number of private households per census tract. The total number of PSUs was determined according to the type of estimator used and the level of precision set for estimating the total data for the households, obtained from the 2010 demographic census data, considering the number of households expected to exist in each census sector. The final number of households was 57,920. The analysis estimates were weighted considering the sampling design and were adjusted to compensate for nonresponses.

Data were collected by trained interviewers who met face-to-face with residents, and they were performed on consecutive days during a nine-day period using portable computers for registration and data entry.

Food acquisition

Food acquisition information was obtained from the *Caderneta de Aquisição Coletiva* (Module POF3). According to the POFs methodology this information was obtained with the person responsible for food expenses and was recorded for seven consecutive days. For each food, the quantity, the unit of measure (weight or volume) and the amount of the expense (in *reais*) were recorded. More details about the recording of data from the POF3 module are detailed in IBGE reports[16].

The data imputation method was used for records that showed a lack of information on variables such as food weight. For records without sufficient information on the quantity, unit of measure or weight/volume of the product, the imputation was carried out based on the median value per kilogram of the product[16].

Based on the amounts of food products purchased, the annual amount of food expenses was obtained by applying the multiplier corresponding to the number of days in the year divided by the 7 days of evaluation, generating an annualization factor equal to 52[16]. For data analysis, food prices were multiplied by the annualization factor and divided by 12 for the months of the year. This study considered only households with 1 consumption unit.

The foods purchased for family consumption (in a monetary and non-monetary form) were selected from the POF 2017-2018 product register and classified into two groups: (i) foods that are indicators of healthy eating (rice, beans, fruit, vegetable and greens, tubers, cassava flour, meat, poultry, egg, fish, viscera, coffee, milk, cheese and yogurt); and (ii) unhealthy food (breads, pasta, sugar, salt, oil, soda, sweetened juice, alcoholic beverages, light and diet beverages, processed meat, canned, prepared food, cookies, cakes, sweets, desserts and fast food). These groups were created based on the quality of the food purchased by the households[17]. Chart 1 presents the description of the evaluated foods according to healthy and unhealthy food groups.

Social profiles of the head of households

The variable head of household profile was created based on three social indicators: sex (male/female); race/skin colour self-classified (white, black or mulatto)[18]; and scholarity (<8; and >8 years). For the self-classification of race/skin color, the POF adopts the following categories: white, black, brown, yellow or indigenous. In this study, the categories white and black and/or pardo were considered for the purpose of comparative analysis as a way of capturing possible inequalities in the acquisition of food. As a result, 1.56% of households whose heads of household were self-classified as yellow and indigenous were considered as missing values.

Then, the social profiles of the family's reference person were evaluated into following eight groups: 1) Male/White/High school; 2) Male/Non-White/High School; 3) Male/White/Low education; 4) Male/non-white/low education; 5) Woman/White/High school; 6) Woman/non-white/High school; 7) Woman/White/Low education; and 8) Woman/non-white/low education.

The choice of these characteristics was based on previous studies that indicate that the relationship of sex, race/skin colour and schooling of the reference person in the family are good indicators that capture social inequalities in access to food[8-10].

Covariates

The family per capita income was estimated considering the exclusion of the 5% highest incomes (extreme values) and is expressed in US dollars based on the currency conversion rate from the Brazilian real (R$) to the US dollar as of January 15, 2018 (R$ 1=U$ 3.31). The following variables were assessed: average family per

capita income; characteristics of households as regions of the country (North, Northeast, Southeast, South and Midwest); area (urban and rural); number of residents per household; water supply (general water network or artesian water well) and sewage (sewage network or other).

Data analysis

The mean (income per capita), proportions (sociodemographic characteristics) and confidence intervals (CI95%) were estimated for each variable in comparisons between the 1st and 5th quintiles of per capita income. The total and the contrasts in the extreme groups (Q1=1st quintile and Q5=5th quintile) of expenditures per cap-

Chart 1. Description of the evaluated food groups.

Food group	Description
Healthy food marker	
Rice	Rice, risotto and rice mixed dishes
Bean	Black beans, white beans and other types of beans
Tuber	All tubers (potatoes, manioc, sweet potatoes and others)
Cassava flour	All cassava flours
Vegetables and greens	Lettuce, kale, cabbage, onions, tomato, pumpkin and others
Fruits	All fruits (banana, apple, pineapple, pear, grape and others)
Meat	Meat, beef, barbecue and meat dishes
Poultry	Poultry meat and poultry dishes
Eggs	Chicken eggs, quail eggs, duck eggs
Fish	Fish and seafood
Viscera	Liver, bovine stomach, chicken heart, chicken gizzard and others
Milk	Fluid milk, powdered milk
Yogurt	Yogurt and curd
Cheese	Cheeses in general
Coffee	Traditional coffee, espresso, cappuccino
Unhealthy food marker	
Bread	White bread (*pão francês*)
Pasta	Spaghetti, lasagna, other types of mass
Sugar	All sugar
Salt	All salts
Oil	Vegetable oils, olive oil, lard, butter and margarine
Soda	Regular soft drinks
Sweetened juice	Flavored fruit juice bottled, powdered fruit juice, natural fruit juice
Alcoholic beverages	Wine, beer, cachaça, whisky, champagne and others
Light and diet beverages	Fruit juice or vegetable dietary bottled or in box, dietetic artificial fruit juice powder, choco milk bottled dietetic light and others
Processed meat	Sausage, bacon, hamburger, dried meat, and others
Canned	Canned sardines, canned tuna, chicken pate, ham pate canned beans, and others
Prepared food	Prepared lasagna, pasta, calzone, pancake, frozen potatoes for frying, potato chips and others
Cookies	All types of cookies
Sweet cookie	All sweet cookies (chocolate cookie, coconut cookie, milk cookie)
Cracker	Salty Cracker, cheese chips
Cakes	All cakes, brownie, cupcake, roulade, cornbread (*Broa de milho*), cereal bar, *sonho de padaria*
Sweets and desserts	Candy, ice cream, chocolate, sweet pie, *churros*, jelly, and others
Fast food	Sandwich, pizza, Brazilian deep-fried snacks (*pastel, coxinha, empada*), sfiha, hot dog, and others

Source: Authors.

ita income were used to explore variations and identify the five foods/food groups that had the largest variations in each group (healthy and unhealthy food marker). The contrast C between the extreme quintile of expenditures per capita income was given by $[\Delta = (Q5 - Q1)]$ where Q5 and Q1 stand for the 5th quintile and 1st quintile strata, respectively, for Δ. To compare the mean of the expenses on the foods/food groups most consumed in the extremes of family income, Student's t test was used.

Food acquisition variables that differed between the 1st and 5th income quintiles were selected to evaluate the acquisition differences among the social profiles. Poisson regression was used to estimate the prevalence ratios (PR) to assess the association of different social profiles and the acquisition of the five most acquired healthy and unhealthy foods. The variables were adjusted by income, years of age, area and region of the households. The level of significance adopted was 5%. The statistical program used for all analyses was Stata 16[19].

Ethical aspects

According to Resolution No. 466 of December 12, 2012, from the National Committee of Ethics in Research (CONEP), researchers who use secondary data available to the public domain, as we did here with the data from the Brazilian Institute of Geography and Statistics (IBGE), do not require approval by a local Ethics Committee of the CEP-CONEP System.

Results

The 52,917 households (91.2% of the total sample) were analysed across the country. The average per capita income in the 1st quintile was 101.7±0.63 dollars (CI95% 100.50-102.98), and in the 5th quintile it was 1339.6 ± 14.6 dollars (CI95% 1310.9-1368.3). Regarding the education of the person of reference in the household, the percentage of people with less than 8 years of study was 81.9% (CI95% 80.74-83.09) in the 1st income quintile, and the percentage of people with more than 8 years of study was 66.5% (CI95% 64.81-68.21) in the 5th income quintile. Among households with the lowest number of residents per household (<3), 72.1% of these (CI95% 70.75-73.44) were in the 5th income quintile, and among households with the highest number of residents per household (≥7), 96.2%

of them (93.95-97.66) were in the first quintile (Table 1).

Of the households belonging to the North and Northeast regions, 83.6% (CI95% 81.01- 85.88) and 80.4% (CI95% 78.85- 81.9), respectively, were in the population's first income quintile. Regarding sex, 59.8% (CI95% 57.92- 61.68) of the women responsible for the household purchases lived in households with an income in the 1st quintile. The households whose head of households self-identified as white were 86.2% (CI95% 84.95-87.35) in the highest income quintile, whereas those who classified themselves as black or mulatto were 51.2% (CI95% 49.09-53.31) in the lowest income quintile (Table 1).

Table 2 shows the average distribution of expenditure per capita on food, in dollars, and the average difference in food acquisition between the 1st and 5th income quintiles of per capita income. Considering the total expenses of all the foods purchased in Brazilian households, the healthy foods that households spent the most on were fruits, vegetables and greens, cheese, milk and poultry. Comparing the 5th quintile and the 1st income quintile, the largest and significant differences were in the acquisition of vegetables and greens ($\Delta=4.07$), fruits ($\Delta=5.18$), tubers ($\Delta=1.92$), milk ($\Delta=2.68$) and cheese (4.65). Among the foods that marked unhealthy eating, there were higher expenses on breads, soft drinks, alcoholic beverages, condiments and cookies. Comparing extreme income quintiles, the largest and significant differences were in the acquisition of soda ($\Delta=2.36$), alcoholic beverages ($\Delta=5.15$), sweetened juice ($\Delta=1.60$), prepared food ($\Delta=2.85$) and sweet and dessert ($\Delta=3.04$).

Regarding healthy eating markers, compared with the reference profile of the household that we chose for this study (men/white/high schooling), the reference profile of the household characterized by white women with higher schooling had a significantly higher purchase of vegetables and green (PR=1.22; CI95% 1.07-1.38), fruits (PR=1.17; CI95% 1.05-1.31), and cheese (PR=1.27; CI95% 1.06-1.54). When the household was headed by a white woman with low scholarity, the household spent 25% more on vegetables and greens and tubers than the reference profile. Regarding unhealthy eating markers, the profile characterized by black women with low education level spent significantly less on soda (PR=0.52; CI95% 0.44-0.61), alcoholic beverages (PR=0.23; CI95% 0.16-0.33) and prepared food (PR=0.51; CI95% 0.37-0.73) than the reference profile and the other social profiles (Table 3).

Table 1. Mean and proportions (%) of sociodemographic characteristics of the population according to the 1st and 5th quintile of family per capita income. POF 2018, Brazil.

Sociodemographic characteristics	Income quintile	
	1st	5th
	Mean (CI95%)	
Income per capita (dollar)	106.5 (105.21-107.76)	1,413.31 (1380.76-1445.86)
	% (CI95%)	
Reference person characteristic		
Scholarity (years)		
≤8	81.9 (80.74-83.09)	18.1 (16.91-19.26)
>8	33.5 (31.79-35.18)	66.5 (64.81-68.21)
Sex		
Male	49.4 (47.65- 51.20)	50.6 (48.79- 52.35)
Female	59.8 (57.92- 61.68)	40.2 (38.32- 42.08)
Race/skin color		
White	13.8(12.65-15.05)	86.2 (84.95-87.35)
Non-white	51.2 (49.09-53.31)	48.8 (46.69-50.91)
Household characteristic		
Region		
North	83.6 (81.01- 85.88)	16.4 (14.12- 18.99)
Northeast	80.4 (78.85- 81.89)	19.6 (18.11- 21.15)
Midwest	36.7 (32.18- 41.49)	63.3 (58.51- 67.81)
Southeast	35.1 (32.16- 38.12)	64.9 (61.88- 67.84)
South	26.9 (23.80- 30.15)	73.1 (69.85- 76.20)
Area		
Urban	24.9 (23.54-26.28)	75.1 (73.72-76.46)
Rural	75.2 (71.45-78.63)	24.8 (21.37-28.55)
Number of residents per household		
≤3	27.9(26.56-29.25)	72.1 (70.75-73.44)
4-6	70.1 (68.10-72.07)	29.9 (27.93-31.90)
≥7	96.2 (93.95-97.66)	3.8 (2.34-6.05)
Water supply		
General water network	47.0 (45.28- 48.72)	53.0 (51.28- 54.72)
Artesian water well	76.0 (72.82-78.97)	24.0 (21.03- 27.18)
Sewage		
Sewage network	34.3 (32.32-36.29)	65.7 (63.70-67.67)
Other way	79.0 (77.67-80.18)	21.0 (19.81-22.33)

Source: Authors.

Discussion

Family budget surveys provide useful information for understanding the pattern of food consumption and economic distribution of the Brazilian population. Information on food purchases in the assessment of dietary conditions in home environments is important to better understand food purchase patterns and the quality of food purchases according to family income level[20]. Studies examining disparities in diet quality at the individual and household levels using food acquisition data are ongoing surveillance efforts to monitor both the quality of household diet[21] and its effect on reducing chronic diseases[22].

This study showed that families with the highest per capita income (5th quintile) had greater acquisition of both healthy and unhealthy foods. Among the healthy foods, this quintile's greatest purchase of fruits, vegetables and greens, tubers, cheese and milk stand out, and among the unhealthy eating markers, their expenditures on beverages, sugary and industrialized preparations, and alcoholic beverages were the highest. Regarding the evaluated profiles, households headed by white women, regardless of education,

Table 2. Averages and variation (Δ) of expenditure per capita on food acquisition between the 1st and 5th quintiles of income per capita, in according to healthy and unhealthy eating markers food. POF 2018, Brazil.

Food	Total		Income per capita quintiles*				Δ†
			1st		5th		
	Mean	CI95%	Mean	CI95%	Mean	CI95%	
Healthy eating marker							
Rice	2.27	2.19-2.35	2.16	2.14-2.18	2.30	2.29-2.33	0.14
Bean	1.14	1.10-1.19	1.04	1.03-1.06	1.17	1.16-1.18	0.13*
Tubers	1.51	1.45-1.57	0.62	0.61-0.62	2.54	2.34-2.37	1.92*
Cassava flour	0.42	0.39-0.45	0.75	0.74-0.77	0.38	0.37-0.38	-0,37
Vegetables and greens	3.43	3.28-3.58	1.33	1.32-1.34	5.40	5.37-5.43	4.07*
Fruits	4.92	4.74-5.10	1.59	1.57-1.61	8.24	8.20-8.29	5.18*
Meat	1.19	1.10-1.28	1.45	1.43-1.47	1.58	1.56-1.61	0.13
Poultry	4.18	4.03-4.33	3.76	3.73-3.78	5.07	5.03-5.11	1.31*
Eggs	1.32	1.27-1.38	0.90	0.90-0.91	2.08	2.06-2.10	1.18*
Fish	1.19	1.10-1.28	1.45	1.43-1.47	1.58	1.56-1.61	0.13
Viscera	0.87	0.82-0.92	0.64	0.63-0.65	1.14	1.13-1.16	0.50*
Milk	3.75	3.61-3.89	2.14	2.12-2.16	4.86	4.82-4.9	2.68*
Yogurt	0.72	0.67-0.77	0.22	0.21-0.22	1.17	1.16-1.19	0.95*
Cheese	2.94	2.76-3.11	0.51	0.50-0.52	5.16	5.12-5.20	4.65*
Coffee	2.02	1.94-2.11	1.27	1.26-1.28	2.37	2.35-2.40	1.10*
Unhealthy eating marker							
Bread	2.67	2.60-2.74	1.80	1.78-1.80	2.97	2.95-2.98	1.17*
Pasta	0.95	0.90-0.99	0.71	0.70-0.71	1.06	1.05-1.07	0.35*
Sugar	0.97	0.93-1.00	0.82	0.81-0.83	0.97	0.96-0.98	0.15*
Salt	0.11	0.10-0.11	0.08	0.08-0.08	0.11	0.11-0.11	0.03*
Oil	1.16	1.10-1.22	0.81	0.80-0.81	1.35	1.34-1.37	0.54*
Soda	2.33	2.22-2.44	0.88	0.87-0.89	3.24	3.21-3.26	2.36*
Sweetened juice	1.28	1.20-1.37	0.36	0.36-0.37	1.96	1.94-1.98	1.60*
Alcoholic beverages	2.99	2.70-3.29	0.39	0.37-0.40	5.54	5.47-5.61	5.15*
Light and diet beverages	0.08	0.07-0.10	0.002	0.002-0.003	0.17	0.16-0.17	0.17*
Processed meat	1.19	1.10-1.28	1.45	1.43-1.47	1.58	1.56-1.61	0.13
Canned	1.02	0.94-1.10	0.40	0.39-0.40	1.59	1.57-1.61	1.19*
Prepared food	2.05	1.83-2.25	0.50	0.49-0.51	3.35	3.30-3.40	2.85*
Cookies	2.49	2.40-2.58	1.45	1.44-1.46	3.15	3.13-3.17	1.70*
Sweet cookie	1.38	1.32-1.45	0.68	0.68-0.69	1.71	1.69-1.72	1.03*
Salty cracker	1.10	1.06-1.15	0.74	0.73-0.74	1.43	1.42-1.45	0.69*
Cakes	0.39	0.36-0.43	0.14	0.14-0.15	0.67	0.66-0.68	0.53*
Sweets and desserts	2.14	1.99-2.29	0.44	0.43-0.45	3.48	3.45-3.52	3.04*
Fast food	0.43	0.36-0.51	0.11	0.10-0.11	0.67	0.65-0.68	0.56*

Notes: Q1=1st quintile; Q5=5th quintile. Conversion rate from Real to US dollars of January 15, 2018 (R$ 1.00=U$ 3.31). †[Δ = (Q5 - Q1)]. *T-test P-value<0.05.

Source: Authors.

tend to have greater acquisition of healthy eating markers, while those headed by black women with less education tend to have less acquisition of unhealthy eating markers than households headed by white men.

To analyse the differences in the patterns of acquisition of healthy and unhealthy food markers according to the groups analysed, it is important to assess the costs of foods in Brazil. According to the 2017-2018 POF report, the average cost of the most consumed fruits by the Brazilian population (bananas, apples, and oranges) was higher than the cost of the purchase of the most consumed vegetables (lettuce, tomato, and pumpkin)[13]. In other words, this result reinforces that the lower cost of these foods can

Table 3. Prevalence ratio (PR)* and confidence intervals (95%CI) of expenditure on healthy and unhealthy eating markers. POF 2018, Brazil.

Characteristics of head of household profile	Healthy eating markers									
	Vegetables and greens		Fruits		Tubers		Cheese		Milk	
	PR	CI95%	PR	CI95%	PR	CI95%	PR	CI95%	PR	CI95%
Men/White/High schooling	-	-	-	-	-	-	-	-	-	-
Men/Non-white/High schooling	0.96	0.83-1.11	0.90	0.80-1.02	1.15	0.99-1.34	0.78	0.67-0.90	0.96	0.84- 1.11
Men/White/Low schooling	1.02	0.89-1.16	0.82	0.71-0.93	1.09	0.95-1.24	0.70	0.58-0.85	1.00	0.87- 1.16
Men/Non-white/Low schooling	0.90	0.80-1.02	0.68	0.60-0.77	0.86	0.74-0.98	0.49	0.41-0.59	0.82	0.72-0.92
Women/White/High schooling	1.22	1.07-1.38	1.17	1.05-1.31	1.20	1.05-1.37	1.27	1.06-1.54	1.10	0.96-1.26
Women/Non-white/High schooling	1.13	0.94-1.35	0.93	0.83-1.04	1.12	0.97- 1.28	0.76	0.64-0.91	1.00	0.88-1.13
Women/White/Low schooling	1.25	1.01-1.55	0.82	0.71-0.94	1.25	1.06-1.47	0.70	0.59-0.83	1.14	0.99-1.31
Women/Non-white/Low schooling	0.96	0.82-1.14	0.76	0.59-0.85	0.96	0.79- 1.16	0.46	0.37-0.60	0.90	0.77-1.04
	Unhealthy eating markers									
	Soda		Alcoholic beverages		Sweetened juice		Prepared food		Sweets and desserts	
	PR	CI95%	PR	CI95%	PR	CI95%	PR	CI95%	PR	CI95%
Men/White/High schooling	-	-	-	-	-	-	-	-	-	-
Men/Non-white/High schooling	0.89	0.77-1.02	1.09	0.81-1.45	0.86	0.70-1.06	0.82	0.63-1.08	0.66	0.55-0.79
Men/White/Low schooling	0.92	0.78-1.08	0.76	0.57-1.00	0.62	0.49-0.78	0.76	0.54-1.08	0.72	0.58-0.90
Men/Non-white/Low schooling	0.66	0.56-0.78	0.54	0.40-0.73	0.64	0.49-0.84	0.62	0.43-0.90	0.44	0.35-0.55
Women/White/High schooling	1.07	0.92-1.25	0.83	0.65-1.07	0.98	0.82-1.19	1.13	0.77-1.65	1.19	0.98-1.45
Women/Non-white/High schooling	0.79	0.68-0.92	0.72	0.39-1.34	0.77	0.62-0.96	0.76	0.53-1.08	0.78	0.63-0.97
Women/White/Low schooling	0.88	0.73-1.06	0.53	0.35-0.80	0.86	0.67-1.11	0.67	0.46-0.98	0.86	0.69-1.08
Women/Non-white/Low schooling	0.52	0.44-0.61	0.23	0.16-0.33	0.59	0.40-0.87	0.51	0.37-0.73	0.58	0.44-0.77

*Adjusted by family per capita income, age, area (urban/rural) and Brazilian country regions.

Source: Authors.

promote greater family purchases, mainly due to the profiles of households headed by women with less education. In a study by Borges *et al.*[2] with data from the POF 2008-2009, which aimed to assess the cost necessary to achieve healthy eating, according to the family budget, the authors describe that the price paid by the lower-income group was lower for all food groups when compared to the other income classes, except for their purchases of vegetables[2].

In this sense, it is important to emphasize that per capita family income and food prices are the main determinants of food choices[1], in addition to high palatability, especially of ultra-processed foods[23]. Restrictions on the food budget result in the selection of diets with higher energy density, indicating that the cost of the diet can lead to the adoption of inappropriate diets[24]. The lower cost of energy-dense foods such as soft drinks and cookies than fresh foods such as lean meats, fruits and vegetables facilitates access to these foods among low-income individuals, this access being even greater as income increases, in addi-

tion to fast food and prepared foods that can lead to inadequate weight gain[25].

In recent decades, changes in the pattern of food consumption have resulted in a significant increase in excess weight in the population. Recently, data published by the National Health Survey showed that 61.7% of Brazilians were overweight and 52.0% of the population aged 18 years or over had received a diagnosis of at least one of the investigated chronic diseases[26]. The consumption of foods that are markers of healthy eating, such as rice, beans, fruits, and vegetables, has been decreasing in recent surveys, and the consumption of unhealthy foods such as cakes, fast food (pizza, savoury snacks), prepared foods and sandwiches has increased at all income levels, though this is not true of soft drinks[13]. Thus, the increased consumption of these foods should be seen as a warning due to the high caloric intake and large amounts of sugars and fats in them, which is why they contribute to greater weight gain and consequently to the increase in the occurrence of obesity and chronic non-communicable diseases.

The poorest households (1st *per capita* income quintile), regardless of whether they were headed by men or women, both also had lower purchases for unhealthy foods. This information suggests that in these low-income households, the priority is "basic" foods, which tend to have greater satiety due to these households' ability to purchase less food. According to the POF report that evaluated the individual consumption of a sub-sample of the population evaluated in this study, among the poorest of the population, there is a greater consumption of the foods that make up the basis of Brazilian diet (rice, cassava flour, corn, based preparations of corn, green beans, pasta, coffee, and poultry)[13].

Regarding the profiles evaluated, this study considered as a reference pattern the households headed by men who self-reported as white and who had a high level of schooling. The choice was made because these households would have the highest per capita income, in this sense, it is important to understand the factors that lead to the differences found in this study regarding the acquisition of healthy and unhealthy food markers.

In the study by Medina et al. carried out among Brazilians, the authors observed different patterns between men and women and between races/skin colours in the quality of food consumption. According to the authors, regardless of sex, self-classified white adults consumed more healthy foods than black/brown adults. The relationship between higher income and higher education of adults was also found in Medina's study, so that as the quintiles of income and education of the evaluated adults increased, the higher was the consumption of fruits, vegetables, legumes, animal proteins and the lower was the consumption of beans[10]. A review study of Brazilian national surveys showed that individuals in a more unfavourable socioeconomic position, of mixed or black race/skin colour, lower education level and income were less likely to consume a healthy diet[27].

In fact, Brazil is a country that still has great social inequality, as evidenced by differences in income, sex, ethnicity, access and availability of food, in addition to regional diversities[28]. Socioeconomic disparities directly reflect on the issue of access to services and food, subject to family purchasing power. Furthermore, the quality of the diet tends to improve with increasing education, while more vulnerable groups allocate their food choices to factors such as price, ease of access and satiety provided by the foods[10].

The results of this research also show that spending on foods of poorer nutritional quality was higher in the highest-income quintiles; however, foods that are markers of healthy eating, such as fruits, vegetables, and protein-rich foods, also showed higher spending among families with higher incomes. Thus, in addition to the inequalities related to access to food between different social classes, this emphasizes the importance of evaluating the quality of food purchased among households with higher incomes, since healthy eating is related to the health and nutritional status of the population[29-31].

The COVID-19 pandemic exacerbated the social differences already present in the country[32]. The hunger and the risks to food insecurity that had been present since 2016, due to the discontinuities of economic policies for income transfers[33], intensified in the pandemic, demanding a better understanding of the extent and magnitude of the problems and the articulation of government measures that can ensure access to adequate and healthy food[32]. Recently, Salles-Costa *et al.*[34] evaluated the trend of increased vulnerability of access to food of the Brazilian population through the food insecurity indicator. According to the authors, a sex and a race/skin colour different from the reference person's were significantly associated with increased severe food insecurity in Brazil. Furthermore, it was found that after a significant reduction in severe food security from 2004 to 2013, it increased sharply from 2014 to 2018, mainly among households where the reference person was a woman and self-identified as black/mulatto[34].

A limitation of this study is that the individual consumption fraction was not considered. However, the data provide important information about the dietary pattern of households by income and different social profiles in the country. In addition, the literature indicates that data on the consumption of different foods, as respective percentages of the total energy consumed, can provide a good real estimate of the individual consumption of most of the main groups of food consumed, as collected in the same survey[12]. Food purchased outside the home was also not evaluated in this study.

Another possible limitation of this work is the fact that the participation of foods in the total calories purchased by families was not evaluated. However, presenting the results based on food purchase expenses, according to health and unhealthy eating makers, can contribute to the debate of public policies that address the issue in the country, for families in extreme poverty. In 2019, Palmeira *et al.*[35], observed the importance

of the Brazilian government on the introduction of measures to regulate food to reduce the cost of the basic food prices on the reduction of the food insecurity levels in the area of extreme poverty in Rio de Janeiro[35].

Conclusion

The relevance of these results, considering the relationship among different social profiles of the head of households and the healthy and unhealthy foods, reinforce the use of gender, skin colour and education level on the debate of social inequalities in food. The use of individual characteristics as gender, race/skin colour and educational has been associated with less likely to have a diversified and healthy diet[27].

Thus, knowledge of how the extremes of income and the social profile influence the pattern of food acquisition is important for the establishment of policies aimed at strengthening small farmers through incentives for family farming, reducing the prices of healthy foods and taxing ultra-processed foods, all of which could contribute to improving the population's consumption pattern. In addition, the elaboration and implementation of public policies that contribute to the reduction of social inequalities can also impact purchasing patterns and access to healthy food, guaranteeing the food and nutritional security of the population.

Collaborations

R Salles-Costa is the principal investigator of this study. R Salles-Costa, MR Sgambato and JB Lignani conceived and designed the study. MR Sgambato and JB Lignani wrote the paper. R Salles-Costa, MR Sgambato and JB Lignani contributed to the analysis of the data. All authors contributed to revising the manuscript and all read and approved the final manuscript.

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