DOI: 10.1590/1980-549720190011.supl.2

ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Social inequalities in the food consumption profile of the Brazilian population: National Health Survey, 2013

Desigualdades sociais no perfil de consumo de alimentos da população brasileira: Pesquisa Nacional de Saúde, 2013

Lhais de Paula Barbosa Medina[I], Marilisa Berti de Azevedo Barros[I], Neuciani Ferreira da Silva Sousa[II], Tássia Fraga Bastos[I,III], Margareth Guimarães Lima[I], Celia Landmann Szwarcwald[IV]

ABSTRACT: ***Introduction:*** High income concentration prevails in Brazil and socioeconomic status influences living and health conditions, including dietary quality. ***Objective:*** To measure the magnitude of social inequalities in the food quality profile of the Brazilian population. ***Method:*** We analyzed data from 60,202 adults who participated in the 2013 National Health Survey. The prevalence of indicators of food quality was estimated according to gender, ethnicity, income, schooling, and health insurance. We calculated prevalence ratios using multiple Poisson regression. ***Results:*** Healthy food consumption was more prevalent among females, white people, and individuals with higher socioeconomic status. However, we also found a higher prevalence of some foods considered unhealthy, such as sweets, sandwiches, snacks, and pizzas, among the most favored social segments, in women, and white people, expressing the concomitance of healthy and unhealthy eating habits. The comparison between the consumption of skim and low-fat milk according to income (prevalence ratio – PR = 4.48) presented the most significant difference. ***Conclusion:*** In addition to the expressive social inequality identified in the Brazilian food profile, mixed patterns were detected, including healthy and unhealthy foods. These results point out the need for monitoring and promoting healthy eating habits, taking into account the social inequalities and contradictions concerning food intake.

Keywords: Food consumption. Health Status Disparities. Diet, food, and nutrition.

[I]Department of Collective Health, School of Medical Sciences, Universidade Estadual de Campinas – Campinas (SP), Brazil.
[II]Department of Collective Health, Institute of Collective Health, Universidade Federal de Mato Grosso – Cuiabá (MT), Brazil.
[III]Faculdade São Leopoldo Mandic – Campinas (SP), Brazil.
[IV]Departament of Health Information, Center for Scientific and Technological Information, Fundação Oswaldo Cruz – Rio de Janeiro (RJ), Brazil.
Corresponding author: Lhais de Paula Barbosa Medina. Rua Tessália Vieira de Camargo, 126, Cidade Universitária Zeferino Vaz, CEP: 13083-887, Campinas, SP, Brazil. Email: lhaisdepaula@gmail.com
Conflict of interests: nothing to declare – **Financial Support:** Ministry of Health, Brazil.

RESUMO: ***Introdução:*** É amplamente reconhecido que elevada concentração de renda prevalece no Brasil e que a posição socioeconômica dos segmentos sociais exerce influência nas condições de vida e saúde, incluindo a qualidade da alimentação. ***Objetivo:*** Medir a magnitude das desigualdades sociais no perfil da qualidade alimentar da população brasileira. ***Método:*** Analisaram-se dados da amostra de 60.202 adultos da Pesquisa Nacional de Saúde de 2013. Foram estimadas as prevalências de indicadores de qualidade alimentar segundo sexo, raça/cor, renda, escolaridade e posse de plano de saúde. Razões de prevalência foram estimadas por meio de regressão múltipla de Poisson. ***Resultados:*** Maior prevalência de consumo de alimentos saudáveis foi verificada no sexo feminino, entre os brancos e no grupo de melhor nível socioeconômico. Entretanto, para alguns alimentos considerados não saudáveis, como doces, sanduíches, salgados e *pizzas*, também foi observada maior prevalência nos segmentos sociais mais favorecidos, nas mulheres e nos brancos, expressando a concomitância de escolhas alimentares saudáveis e não saudáveis. Desigualdade de maior magnitude foi observada quanto à comparação do consumo de leite desnatado e semidesnatado segundo renda (razão de prevalência – RP = 4,48). ***Conclusão:*** Além de expressiva desigualdade social no perfil alimentar dos brasileiros, foram detectados perfis mistos, incluindo alimentos saudáveis e não saudáveis, sinalizando a necessidade de monitoramento e de intervenções de promoção de alimentação saudável que levem em conta as desigualdades sociais e as contradições no consumo alimentar.

Palavras-chave: Consumo de alimentos. Disparidades nos Níveis de Saúde. Alimentos, dieta e nutrição.

INTRODUCTION

Brazil has one of the highest income concentrations in the world, being the tenth most unequal nation among 140 countries evaluated by the United Nations (UN)[1]. The Brazilian income concentration reflects a strong disparity of living conditions among the social segments of the population. In 2017, more than 16 million Brazilians were below the poverty line[2], while few families had wealth equivalent to that of the poorest half of the population[3].

Socioeconomic status significantly impacts the living situation of social segments, determining possibilities of access to services, goods, and products, including food[4]. The influence of food quality on health is widely recognized[5], and access to healthy foods is subject to families' economic conditions. In addition, proper nutrition depends, among other aspects, on people's knowledge of the types and characteristics of foods that make them more or less healthy, the ease of access and proximity to shopping places, the preferences developed throughout life, and health issues[6].

Researches confirm that dietary quality tends to be better with increasing income or schooling and those diets with high-energy content and low nutritional quality are preferably consumed by socially disadvantaged groups[7]. These segments are more prone to choose unhealthy foods due to their prices, the satiety provided, ease of access, and level of knowledge about the impact that including these items in the diet has on health.[8] However, the contemporary lifestyle, characterized by the urbanization process, fast pace of life, the new configuration of occupations, among other factors, adds new challenges to food choice[9].

Regular consumption of fruits, vegetables, and low-saturated fat foods is considered a protective factor against chronic non-communicable diseases (NCDs), as well as regular physical activity and adoption of other healthy behaviors[10]. For this reason, in the Strategic Action Plan to Tackle Chronic Non-Communicable Diseases 2011–2022[10], the Brazilian government defined a set of actions, such as monitoring behaviors related to the occurrence of chronic NCDs. The National Health Survey (NHS) represents one of the relevant strategies for surveillance of risk factors for chronic diseases and, among other things, it monitors the dietary conditions of the Brazilian population[11].

National population-based research publications[12-15] show a lack of studies with concomitant analyses of food consumption markers that simultaneously address healthy and unhealthy food choices, in order to better characterize dietary profiles and identify possible contradictions in these profiles. The few investigations that analyze multiple social indicators also make it possible to verify how dietary profiles and contradictions are expressed in different sociodemographic segments.

From this perspective, this article aims to analyze the magnitude of social inequalities in a wide range of dietary markers according to various social stratifiers that include, besides gender and schooling, ethnicity, income, and health insurance.

METHOD

We used data from the 2013 NHS performed by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* – IBGE), in partnership with the Ministry of Health. The NHS addressed multiple health issues including lifestyle, diseases and health status, access to and use of health services, preventive practices, among other topics[11,16].

The NHS used a three-stage cluster sampling design. In the first stage, the primary sampling units (PSUs) – consisting of census tracts or set of tracts – were drawn; in the second stage, households were selected; and in the third stage, a resident aged 18 years or older who answered the individual questionnaire was chosen from each selected household. Properly trained interviewers collected data using personal digital assistants[16].

The sample comprised 64,348 households, and 60,202 participants aged 18 years or older were interviewed. More data related to the survey design and sampling method are available in other publications[11,17].

The dependent variables analyzed were:

- regular consumption on five or more days of the week (yes or no):
  - a1) raw vegetables;
  - a2) cooked vegetables;
  - a3) fruits;
  - a4) fresh juice;
  - a5) beans;
  - b) fish at least once a week (yes or no).

- among those who eat these foods (yes or no):
  c1) low-fat or skim milk;
  c2) red meat without visible excess fat;
  c3) skinless chicken.
- consumption on up to two days a week (yes or no):
  d1) red meat;
  d2) sugary drinks (soft drinks or processed juices);
  d3) sweet foods (pieces of cake or pies, candies, chocolates, caramels, and cookies);
  d4) sandwiches, snacks, or pizza (as a substitute for lunch or dinner).

The independent variables were: gender (male and female), self-reported ethnicity (white and black/multiracial), household income (categorized into deciles), schooling (illiterate or less than one year of study, incomplete or complete elementary school, incomplete or complete high school, incomplete or complete higher education), and private health insurance (yes or no). The gender and age variables were taken into account for confounding adjustment, as well as the geographic region of residence (North, Northeast, South, Southeast, and Midwest). In the analysis according to ethnicity, Asians and indigenous people were excluded due to their low representativeness.

We estimated the prevalence of indicators of food consumption according to independent variables, as well as the adjusted prevalence ratios and 95% confidence intervals, using multiple Poisson regression. The effect of the complex sample design was weighted in all analyses performed using the survey module of the Stata 15.0 software (Stata Corp., College Station, United States).

The National Research Ethics Committee (*Comissão Nacional de Ética em Pesquisa* – CONEP) approved the NHS.

RESULTS

The study population consisted mostly of women (52.8%) and black/multiracial people (51.8%); 87.7% had a per capita household income lower than three minimum wages per month; only 12.6% completed higher education; and approximately 70% reported not having private health insurance.

Analyses according to gender (Table 1) showed that women presented a better dietary profile compared to men because they consumed more raw and cooked vegetables, fruits, fresh juice, low-fat and skim milk, red meat without visible fat, and skinless chicken. Women also ingested red meat, soft drinks, and processed juice less often, but reported lower consumption of beans and fish and replacing main meals with sandwiches, snacks, and pizza more frequently.

Analyses according to ethnicity (Table 2) showed a better dietary profile among white people, taking into account most of the indicators analyzed. On the other hand, white people

also had the highest prevalence of consumption of sweets and sandwiches, snacks, or pizza as substitutes for main meals, in addition to the lower prevalence of regular intake of beans.

Regarding the analysis according to income deciles (Table 3), the wealthiest 10% of the population presented better dietary profile considering most of the studied indicators, with increasing gradients as income grows. However, the richest segment exhibited less regular bean consumption and a higher prevalence of frequent consumption of red meat; sweet foods; and sandwiches, snacks, and pizza.

Analysis results according to schooling (Table 4) were similar to those observed in the analysis according to income deciles, with a higher prevalence of healthy food consumption

Table 1. Prevalence and prevalence ratios of food quality markers according to gender in the Brazilian population aged 18 years or older. National Health Survey (NHS), 2013.

	Prevalence (%)			Prevalence ratio (PR)[a]
	Total	Male (n=25,920)	Female (n=34,282)	PR[b] (95%CI)
≥ 5x per week[c]				
Raw V	46.5	42.2	50.3	1.18 (1.14 – 1.22)
Cooked V	32.1	27.7	35.7	1.27 (1.21 – 1.32)
Fruits	41.4	34.9	47.1	1.33 (1.28 – 1.38)
Fresh juice	25.2	24.5	25.8	1.05 (1.00 – 1.10)
Beans	71.8	76.7	67.5	0.87 (0.86 – 0.89)
≥ 1x per week[c]				
Fish	54.5	55.3	53.9	0.97 (0.94 – 0.99)
Option for foods with less fat				
Skim or low-fat milk	17.0	13.4	20.0	1.44 (1.33 – 1.55)
Skinless chicken	76.1	69.0	82.3	1.18 (1.16 – 1.21)
Red meat without visible fat	69.5	60.3	77.9	1.28 (1.26 – 1.31)
≤ 2x per week[c]				
Red meat	28.2	22.7	33.0	1.43 (1.36 – 1.50)
Sugary drinks	37.3	42.5	32.7	1.15 (1.13 – 1.18)
Sweet foods	38.1	38.1	38.2	0.99 (0.96 – 1.01)
Sandwiches, snacks, or pizzas	13.6	12.7	14.3	0.98 (0.96 – 0.99)

[a]Prevalence ratio adjusted for age and region; [b]reference category: males; [c]frequency of weekly consumption; V: vegetables; 95%CI: 95% confidence interval.

in the segments with the highest level of education. The dietary paradoxes were also similar: the most schooled groups presented the lowest prevalence of consumption of beans and the highest prevalence of intake of red meat, sweet foods, and meal substitutes.

In the analysis of the dietary pattern according to individuals who had private health insurance (Table 5), we identified a higher prevalence of healthy dietary profile for most indicators in the stratum that had health insurance. In contrast, those with health insurance also presented the worst profile for the consumption of sweets, red meat, and meal replacements, and the prevalence of regular consumption of beans was higher among users of the public health system (*Sistema Único de Saúde* – SUS).

Table 2. Prevalence and prevalence ratios of food quality markers according to ethnicity in the Brazilian population aged 18 years or older. National Health Survey (NHS), 2013.

	Prevalence (%)		Prevalence ratio (PR)[a]
	Black and multiracial (n=35,143)	White (n=24,106)	PR[b] (95%CI)
≥ 5x per week[c]			
Raw V	38.9	54.5	1.18 (1.14 – 1.22)
Cooked V	28.7	35.2	1.08 (1.03 – 1.13)
Fruits	36.5	46.5	1.16 (1.12 – 1.20)
Fresh juice	25.9	24.3	1.13 (1.07 – 1.19)
Beans	76.0	67.7	0.87 (0.86 – 0.89)
≥ 1x per week[c]			
Fish	55.8	52.7	1.06 (1.02 – 1.09)
Option for foods with less fat			
Skim or low-fat milk	12.8	21.1	1.52 (1.40 – 1.66)
Skinless chicken	76.6	75.5	1.04 (1.02 – 1.07)
Red meat without visible fat	67.8	71.2	1.06 (1.04 – 1.09)
≤ 2x per week[c]			
Red meat	29.5	26.7	0.96 (0.91 – 1.01)
Sugary drinks	37.2	37.5	1.00 (0.98 – 1.03)
Sweet foods	34.3	42.3	0.90 (0.88 – 0.92)
Sandwiches, snacks, or pizzas	10.6	16.8	0.95 (0.93 – 0.96)

[a]Prevalence ratio adjusted for gender, age, and region; [b]reference category: black and multiracial; [c]frequency of weekly consumption; V: vegetables; 95%CI: 95% confidence interval.

DISCUSSION

In summary, the results of this study reveal a better food consumption profile among women, white individuals, and social groups with higher income, higher schooling, and health insurance. These social segments presented a higher prevalence of regular consumption of raw and cooked

Table 3. Prevalence ratios of food quality markers according to income strata (in deciles) in the Brazilian population aged 18 years or older. National Health Survey (NHS), 2013.

	Prevalence ratio (PR)[a]			
	PR[b] (95%CI)	PR[b] (95%CI)	PR[b] (95%CI)	PR[b] (95%CI)
	(2/1)	(3/1)	(4/1)	(5/1)
≥ 5x per week[c]				
Raw V	1.27 (1.16 – 1.38)	1.49 (1.36 – 1.63)	1.71 (1.57 – 1.87)	2.11 (1.93 – 2.31)
Cooked V	1.18 (1.06 – 1.31)	1.30 (1.17 – 1.45)	1.46 (1.32 – 1.61)	1.95 (1.76 – 2.15)
Fruits	1.28 (1.18 – 1.40)	1.55 (1.42 – 1.69)	1.88 (1.72 – 2.04)	2.34 (2.15 – 2.56)
Fresh juice	1.27 (1.16 – 1.40)	1.47 (1.33 – 1.63)	1.67 (1.52 – 1.84)	2.42 (2.17 – 2.69)
Beans	1.02 (0.99 – 1.06)	1.00 (0.97 – 1.04)	0.90 (0.87 – 0.94)	0.65 (0.62 – 0.69)
≥ 1x per week[c]				
Fish	0.96 (0.92 – 1.01)	0.96 (0.91 – 1.02)	1.10 (1.05 – 1.16)	1.43 (1.35 – 1.51)
Option for foods with less fat				
Skim or low-fat milk	1.08 (0.88 – 1.31)	1.26 (1.04 – 1.53)	2.11 (1.76 – 2.55)	4.48 (3.70 – 5.43)
Skinless chicken	1.01 (0.98 – 1.04)	1.03 (1.00 – 1.07)	1.13 (1.09 – 1.16)	1.22 (1.18 – 1.27)
Red meat without visible fat	1.04 (1.00 – 1.08)	1.04 (1.00 – 1.09)	1.13 (1.08 – 1.18)	1.29 (1.24 – 1.35)
≤ 2x per week[c]				
Red meat	0.76 (0.71 – 0.81)	0.70 (0.65 – 0.75)	0.63 (0.59 – 0.68)	0.73 (0.66 – 0.80)
Sugary drinks	0.92 (0.88 – 0.96)	0.88 (0.84 – 0.92)	0.92 (0.89 – 0.96)	1.01 (0.96 – 1.06)
Sweet foods	0.93 (0.90 – 0.96)	0.86 (0.82 – 0.89)	0.83 (0.80 – 0.86)	0.80 (0.76 – 0.85)
Sandwiches, snacks, or pizzas	0.98 (0.96 – 0.99)	0.94 (0.92 – 0.96)	0.90 (0.88 – 0.92)	0.86 (0.83 – 0.88)

[a]Prevalence ratio according to income deciles adjusted for gender, age, and region: (1) 1st decile; (2) 2nd to 4th decile; (3) 5th to 6th decile; (4) 7th to 9th decile; (5): 10th decile; [b]reference category: (1) 1st income decile; [c]frequency of weekly consumption; V: vegetables; 95%CI: 95% confidence interval.

vegetables and fruits, as well as greater intake of foods with reduced fat content. Paradoxically, these same strata demonstrated low regular ingestion of beans and higher prevalence of consumption of sweets (except for women, who did not differ from men in this regard), red meat (except among white people), and sandwiches, snacks, and pizzas as a substitute for main meals.

Table 4. Prevalence ratios of food quality markers according to schooling level[#] in the Brazilian population aged 18 years or older. National Health Survey (NHS), 2013.

	Prevalence ratio (PR)[a]			
	PR[b] (95%CI)	PR[b] (95%CI)	PR[b] (95%CI)	PR[b] (95%CI)
	(2/1)	(3/1)	(4/1)	(5/1)
≥ 5x per week[c]				
Raw V	1.34 (1.25 – 1.43)	1.45 (1.35 – 1.57)	1.71 (1.59 – 1.83)	1.94 (1.81 – 2.08)
Cooked V	1.37 (1.26 – 1.50)	1.48 (1.33 – 1.64)	1.71 (1.56 – 1.88)	2.01 (1.83 – 2.21)
Fruits	1.35 (1.26 – 1.44)	1.62 (1.50 – 1.75)	1.85 (1.72 – 1.98)	2.12 (1.96 – 2.28)
Fresh juice	1.28 (1.17 – 1.40)	1.37 (1.24 – 1.53)	1.64 (1.49 – 1.79)	2.03 (1.83 – 2.25)
Beans	0.96 (0.93 – 0.98)	0.91 (0.89 – 0.94)	0.85 (0.83 – 0.88)	0.67 (0.64 – 0.70)
≥ 1x per week[c]				
Fish	1.07 (1.02 – 1.13)	1.18 (1.12 – 1.25)	1.27 (1.21 – 1.34)	1.52 (1.43 – 1.61)
Option for foods with less fat				
Skim or low-fat milk	1.25 (1.09 – 1.44)	1.47 (1.24 – 1.74)	2.13 (1.84 – 2.46)	4.12 (3.59 – 4.72)
Skinless chicken	1.04 (1.01 – 1.08)	1.13 (1.08 – 1.17)	1.19 (1.15 – 1.24)	1.25 (1.20 – 1.30)
Red meat without visible fat	1.00 (0.97 – 1.04)	1.04 (0.99 – 1.08)	1.14 (1.10 – 1.19)	1.23 (1.18 – 1.28)
≤ 2x per week[c]				
Red meat	0.95 (0.89 – 1.02)	0.92 (0.84 – 1.00)	0.84 (0.77 – 0.91)	0.89 (0.82 – 0.98)
Sugary drinks	1.00 (0.97 – 1.04)	0.97 (0.94 – 1.01)	1.00 (0.96 – 1.03)	1.10 (1.05 – 1.14)
Sweet foods	0.97 (0.94 – 0.99)	0.90 (0.86 – 0.94)	0.86 (0.83 – 0.90)	0.79 (0.75 – 0.83)
Sandwiches, snacks, or pizzas	0.99 (0.98 – 1.01)	0.96 (0.93 – 0.98)	0.92 (0.90 – 0.94)	0.88 (0.86 – 0.91)

[#]Schooling levels: level 1) illiterate or incomplete elementary school; level 2) complete elementary school or incomplete middle school; level 3) complete middle school or incomplete high school; level 4) complete high school or incomplete higher education; level 5) complete higher education; [a]prevalence ratio adjusted for gender, age, and region; [b]reference category: level 1) illiterate or incomplete elementary school; [c]frequency of weekly consumption; V: vegetables; 95%CI: 95% confidence interval.

Studies conducted in Brazil and other countries have also identified a better dietary profile in women[18-20]. Research evaluating young adults from 23 countries found a 50% higher consumption of low-fat foods and a 25% greater intake of fiber-rich foods among women, compared to men, and attributed the better quality of women's diet to their highest concern with the maintenance of body weight and the importance they give to recommendations for healthy eating[21]. Additionally, women are often responsible for the diet and health of family members, which may favor healthier food choices[22]. In contrast, men's insufficient knowledge of nutritional recommendations for vegetable consumption

Table 5. Prevalence and prevalence ratios of food quality markers according to private health insurance in the Brazilian population aged 18 years or older. National Health Survey (NHS), 2013.

	Prevalence (%)		Prevalence ratio (PR)[a]
	Without insurance (n=43,834)	With insurance (n=16,368)	PR[b] (95%CI)
≥ 5x per week[c]			
Raw V	40.9	59.5	1.30 (1.26 – 1.34)
Cooked V	28.0	41.1	1.32 (1.26 – 1.38)
Fruits	36.2	53.3	1.41 (1.36 – 1.45)
Fresh juice	23.4	29.5	1.44 (1.37 – 1.51)
Beans	74.7	65.3	0.85 (0.83 – 0.87)
≥ 1x per week[c]			
Fish	52.3	59.6	1.23 (1.19 – 1.27)
Option for foods with less fat			
Skim or low-fat milk	11.8	28.1	2.29 (2.12 – 2.47)
Skinless chicken	74.0	80.6	1.13 (1.11 – 1.15)
Red meat without visible fat	66.6	76.0	1.15 (1.13 – 1.17)
≤ 2x per week[c]			
Red meat	29.1	25.9	0.91 (0.87 – 0.96)
Sugary drinks	38.1	35.5	1.06 (1.03 – 1.08)
Sweet foods	35.5	44.2	0.88 (0.86 – 0.91)
Sandwiches, snacks, or pizzas	11.7	17.9	0.94 (0.92 – 0.95)

[a]Prevalence ratio adjusted for gender, age, and region; [b]reference category: without insurance; [c]frequency of weekly consumption; V: vegetables; 95%CI: 95% confidence interval.

and lower engagement in diets to lose weight were considered reasons for the poor dietary choices of these individuals in a study assessing male adults and elderly adults from the United Kingdom[18].

Regarding the ethnicity-based dietary inequalities found in this study, research that compared the dietary patterns of white and black Americans identified a higher frequency of foods such as processed meat, fried foods, refined grains, sugar, margarine, sweets, and fats among black people. In other words, a worse dietary profile, similar to that detected in the Brazilian black population[23]. In Brazil, a country with a slave heritage and the largest number of people of African descent outside the African continent, the black population has worse socioeconomic status compared to white people[24], with lower income levels, even though this issue is controlled by educational level[3]. The lower quality eating pattern observed in this study derives, in part, from this condition, because, by adjusting the results for schooling and income, the perceived differences disappeared in several of the indicators analyzed. The remaining inequalities can be attributed to other factors, such as food culture.

Regarding the findings related to income, the scientific literature is consistent in stating that food choice is strongly influenced by the individuals' income levels, agreeing with the results of this study[25-28]. Income ensures access to food, which in turn has price-related quality, especially in developing countries such as Brazil[29]. A food acquisition study found that, among the foods purchased, fruits and vegetables had the highest prices, while sugars, oils, fats, and refined cereals, such as flour and pasta, presented the lowest[27]. Nutritional recommendations prioritize diets based on whole grains and cereals, low-fat meats, fish, vegetables, and fruits because evidence associates them with better health[6,30]. These foods have lower energy density, higher nutritional value[6], and they cost more when compared to processed foods based on ingredients such as sugar, oils, and flours[27].

This condition elucidates the economic limits for adherence to a diet based on fresh and nutritious foods, especially among low-income clusters. One of the strategies to encourage the consumption of healthy foods is to exempt them from taxation, making them more accessible to populations of lower socioeconomic status[31]. Regulating the food industry regarding the production of food with good nutritional quality is also an alternative for reducing the losses related to the intake of processed products[32].

With respect to schooling, the prevalence of regular consumption of raw and cooked vegetables and fruits and the intake of skim or low-fat milk more than doubled when comparing the extreme subgroups with the best and worst level of education. Research conducted in European countries also identified a better food consumption profile, including fruits, vegetables, lean meats, low-fat dairy products, whole grains, and fish, in the highest socioeconomic status subgroups defined by schooling, income, and occupation[7]. Investigations have identified that, in addition to economic constraints, the lack of knowledge about nutrition and nutritional recommendations contributes to the worse food consumption pattern observed in the less schooled segments[33,34].

Concerning the differences in food choices between social strata found in this study, another hypothesis to consider is the influence of the spatial context on food-related inequalities, which contemplates the availability of healthy environments that guarantee access to fresh and quality food. Economically disadvantaged areas have fewer establishments that sell healthy foods, such as supermarkets, street markets, and produce markets. Besides the low number, these establishments, when present, offer lower quality or higher priced products. In this sense, the poorer areas of cities tend to concentrate small establishments and convenience stores that sell low nutritional value products[35-37]. A review study published in 2008 that assessed disparities in food access in the United States with regard to neighborhood environments found that populations with more access to supermarkets and retail stores selling healthy foods tended to adopt more appropriate dietary patterns[38].

The nutrition transition model proposed by Popkin (1993) helps to understand the best dietary profile that prevails today in higher socioeconomic levels, as well as the paradox of food choices found in these groups. According to the author, human societies, having historically moved through three dietary patterns – the collecting food pattern, the famine pattern, and the receding famine pattern –, would now have reached the degenerative diseases pattern, characterized by a diet with high levels of saturated fat, sugar, refined carbohydrates, and low levels of fiber and unsaturated fats. The Brazilian population with a lower socioeconomic status tends to be in this pattern[39].

Popkin suggests that societies have migrated to a fifth pattern, the behavioral change pattern. Still emerging, this pattern derives from the interest in preventing chronic diseases and increasing the life expectancy of the population[39].

Taking this model into account and knowing that populations with better socioeconomic status tend to adhere more easily and more quickly to nutritional and health recommendations, we can state that the best dietary pattern identified in this study among the most favored is due to a transition from the risk of chronic diseases pattern to the behavioral change pattern. A cohort study conducted in 2004 found that social advancement did not necessarily reduce the consumption of certain types of food. The most schooled and of best socioeconomic status presented higher consumption of ultra-processed foods, justified by the easier access to and interest in ready-to-eat products[26].

Many factors influence the dietary profile of populations, and only knowledge about dietary recommendations and resource availability may not be sufficient to promote changes in the dietary repertoire[40,41,42]. Other aspects that interfere in food choices, especially among urban populations, include the imposition of a fast-paced life, technological advances, sedentary occupation[39-43], greater participation of women in the labor market[44], and adherence to eating habits considered globalized[45].

In addition, we should consider taste-related food preferences. Refined, sugar-added, and high-fat items, for example, have high palatability[46,47], despite containing fewer nutrients and more energy density compared to healthier options[48]. Moreover, researches confirm

that taste, among other things, impacts the food choice of individuals[35,49]. Thus, despite being aware of the healthiest food options and having sufficient resources, it is possible that, when considering this set of factors, individuals will choose tastier foods, even if they are not the most nutritious[50] or pose a risk to their health[30]. The hyperpalatability of foods, therefore, may also contribute to the higher prevalence of consumption of ultra-processed foods found in Brazilian strata in social advantage.

Specifically regarding the consumption of red meat, the analyses of this study evidenced a high prevalence of frequent intake of this food, especially among men, groups with higher income, better schooling, and health insurance. This finding warns of the risks of high consumption of this food, since epidemiological evidence has attributed a higher risk for developing cardiovascular diseases[51,52] and colorectal cancer[54,55] to the ingestion of red and processed meat. Current recommendations foresee a gradual reduction in consumption of red meat, and the Dietary Guidelines for the Brazilian Population advises that only one-third of meals should include this item, substituting it for fish, chicken, and eggs as a healthy alternative[6].

The analysis of the results of the present study should take into account the usual limitations of cross-sectional studies and food intake surveys, which may include bias in assessing the regular diet due to participant's memory issues and underestimation or overestimation of consumption of types of food because the interviewee wants to fit into healthy dietary patterns[55,56]. The analysis of unhealthy items already contemplated occasional consumption. Therefore, it focused on consumption profiles that were harmful to dietary quality.

The main strength of this study was to analyze a broad set of food markers simultaneously, which allowed us to identify contradictions in the food repertoire depending on the demographic or socioeconomic variable used to compare population subgroups. Additionally, it presented the potential of national research, with representation for all Brazilians and addressing social inequalities in view of different indicators.

CONCLUSION

The food consumption profile of Brazilians presents significant social inequality, with women, white people, and population groups with better socioeconomic status having the healthiest profile. Conversely, these social segments also consumed some foods considered unhealthy in a higher proportion, and this study sought to discuss the reasons for this concomitance of dietary profiles. Income segments showed higher inequalities for low-fat milk consumption, followed by fresh juice and fruit intake. Differences in dietary choices between social strata indicate peculiarities about food consumption in distinct sociodemographic segments of the population that need to be considered in actions to promote healthy eating.

ACKNOWLEDGMENTS

The authors thank the Ministry of Health for funding the project under grant no. 817122/2015, and the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPq) for the productivity scholarship granted to M.B.A. Barros.

REFERENCES

1. United Nations Development Programme. Human Development Report 2016. Nova York: United Nations Development Programme; 2016. 193 p.
2. Skoufias E, Nakamura S, Gukovas RM. Salvaguardas Contra a Reversão dos Ganhos Sociais Durante a Crise Econômica no Brasil. World Bank Group; 2017.
3. Oxfam Brasil. A distância que nos une: um retrato das desigualdades brasileiras. Oxfam Brasil; 2017.
4. Buss PM, Pellegrini Filho A. A saúde e seus determinantes sociais. Physis Rev Saúde Coletiva 2007; 17(1): 77-93. http://dx.doi.org/10.1590/S0103-73312007000100006
5. Mozzafarian D. Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity – A Comprehensive Review. Circulation 2016; 133(2): 187-225. https://doi.org/10.1161/CIRCULATIONAHA.115.018585
6. Brasil. Ministério da Saúde. Guia Alimentar para a População Brasileira. Brasil: Ministério da Saúde; 2014.
7. Darmon AN, Drewnowski N. Does social class predict diet quality? Am J Clin Nutr 2008; 87(5): 1107-17. https://doi.org/10.1093/ajcn/87.5.1107
8. Van Lenthe FJ, Jansen T, Kamphuis CBM. Understanding socio-economic inequalities in food choice behaviour: Can Maslow's pyramid help? Br J Nutr 2015; 113(7): 1139-47. https://doi.org/10.1017/S0007114515000288
9. Kamphuis CBM, Bekker-Grob EW, Van Lenthe FJ. Factors affecting food choices of older adults from high and low socioeconomic groups: a discrete choice experiment 1 – 3. Am J Clin Nutr 2015; 101(4): 768-74. https://doi.org/10.3945/ajcn.114.096776
10. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise de Situação de Saúde. Plano de ações estratégicas para o enfrentamento das Doenças Crônicas Não Transmissíveis (DCNT) no Brasil 2011-2022. Brasil: Ministério da Saúde; 2011. v. 1. 160 p.
11. Szwarcwald CL, Malta DC, Pereira CA, Vieira MLFP, Conde WL, Souza Júnior PRB de, et al. Pesquisa Nacional de Saúde no Brasil: concepção e metodologia de aplicação. Ciên Saúde Coletiva 2014; 19(2): 333-42. http://dx.doi.org/10.1590/1413-81232014192.14072012
12. Jaime PC, Stopa SR, Oliveira TP, Vieira ML, Szwarcwald CL, Malta DC. Prevalência e distribuição sociodemográfica de marcadores de alimentação saudável, Pesquisa Nacional de Saúde, Brasil 2013. Epidemiol Serv Saúde 2015; 24(2): 267-76. http://dx.doi.org/10.5123/S1679-49742015000200009
13. Claro RM, Santos MAS, Oliveira TP, Pereira CA, Szwarcwald CL, Malta DC. Consumo de alimentos não saudáveis relacionados a doenças crônicas não transmissíveis no Brasil: Pesquisa Nacional de Saúde, 2013. Epidemiol Serv Saúde 2015; 24(2): 257-65. http://dx.doi.org/10.5123/S1679-49742015000200008
14. Jaime PC, do Prado RR, Malta DC. Family influence on the consumption of sugary drinks by children under two years old. Rev Saúde Pública 2017; 51(Supl. 1): 1S-9S. http://dx.doi.org/10.1590/s1518-8787.2017051000038
15. Oliveira MM de, Malta DC, Santos MAS, Oliveira TP, Nilson EAF, Claro RM. Consumo elevado de sal autorreferido em adultos: dados da Pesquisa Nacional de Saúde, 2013. Epidemiol Serv Saúde 2015; 24(2): 249-56. http://dx.doi.org/10.5123/S1679-49742015000200007
16. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde 2013. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2014. 181 p.
17. Souza-Júnior PRB de, Freitas MPS de, Antonaci G de A, Szwarcwald CL. Desenho da amostra da Pesquisa Nacional de Saúde 2013. Epidemiol Serv Saúde 2015; 24(2): 207-16. http://dx.doi.org/10.5123/S1679-49742015000200003

18. Baker AH, Wardle J. Sex differences in fruit and vegetable intake in older adults. Appetite 2003; 40(3): 269-75.
19. Brasil. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016. Brasília: Ministério da Saúde; 2017. 160 p.
20. Assumpção D de, Domene SMÁ, Fisberg RM, Canesqui AM, Barros MB de A. Diferenças entre homens e mulheres na qualidade da dieta: estudo de base populacional em Campinas, São Paulo. Ciên Saúde Colet 2017; 22(2): 347-58. http://dx.doi.org/10.1590/1413-81232017222.16962015
21. Wardle J, Haase AM, Steptoe A, Nillapun M, Jonwutiwes K, Bellisle F. Gender Differences in Food Choice: The Contribution of Health Beliefs and Dieting. Ann Behav Med 2004; 27(2): 107-16. https://doi.org/10.1207/s15324796abm2702_5
22. Fonseca AB, Souza TSN, Frozi DS, Pereira RA. Modernidade alimentar e consumo de alimentos: contribuições sócio-antropológicas para a pesquisa em nutrição. Ciên Saúde Colet 2011; 16(9): 3853-62. ttp://dx.doi.org/10.1590/S1413-81232011001000021
23. Judd ES, Gutiérrez OM, Newby PK, Howard G, Howard VJ, Locher JL, et al. Dietary patterns are associated with incident stroke and contribute to excess risk of stroke in Black Americans. Stroke 2013; 44(12): 3305-11. https://doi.org/10.1161/STROKEAHA.113.002636
24. Hasenbalg C, Silva NV. Educação e diferenças raciais na mobilidade ocupacional no Brasil. In: Hasenbalg C, Silva NV e Lima M., editor. Cor e Estratificação Social. Rio de Janeiro: Contracapa; 1999. p. 217-30.
25. Bojorquez I, Unikel C, Cortez I, Cerecero D. The social distribution of dietary patterns. Traditional, modern and healthy eating among women in a Latin American city. Appetite 2015; 92: 43-50. https://doi.org/10.1016/j.appet.2015.05.003
26. Bielemann RM, Santos Motta JV, Minten GC, Horta BL, Gigante DP. Consumption of ultra-processed foods and their impact on the diet of young adults. Rev Saúde Pública 2015; 49. http://dx.doi.org/10.1590/S0034-8910.2015049005572
27. Ricardo CZ, Claro RM. Cost and energy density of diet in Brazil, 2008-2009. Cad Saúde Pública 2012; 28(12): 2349-61. http://dx.doi.org/10.1590/S0102-311X2012001400013
28. Drewnowski A, Darmon N. Food Choices and Diet Costs: an Economic Analysis. In: Symposium: Modifying the Food Environment: Energy Density, Food Costs, and Portion Size. 2005; 900-4.
29. Claro RM, Monteiro CA. Renda familiar, preço de alimentos e aquisição domiciliar de frutas e hortaliças no Brasil. Rev Saúde Pública 2010; 44(6): 1014-20. http://dx.doi.org/10.1590/S0034-89102010000600005
30. World Health Organization. Diet, nutrition and the prevention of chronic diseases. World Health Organization Technical Report. Genebra: World Health Organization; 2003.
31. Moubarac JC, Claro RM, Baraldi LG, Levy RB, Martins APB, Cannon G, et al. International differences in cost and consumption of ready-to-consume food and drink products: United Kingdom and Brazil, 2008-2009. Glob Public Health 2013; 8(7): 845-56. https://doi.org/10.1080/17441692.2013.796401
32. Magalhães R. Regulação de Alimentos no Brasil. R Dir Sanit 2017; 17(3): 113-33. https://doi.org/10.11606/issn.2316-9044.v17i3p113-133
33. Wardle J, Parmenter K, Waller J. Nutrition knowledge and food intake. Appetite 2000; 34(3): 269-75. https://doi.org/10.1006/appe.1999.0311
34. Patterson RE, Satia JA, Kristal AR, Neuhouser ML, Drewnowski A. Is there a consumer backlash against the diet and health message? J Am Dietetic Assoc 2001; 101(1): 37-41. https://doi.org/10.1016/S0002-8223(01)00010-4
35. Moore LV, Diez Roux AV. Associations of neighborhood characteristics with the location and type of food stores. Am J Public Health 2006; 96(2): 325-31. https://dx.doi.org/10.2105%2FAJPH.2004.058040
36. Filomena S, Scanlin K, Morland KB. Brooklyn, New York foodscape 2007-2011: A five-year analysis of stability in food retail environments. Int J Behav Nutr Phys Act 2013; 10: 1-7. https://dx.doi.org/10.1186%2F1479-5868-10-46
37. Mook K, Laraia BA, Oddo VM, Jones-Smith JC. Food Security Status and Barriers to Fruit and Vegetable Consumption in Two Economically Deprived Communities of Oakland, California, 2013–2014. Prev Chronic Dis 2016; 13: 150402. https://doi.org/10.5888/pcd13.150402
38. Larson NI, Story MT, Nelson MC. Neighborhood Environments. Disparities in Access to Healthy Foods in the U.S. Am J Prev Med 2009; 36(1): 74-81. https://doi.org/10.1016/j.amepre.2008.09.025
39. Popkin BM. Nutritional Patterns and Transitions. Pop Dev Rev 1993; 19(1):138-157 https://doi.org/10.2307/2938388.
40. Paulin GD. Let's do lunch: expenditures on meals away from home. Mon Lab Rev. 2000; 123(5):36-45.
41. Patterson RE, Kristal AR, White E. Do beliefs, knowledge, and perceived norms about diet and cancer predict dietary change? Am J Public Health 1996; 86(10): 1394-400.

42. Dallongeville J, Marécaux N, Cottel D, Bingham A, Amouyel P. Association between nutrition knowledge and nutritional intake in middle-aged men from Northern France. Public Health Nutr 2001; 4(1): 27-33.
43. Jabs J, Devine CM. Time scarcity and food choices: An overview. Appetite 2006; 47(2): 196-204. https://doi.org/10.1016/j.appet.2006.02.014
44. Lelis CT, Teixeira KMD, Silva NM. A inserção feminina no mercado de trabalho e suas implicações para os hábitos alimentares da mulher e de sua família. Saúde Debate 2012; 36(95): 523-32. http://dx.doi.org/10.1590/S0103-11042012000400004
45. Garcia RWD. Reflexos da globalização na cultura alimentar: Considerações sobre as mudanças na alimentação urbana. Rev Nutr 2003; 16(4): 483-92. http://dx.doi.org/10.1590/S1415-52732003000400011
46. Castro IRR de. Desafios e perspectivas para a promoção da alimentação adequada e saudável no Brasil. Cad Saúde Pública 2015; 31(1): 7-9. http://dx.doi.org/10.1590/0102-311XPE010115
47. Drewnowski A. The role of energy density. Lipids 2003; 38(2): 109-15.
48. Mendoza J, Drewnowski A, Christakis D. Dietary energy density is associated with obesity and the metabolic syndrome in US adults. Diabetes Care 2007; 30(4): 974-9. https://doi.org/10.2337/dc06-2188
49. Glanz K, Basil M, Maibach E, Goldberg J, Snyder D. Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. J Am Diet Assoc 1998; 98(10): 1118-26. https://doi.org/10.1016/S0002-8223(98)00260-0
50. French SA. Pricing effects on food choices. In: Symposium: Sugar and fat — from genes to culture. J Nutr 2003; 133(12): 841S-3S.
51. Micha R, Michas G, Mozaffarian D. Unprocessed red and processed meats and risk of coronary artery disease and type 2 diabetes--an updated review of the evidence. Curr Atheroscler Rep 2012; 14(6): 515-24. https://doi.org/10.1007/s11883-012-0282-8
52. de Oliveira Otto MC, Mozaffarian D, Kromhout D, Bertoni AG, Sibley CT, Jacobs DR Jr., et al. Dietary intake of saturated fat by food source and incident cardiovascular disease: the Multi-Ethnic Study of Atherosclerosis. Am J Clin Nutr 2012; 96(2): 397-404. https://doi.org/10.3945/ajcn.112.037770
53. English DR, MacInnis RJ, Hodge AM, Hopper JL, Haydon AM, Giles GG. Red meat, chicken, and fish consumption and risk of colorectal cancer. Cancer Epidemiol Biomarkers Prev 2004; 13(9): 1509-14.
54. Carr PR, Walter V, Brenner H, Hoffmeister M. Meat subtypes and their association with colorectal cancer: Systematic review and meta-analysis. Int J Cancer 2016; 138(2): 293-302. https://doi.org/10.1002/ijc.29423
55. Medlin C, Skinner J. Individual dietary intake methodology: a 50-year review of progress. J Am Diet Assoc 1988; 88(10): 1250-7.
56. Scagliusi FB, Ferriolli E, Pfrimer K, Laureano C, Cunha CS, Gualano B, et al. Underreporting of energy intake in Brazilian women varies according to dietary assessment: a cross-sectional study using doubly labeled water. J Am Diet Assoc 2008; 108(12): 2031-40. https://doi.org/10.1016/j.jada.2008.09.012

Received on: 12/17/2018
Final version presented on: 02/22/2019
Approved on: 02/25/2019

Authors' contribution: L. P. B. Medina: conception, analysis, data interpretation, and writing of the manuscript. M. B. A. Barros: conception, analysis, data interpretation, writing of the manuscript, and approval of the final version to be published. N. F. Souza: analysis, data interpretation, and critical review of intellectual content. T. F. Bastos: data interpretation and critical review of intellectual content. M. G. Lima and C. L. Szwarcwald: analysis, data interpretation, and critical review of intellectual content.