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Development of a Food Frequency Questionnaire for *Quilombola* Populations in Rio Grande do Sul State, Brazil

Desenvolvimento de um Questionário de Frequência Alimentar para Populações *Quilombola* do Rio Grande do Sul, Brasil

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Abstract

AIM: To develop a food frequency questionnaire (FFQ) to investigate dietary intake of adults in the maroon communities in Rio Grande do Sul. *Methods***:** The FFQ was based on prior administration of 24-hour recalls (24hRs) used in a cross-sectional study conducted in 2011 with a representative sample of maroon communities in Rio Grande do Sul (RS). 589 dietary recalls were collected, generating a list of 163 food items. To construct the food list of the FFQ, we selected the items that had a frequency of occurrence of at least 5%.and those that showed a percentage contribution to the intake of energy and nutrients of interest in the study. *Results***:** The most frequently consumed foods by the *quilombola* population were rice, soybean oil, coffee, beans, breads, sugar and red meat. The food with the highest contribution to calorie intake was homemade bread, as well as carbohydrates and sodium. The item that contributed most to the intake of protein was red meat. For lipids, the major contributor was soybean oil. For fibers, the largest contributor was beans, as well as potassium. The orange was the food that contributed most to the intake of vitamin C. The final list of the food frequency questionnaire consists of 65 food items. *Conclusion***:** This study is an important contribution to the identification ofeating habits of the maroon communities in Rio Grande do Sul, due to the paucity of data on the subject.

Keywords: Surveys and Questionnaires. Food Consumption. Chronic Disease. Cardiovascular Diseases. Adult. Ethnic Groups.

Resumo

Objetivo: desenvolver um questionário de frequência alimentar para investigar o consumo alimentar de adultos pertencentes a comunidades *quilombola* do Rio Grande do Sul. *Métodos***:** O questionário de frequência alimentar foi elaborado com base na aplicação prévia de recordatório alimentar de 24 horas de um estudo transversal realizado em 2011, com amostra representativa da população em estudo. Foram coletados 589 recordatórios, gerando uma lista de 163 itens alimentares. Destes, foram selecionados aqueles com frequência de aparecimento de pelo menos 5%, além dos que apresentaram contribuição percentual para a ingestão de energia e dos nutrientes de interesse no estudo. *Resultados***:** os alimentos mais consumidos pela população *quilombola* foram: arroz, óleo de soja, café, feijão, pães, açúcar e carne bovina. O alimento com maior contribuição para a ingestão calórica e de sódio foi o pão caseiro. Para a ingestão de proteína, a carne bovina. Para os lipídeos, o óleo de soja. Para as fibras e potássio, o feijão. E para a vitamina C, a laranja. A lista final do questionário de frequência alimentar contém 65 itens alimentares. *Conclusões***:** O presente estudo contribui para a identificação dos hábitos alimentares das comunidades *quilombola* do Rio Grande do Sul.

Palavras-chave: Inquéritos e Questionários. Consumo de Alimentos. Doença Crônica. Doenças Cardiovasculares. Adulto. Grupos Étnicos.

Introduction

Noncommunicable chronic diseases (NCD) are considered a global health problem and a high health priority in Brazil.[1] They have modifiable risk factors in common, among them smoking, physical inactivity, harmful alcohol consumption and unhealthy eating habits.[2] Exposure and vulnerability of populations to NCT are also influenced by socioeconomic conditions.[3] Vulnerable and socially disadvantaged populations are more likely to be ill and die earlier than populations belonging to higher social positions.[4]

Among populations considered socially vulnerable are the maroon (or *quilombola)* communities, who recently have received more attention from social programs and actions against hunger.[5] However, there are few data available on the dietary pattern of this population.

To obtain this information, we need a specific instrument, capable of assessing the individuals' dietary intake and distinguishing different consumption patterns. The food frequency

questionnaire (FFQ) is the method of investigation of food consumption most commonly indicated in epidemiological studies aiming to associate diet with NCD occurrence.[6]

The FFQ has many advantages, such as practicability and wide use in epidemiological studies that associate dietary habits with the development of noncommunicable chronic diseases.[7] It is a simple, low-cost tool, capable of distinguishing different consumption patterns among individuals. One of the greatest advantages of FFQ is its efficiency in measuring habitual foods intake because it provides overall information on the foods consumed over a time period rather than measuring food intake over a few days.[6]

Thus, the aim of this study was to develop a food frequency questionnaire to investigate usual food consumption by adults belonging to maroon communities in the state of Rio Grande do Sul.

Methods

Population studied

The FFQ was designed based on a 24-hour food recall previously used in a cross-sectional study[8] conducted in 2011 with a representative sample of maroon communities in Rio Grande do Sul (RS), Brazil.

The sample was calculated assuming an estimated prevalence of 9.5% of moderate and severe food insecurity in the Afro-Brazilian population in the state of Rio Grande do Sul, with a margin of error of 3 percent points at 95% confidence interval (95%CI) and design effect of 1.5. Ten percent for losses was added to the value obtained, resulting in a sample of 634 families. All individuals aged 18 years or over, of both sexes, identified as the head of the household, responded to the inquiry.

Data collection

A total of 589 24-h dietary recalls (24hR) were collected, one for each head of household. In order to minimize biases in data collection, the interviewers were trained with standardized procedures for data collection.

The participants of the study mentioned in the 24hRs all foods and beverages consumed in the previous day, with their respective portion sizes in home kitchen measurements, which were obtained with the aid of a photograph album.

In addition to the 24hR, standardized questionnaires with 120 questions on the household' socioeconomic status and food and nutrition security were administered. The respondents also had their body weight and height measured by a trained and supervised team.

The project was approved by the Research Ethics Committee of the Federal University of Rio Grande do Sul in March 24, 2011 – process number 20041/2011. Data were calculated after the informed consent was obtained from the subjects and upon previous agreement of the communities' leaders.

Development of the FFQ

Based on the application of the 24hRs, a list of 163 food items was generated. To build the FFQ food list, the foods that had a 5% frequency, i.e. those cited at least in 5% of the 24-h recalls, were selected.

Subsequently, using the formula proposed by Block et al.,[9] it was calculated the contribution (in percentage) of the food items to energy intake and to the following nutrients: protein, lipid, carbohydrate, vitamin C, dietary fiber, sodium and potassium, which are considered risk factors or protection against NCD.[10] The food items that contributed with 90% intake of energy and these nutrients were selected.

Also included in the FFQ list were food items not mentioned in the 24hRs, but are consumed by the majority of the population, also in other year seasons, because the 24hRs were administered in winter. The foods included were: watermelon, melon, baby corn and squash.

At the end of the FFQ, some questions about usual practices regarding fat consumption were also included, such as the kind of fat used in cooking and usual intake of visible meat fats or chicken skin.[11]

The foods items of the final list were divided into groups, according to the Dietary Guidelines for the Brazilian Population, published in 2008,[12] namely: cereal grains, tubers and roots; fruits, vegetables and greens; beans and other protein-rich foods; milk and dairy products; meats and eggs; fats and sugars.

The present FFQ contains eight food intake frequencies, as proposed by Roseli Sichieri:[13] more than 3 times a day; 2 to 3 times/day; once a day; 5 to 6 times/week; 2 to 4 times/week; once a week; 1 to 3 times/month; and never or almost never.

The portions were established according to the average portions indicated in the 24hR for each food. For some foods, the conventional portion was also used, such as "unit" for eggs and bread.

To calculate the nutritional composition of each food item, we used the nutrition software ADS Nutri. The foods and dishes not registered in the software were included, based on the Brazilian Table of Foods Composition (TACO)[14] and the USDA table,[15] which was used only for foods not contained in TACO and not supplemented or enriched, since they are common in the US diet, different from the Brazilian diet.

Results

The population studied consisted of 589 adults, 362 being women (64.9%) and 207 men (35.1%). The mean age of participants was 45 years (±17), the majority with 4 to 8 complete years of school (43.0%) and belonging to the economic class C (48.2%).

With respect to the nutritional status, it was found that most of the population under study was overweight (62%, n=353).

The foods eaten with a frequency of at least 5% are listed on Table 1. The main ones are rice, soybean oil, coffee, bean, bread, sugar and beef, foods consumed by more than 40% of the population.

Table 1. Foods cited with more frequency, and at least 5% frequency, in the 24hRs. Maroon populations in Rio Grande do Sul, 2011.

Foods	**%**
White rice	89.76
Soybean oil	79.57
Coffee	69.45
Black beans	60.80
Bread	52.94
Sugar	45.40
Beef	41.34
Milk	37.91
Chicken	34.64
Noodles	31.87
Margarine	29.14
Sweets	27.04
Orange	24.95
Lettuce	23.46
Soda	22.10
Cassava	20.94

continue

Foods	**%**
Egg	19.82
Soft drink	18.75
Pork	17.91
Tea	17.11
Tomato	16.33
Tangerine	15.56
Sandwich/snacks	14.80
Cabbage	14.07
Boiled potato	13.39
Cheese	12.73
Mortadella	12.09
Lemon	11.50
Cornstarch biscuit	11.00
Vegetables soup	10.49
Cream cracker	10.00
Cake	9.51
Apple	9.03
Butter	8.55
Sausage	8.17
Deep fried snacks	7.82
Chicken soup	7.46
French fries	7.16
Polenta	6.86
Hot dog	6.56
Chayote	6.30
Carrot	6.05
Fish	5.80

continue

Foods	**%**
Carreteiro (meat and rice)	5.58
Ham	5.35
Beet	5.15
Leaf cabbage	4.96

Table 2 shows the main foods with the highest percentage contribution to energy intake and nutrients of interest.

Table 2. Percentage contribution of foods to energy and nutrients intake. Maroon populations in Rio Grande do Sul, 2011.

Variables	**Foods contribution**
Energy (kcal)	Homemade bread (11.68%) Beef (10.51%) Rice (9.75%) Bean (7.24%) Soybean oil (5.84%)
Protein	Beef (25.31%) Chicken (13.34%) Bean (10.04%) Pork (7.90%) Homemade bread (7.47%)
Lipids	Soybean oil (20.53%) Beef (20.22%) Chicken (7.98%) Margarine (6.44%) Eggs (3.54%)
Carbohydrate	Homemade bread (17.18%) Rice (15.91%) Sugar (9.87%) Bean (9.78%) Bakery bread (6.22%)

continue

Variables	Foods contribution
Dietary fibers	Bean (55.64%) Rice (8.64%) Homemade bread (6.37%) Noodle (3.24%) Bakery bread (2.90%)
Vitamin C	Orange (47.71%) Bergamot orange (19.32%) Lemon (7.21%) Vegetable soup (3.66%) Papaya (3.37%)
Sodium	Homemade bread (22%) Bakery bread (12.45%) Beef (5.77%) Polenta (5.54%) Vegetable soup (4.45%)
Potassium	Bean (21.01%) Coffee (18.11%) Beef (9.86%) Orange (6.79%) Chicken (4.60%)

The food with the highest percentage contribution to energy was bread. Bread was also the food that contributed most to the percentage of carbohydrate and sodium. Beef was the food that contributed most to the percentage of protein. To lipids, it was soybean oil. The food with the highest percentage contribution to dietary fibers and potassium was bean. The food item that contributed most to the percentage of vitamin C was orange.

The final FFQ list is comprised of 65 food items, representing 97.38% of total calorie intake, 98.39% of lipids, 97.13% of carbohydrate, 97.92% of dietary fibers, 96.79% of vitamin C, 97.85% of sodium and 97.32% of potassium, as described on Table 3.

Table 3. Percentage contribution of some nutrients estimated according to the Food Frequency Questionnaire in relation to the total consumption reported in the 24hR. Maroon populations in Rio Grande do Sul, 2011.

Nutrient	% contribution
Calorie	97.38%
Lipids	98.39%
Carbohydrates	97.13%
Vitamin C	96.79%
Sodium	97.85%
Potassium	97.32%
Dietary fibers	95.17%

Discussion

A FFQ specifically developed for maroon populations is important due to lack of data on the eating habits of these communities. Because it is a vulnerable population, it is important to create instruments to assess their food intake. Moreover, studies on the FFQ development for the traditional populations in Brazil were not found in the literature, which emphasizes the need for this kind of study.

Despite the numerous advantages of this method, the present FFQ has limitations. One disadvantage is that the 24hRs were administered in winter, which prevented that some foods commonly consumed in other seasons to be cited.

The present FFQ had in its final list a total of 65 food items. The literature recommends that FFQ lists should not include less than 50 items, because the food intake may not be properly assessed, and should not exceed 100 items, in order to avoid that the list becomes too large, impairing the rapidity and simplicity of FFQs.[6]

Among the most consumed foods in the maroon population's diet are bread, white rice, coffee, bean, refined sugar and meats. These were also the most common foods eaten by populations in Cuiabá[16] and Niterói.[17] Despite the fact that today the consumption of staple foods such as rice and bean has been diminishing,[18] they were very much present in the maroons' diets, which may have a positive impact on the health of this population.

On the other hand, there was a low intake of fruits and vegetables. This finding can also be explained by the fact that the most vulnerable and low-income populations tend to have a lower intake of this group of foods. This tendency was evidenced in the Brazilian Household Budget Survey of 2008-2009,[19] which showed a lower consumption expenditure of fruits and vegetables by poorer populations.

Another possible explanation for the low intake of fruits and vegetables is that in colder regions, as the state of Rio Grande do Sul, during winter there is a lower consumption of the foods of this group. Many studies point that there is a variation in the consumption of fruits and vegetables according to the time of the year, which is higher in summer. Smolková et al. reported a larger consumption of meats, carbohydrates, fats and few fresh fruits and vegetables during winter when compared to summer.[20]

The FFQ developed for the population of Porto Alegre[21] is the one that is much closer to the region of the population under study. It has a larger list of foods and showed agreement for most of the foods, except for: *carreteiro* (dish made of rice and meats), sweet potato, deep fried snacks, cassava flour, lemon and sheep meat. A possible explanation is that these foods are common in the dietary habits of the maroon populations; however, they were not identified as being usually eaten by the urban population of Porto Alegre.

EXHIBIT 1 – Food Frequency Questionnaire

Name: Date:

Instructions for completion: Please complete the following questionnaire according to your consumption frequency.

FOOD	PORTION SIZE	More than 3 times/ day	2 - 3 times/ Day	Once a day	5 - 6 times/ week	2 - 4 times/ week	Once a week	1 - 3 times/ month	Never/ almost never
Rice	Full medium serving skimmer								
Carreteiro (rice and meat dish)	Full medium serving skimmer								
Sweet potato	Medium unit								
Boiled potato	Medium unit								

continue

FOOD	PORTION SIZE	More than 3 times/ day	2 - 3 times/ Day	Once a day	5 - 6 times/ week	2 - 4 times/ week	Once a week	1 - 3 times/ month	Never/ almost never
French fries	Large portion								
Cassava flour	Full tablespoon								
Noodle	Spaghetti spoon								
Boiled cassava	Large piece								
Deep fried cassava	Large piece								
Bakery bread	Medium unit								
Homemade bread	Medium unit								
Polenta	Full serving spoon								
Cake	Large piece								
Deep fried sweet dough (*bolinho de chuva*, *cueca virada*)	Large unit								
Kuchen	Large piece								
Sweet cookie	Unit								
Savory biscuit	Unit								
Avocado	Small unit								
Lettuce and other leaf vegetables	Full small plate								
Squash	Medium serving skimmer (not full)								
Beet	Medium serving skimmer								

continue

FOOD	PORTION SIZE	More than 3 times/ day	2 - 3 times/ Day	Once a day	5 - 6 times/ week	2 - 4 times/ week	Once a week	1 - 3 times/ month	Never/ almost never
Carrot	Full serving spoon (chopped)								
Leaf cabbage	Large leaf								
Chayote	Full serving spoon								
Cabbage	Large leaf								
Baby corn	Unit								
Tomato	Small unit								
Pineapple	Large slice								
Banana	Medium unit								
Orange	Large unit								
Lemon	Medium unit								
Apple	Medium unit								
Papaya	Medium slice								
Melon	Medium slice								
Watermelon	Medium slice								
Tangerine	Large unit								
Vegetable soup	Flat plate								
Bean or lentil	Full medium ladle								
Milk	Full small glass								
Cheese	Medium slice								
Beef	Medium piece								
Chicken	Medium piece								
Sheep meat	Medium piece								
Pork	Medium piece								
Fish	Small fillet								

continue

FOOD	PORTION SIZE	More than 3 times/ day	2 - 3 times/ Day	Once a day	5 - 6 times/ week	2 - 4 times/ week	Once a week	1 - 3 times/ month	Never/ almost never
Sausage, mortadella, salami, hot dog	Medium piece								
Egg	Unit								
Bacon	Medium slice								
Chicken soup	Flat plate								
Chimia (kind of jelly or fruit paste)	Full tablespoon								
Sweets	Unit								
Sandwich	Unit								
Snacks (chips type)	Large package								
Soda	Can								
Mayonnaise with potato	Full tablespoon								
Margarine	Dessert spoon (not full)								
Butter with salt	Tablespoon (not full)								
Coffee	Full small cup								
Tea	Cup								
Meat broth	Bouillon cube								
Sugar	Full tablespoon								
Soft drink	Full double glass								
Processed juices	Full double glass								

1. What kind of oil or fat do you use in cooking/preparation of meals?

( ) Do not use

( ) Margarine

( ) Butter

( ) Olive oil

( ) Soybean/corn/other oil

( ) Bacon

( ) Lard

( ) Do not know/do not cook

2. When you eat fatty red meat (beef, pork, kid meat), your usually:

( ) always remove excess fat

( ) eat fat

( ) do not eat fatty red meat

3. When you eat chicken with skin, you usually:

( ) always remove skin

( ) eat with skin

( ) do not eat skinny chicken

Conclusion

In this study, it was found a high percentage contribution of the foods included in the FFQ list to the nutrients studied. This fact can be explained by the methodology used, with percentage contribution of foods to energy and nutrients intake. Another hypothesis is that there can be a diet monotony among this population, with high agreement of the most frequent foods intake and calorie contribution.

The FFQ should always fit the population under study and consider their dietary habits, respecting their regional and cultural varieties, in order to provide a reliable and consistent description of the food intake of each location. [6] In this study, besides building a specific questionnaire for the maroon populations of Rio Grande do Sul, it was possible to know some foods present in the dietary pattern of this group of individuals, about which there are few data in the literature. The present study contributes to the identification of eating habits of maroon populations in Rio Grande do Sul.

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References

1. Schmidt MI, Duncan BB, Silva GA, Menezes AM, Monteiro CA, Barreto MS, et al. Chronic non-communicable diseases in Brazil: burden and current challenges. Lancet 2011; 377(9781):1949-1961.
2. Shetty P. Nutrition transition and its health outcomes. Indian J Pediatr. 2013; 80(1):21-27.
3. World Health Organization. Comission on Social Determinants of Health. CDSH Final Report. Closing the gap in generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.
4. Blas E, Kurup AS. Equity, social determinants and public health programmes. Geneva: WHO; 2010.
5. Silva DO, Guerrero AFH, Guerrero CH, Toledo LM. A rede de causalidade da insegurança alimentar e nutricional de comunidades quilombola com a construção da rodovia BR-163, Pará, Brasil. Rev Nutr. 2008; 21:83-87.
6. Fisberg RM. Inquéritos Alimentares: métodos e bases científicos. Barueri: Manole; 2005. 334p.
7. Willet W. Future directions in the development of food-frequency questionnaires. Am J Clin Nutr. 1994; 59(1):171-174.
8. Bairros FS. Acesso aos Programas de Desenvolvimento Social e Combate à Fome, e repercussões na segurança alimentar e nutricional das comunidades quilombola do Rio Grande do Sul [tese]. [Porto Alegre]: Faculdade de Medicina, Programa de Pós Graduação em Epidemiologia da Universidade Federal do Rio Grande do Sul; 2011.
9. Block G, Dresser CM, Hartman AM, Carroll MD. Nutrient sources in the American diet: quantitative data from the NHANES II survey. I. Vitamins and minerals. Am J Epidemiol. 1985; 122(1):13-26.
10. World Health Organization. Diet, nutrition and prevention of chronic diseases. Report FAO/WHO Expert Consulation. Geneva: WHO; 2003. 149 p. WHO Technical Report Series, n. 916.
11. Ribeiro AB, Cardoso MA. Construção de um questionário de freqüência alimentar como subsídio para programas de prevenção de doenças crônicas não transmissíveis. Rev. Nutr. 2002; 15(2):239-245.
12. Brasil. Ministério da Saúde. Coordenação Geral da Política de Alimentação e Nutrição. Departamento de Atenção Básica, Secretaria de Assistência à Saúde. Guia alimentar para a população brasileira: promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2006.
13. Sichieri R. Epidemiologia da obesidade. Rio de Janeiro: Eduerj; 1998. 140 p.
14. Universidade de Campinas. Núcleo de Estudos e Pesquisas em Alimentação. Tabela brasileira de composição de alimentos. 4 ed. rev. ampl. Campinas: NEPA – UNICAMP; 2011. 161 p.

15. U.S. Department of Agriculture. USDA National Nutrient Database for Standard Reference. Release 27. [acesso em: 8 dez. 2014). Disponível em: http://www.ars.usda.gov/Services/docs.htm?docid=25706

16. Ferreira MG, Silva NF, Schmidt FD, Silva RMVG, Sichieri R, Guimarães LV, et al. Desenvolvimento de questionário de frequência alimentar para adultos em amostra de base populacional de Cuiabá, Região Centro-Oeste do Brasil. Rev Bras Epidemiol. 2010; 13(3):413-424.

17. Anjos LA, Warlich V, Vasconcellos M, Souza D, Olinto MT, Waissmann W, et al. Development of a food frequency questionnaire in a probabilistic sample of adults from Niterói, Rio de Janeiro, Brazil. Cad Saúde Pública 2010; 26(11):2196-2204

18. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009: análise do consumo alimentar pessoal no Brasil. Rio de Janeiro: IBGE; 2011.

19. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2002-2003: análise da disponibilidade domiciliar de alimentos e do estado nutricional no Brasil. Rio de Janeiro: IBGE; 2004.

20. Smólkova B, Dusinská M, Raslová K, McNeil G, Spustová V, Blazícek P, et al. Seasonal changes in markers of oxidative damage to lipids and DNA; correlations with seasonal variation in diet. Mutat Res. 2004; 551(1-2):135-144.

21. Henn RL, Fuchs SC, Moreira LB, Fuchs FD. Development and validation of a food frequency questionnaire (FFQ-Porto Alegre) for adolescent, adult and elderly populations from Southern Brazil. Cad Saude Publica 2010; 26(11):2068-2079.

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