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Contribution of the production for self-consumption to food availability and food security in households of the rural area of a Brazilian city

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ABSTRACT

Production for self-consumption can meet the principles of food safety such as respect for food habits and diversity. The participation of production for self-consumption in food availability was compared to the purchase of food for 30 days in 79 households (272 inhabitants) of the rural area of a Brazilian city in 2012. The food security was evaluated by the method “Food energy deficiency in the domicile” that classified 12.7% of the households as insecure. In all households, staple foods (rice, pasta, corn, beans, milk, eggs, meats) were available and more than 60% had processed foods (cookies, soft drinks). Only 22.7% of the calories came from production for own consumption and the biggest expense was the purchase of carbohydrates (91.1%), mainly sugar (12.2%). Evaluating only the energy availability of food is not sufficient since the quality and origin of food is of great relevance in the food security condition.

KEYWORDS

Family farming; food availability; food security; production for self-consumption

Introduction

Similar to the definition of the United Nations Food and Agriculture Organization (FAO), in Brazil, food and nutritional security are defined by law as “the achievement of everyone’s right to regular and permanent access to quality food in sufficient quantity, without compromising access to other essential needs, based on food practices that promote health, respect cultural diversity, and are environmentally, culturally, economically, and socially sustainable” (Brasil 2006; FAO 2002).

Food security is subject to two principles: the human right to adequate food (HRAF) and the practice of food sovereignty. Such principles must guide the definition of strategies for a country’s development as well as the formulation of public policies, the means for implementing them, and the monitoring and social control instruments (Nascimento 2009).

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Food sovereignty refers to the people's right to define their own production, distribution, and food consumption policies and strategies. This reference has been used in the promotion of sustainable models that foster family-based production, in the approximation of production and consumption of food, and in the appreciation of the diversity of food habits. (Marques 2010; Nascimento 2009).

The HRAF refers to every person's right to be free from hunger and malnutrition, and have an adequate and healthy diet. The word "adequate" is not limited to nutritional aspects, but comprises elements of a country's social and economic justice, such as agricultural policy, nondiscrimination of people, and sanitary surveillance of food (Abrandh 2005; Leão and Recine 2011). In order to meet the HRAF, it is necessary to guarantee continuous access to adequate and healthy food, and other human rights, which are a precondition for the exercise of citizenship and dignity (Leão 2010).

Thus, one of the challenges faced by humankind at the beginning of the twenty-first century is the need to eradicate hunger, which affects a large contingent of the population living in environments that, paradoxically, have a developed food production capacity (Silva 2008). Among the people facing food insecurity in Brazil, 16 million suffer from hunger and 46.7% of them live in rural areas, although 15.6% of the Brazilian population lives in the countryside (Brazilian Institute of Geography and Statistics [IBGE] 2010a). Brazilian data from the National Household Sampling Survey (PNAD) revealed that the proportion of homes with residents in a food insecurity situation in rural areas is 35.1% (IBGE 2010a).

The situation of poverty and food insecurity of family farmers becomes more serious with the advent of productive specialization and the dedication to monocultures aiming to increase income and producing less for self-consumption and the local markets. Thereby, due to the commercial character of agriculture, the production of basic food becomes vulnerable (Gazolla and Schneider 2007; Grisa and Schneider 2014).

Family agriculture represents the most equitable social occupation of the agrarian space, favoring the appreciation of social, environmental, and cultural dimensions of production for self-consumption, and offering direct access to food, which are characteristics of food security (Caporal and Costabeber 2006; Maluf 2004).

Production for self-consumption is a noncash income source, which allows families to save resources on the purchase of food. It is an income source strategy contributing to increase the economic stability of rural families in addition to meeting the principles of food security, such as diversity of food and maintenance of consumption habits (Grisa 2009). However, although there is great diversity of food, an ever-small number of species and varieties of plants are consumed. (Santilli 2009).

At the global level, although much of the population has daily and regular access to food, inappropriate choices and combinations can lead

to an insufficient supply of essential elements for proper nutrition towards an excessive calorie intake, contributing to the incidence of overweight, obesity, and chronic diseases. This situation can generate food insecurity, characterized by lacking access on a regular and permanent basis to a healthy diet, sufficient in quantity and in sanitary and nutritional quality (Kepple and Segall-Corrêa 2011; Maluf 2006).

The evaluation of the availability of food according to the form of acquisition, energy content, and nutrients is essential to know the nutritional situation of a population and to guide public policies (Levy et al. 2012; Monterio, Cannon, and Levy et al. 2016). The FAO, through the Food Balance Sheets, set up the indicator average daily caloric availability per capita to measure and monitor countries' food vulnerability. This method can be adapted for the assessment of household food availability and used for food security classification (IBGE 2010b; Smith 2002).

The objective of this study was to analyze the contribution of the production for self-consumption to food availability and of the status of food security in households in the rural area of the municipality of São Miguel do Anta, Minas Gerais.

Methodology

This study was conducted from July to October 2012 in municipality the of Minas Gerais state, Brazil. The municipality had 6760 inhabitants in 2010, with 3006 (44.58%) living in rural zones. According to the *Empresa de Assistência Técnica e Extensão Rural* (EMATER—State Technical Assistance and Rural Extension Company) in this municipality, the rural area is divided into 19 communities, which compound 4 big geographical areas (IBGE 2010c). The main economic activity of family agriculture is the coffee crop (Castro and Soares 2010).

According to the classification of the *Escala Brasileira de Insegurança Alimentar* (EBIA—Brazilian Food Insecurity Scale), based on the results from the *Pesquisa Nacional por Amostra de Domicílios* (PNAD—National Survey of Households) (IBGE 2010a), a prevalence of food insecurity of 25.5% in Minas Gerais was considered for the calculation of the sample size. A $\pm 5\%$ maximum error was estimated, which provided a sample size of 547 individuals in the municipality, with 244 of them in the countryside (44.58%). Based on Dutra et al.'s (2014) study, which represented an average of four people per home, our sample size was represented by 61 households. Adding 10% for eventual losses and 20% for confounding factors, the final sample comprised 79 households randomly selected. The EPI-INFO Statcalc program (version 6.04) was used for the calculations. In order to maintain the proportionality of families per community, a draw was made ensuring that all families had the same chances of participating in the study. The study

design was cross-sectional, with rural houses being the study units. The participants were 79 families, making an amount of 272 individuals. In order to take part in the study, participants had to live in a house included in the study sample, and feed on the food available for consumption in the household. In March 2012, a pilot test was conducted with 10 households from the same municipality to test the validity and reproducibility of the questionnaires. These participants were not included in the main study and the questionnaires were not changed.

The survey was carried out as home visits. In order to administer the questionnaires, the residents were interviewed and anthropometric measures were obtained. All questions and measures were taken by two trained nutritionists. Questionnaires with socioeconomic data and food availability were answered by the person in charge of the household. Anthropometric measurements were performed with all residents for use in calculating the estimated energy requirement (EER). During the visit, all participants signed the informed consent form. Where there were children, consent was obtained from the person responsible for them. It took two to four visits to each household. Attempts were made to find all individuals living in the household and other potential locations such as schools, health centers, shops, or even neighbor farms were also visited where necessary. After the evaluation, all families were visited again to provide the anthropometric and food results as well as the nutritional instructions, and to motivate them to look for health professionals whenever necessary. The research was approved by the Ethics Committee for Research with Humans of the Viçosa Federal University, ref. no. 196/2011.

Socioeconomic evaluation

The studied sociodemographic factors of all residents in the households were gender, age, years of schooling, and occupation. Questions regarding housing conditions, such as number of residents, status of the house, housing situation (owned or not, number of rooms), sewage treatment, water supply, and garbage destination were investigated in accordance with the validated methodology of the *Pesquisa de Padrões de Vida* (PPV—Living Standards Survey) (IBGE 1998).

The monthly available family income *per capita* was calculated in Reais (Brazilian currency), in accordance with the methodology proposed by Takagi, Silva, and Grossi (2001), where the estimated value of the production for self-consumption (converted into monetary value using the prices prevailing in the local retail) is added to the declared total family income, and rental and mortgage payments (if any) are deducted.

Indicator of dietary energy availability in the household and analysis of availability of household food and production for self-consumption

The method for the classification of food security proposed by Smith (2002) utilizes the total daily energy *per capita* available for consumption in the household, and subtracts the sum of the energy needs of all family members, to check if the energy availability meets the needs of each family. A family was defined as “insecure” when the total available energy in the household was lower than the total energy requirements recommended for the family members.

For the calculation of the total daily energy *per capita* available for in-house consumption, a questionnaire containing a food list was used. Participants were asked to report the amount (in kg and L) of each food *in natura* acquired for 30 days as well as the origin of this acquisition (production or purchase). These quantities were converted into calories, divided by the number of people living in the house and then by 30 days. Such methodology involves conducting a detailed quantitative survey of all the food actually available in the household in the reference period prior to the interview (Barbosa, Franceschini, and Priore 2004; Galeazzi et al. 1996; Norder 1998).

We analyzed the nutritional composition of the daily *per capita* availability of all acquired food, which was converted into weight and measurement units with the help of the Diet Pro (version 5.i) software, and subsequently into calories and macronutrients. Energy, carbohydrates, proteins, lipids, and saturated, mono-unsaturated, and poly-unsaturated fatty acids were analyzed. The amount of each macronutrient available for daily consumption *per capita* was expressed as the percentage of energy that each macronutrient represented in the total energy available for consumption.

For the sum of the energy needs of all family members, the individual energy requirements were calculated. It was decided to use the EER formula recommended by the Institute of Medicine (2002), which uses weight, height, and level of physical activity as variables. Weight was determined with an electronic digital scale with a capacity of 150 kg and subdivisions of 50 g. Height/length was measured with the help of a vertical anthropometer with a wooden ruler and metallic base, divided into centimeters and subdivided into millimeters, 2.13 m long. In children under 2 years of age, length was determined on a firm surface, in a horizontal position, with the child at the center of the anthropometer (Brasil 2011). The level of physical activity was identified during the interviews considering the activities carried out in rural areas for adults and school activities for children (Bicalho et al. 2010).

The analysis of the contribution of the produced foodstuff for self-consumption to the total energy availability was performed by comparing

the total available energy against the proportion of energy originating from production and from purchase (Levy-Costa et al. 2005).

Statistical analysis

The database was prepared using double data entry in Microsoft Excel and the *validate* command of the Epi Info 6.04 program was utilized to check the data, which was then analyzed with the aid of the Statistical Package for Social Sciences program 17.0. The data underwent analyses of measures of central tendency and dispersion (mean, standard deviation, median, minimum, and maximum). The Kolmogorov-Smirnov test was conducted in order to verify the normality of data; chi-square and Fisher's exact tests were performed to check the associations between food security status and purchase and production of food, and between the availability of fat and sugar; and Spearman correlation test was used to investigate the relationship between the number of food species and food security status. The significance level adopted was a probability value below 5%.

Results

The sample comprised 79 households in the rural zone, with a total of 272 residents who were 52.6% male, 16.1% under 10 years old, 15.5% teenagers, 48.9% adults, and 19.5% elderly. The median years of schooling was 4 (0–15) years.

The total monthly household income presented varied from R\$ 247.00 to R\$ 4890.00, and the *per capita* income ranged from R\$ 49.50 to R\$ 1630.00, with the minimum national wage in 2012 being R\$ 622.00. When the income was categorized according to its origin, it was noticed that income from production for self-consumption was present in all households. Moreover, in 74.6% of homes, there was a salary or retirement, 44.3% had income from the sale of food production, and 31.6% received benefits from a governmental income transfer program known as "*Bolsa Família*." In all households, there was more than one source of income. The monthly income arising from the production for self-consumption in the households varied from R\$12.00 to R\$635.00, being responsible for up to 64.3% of the total income in a household.

All households were classified as Economy Class B according to the methodology of the *Pesquisa de Padrões de Vida* (PPV—Living Standards Survey) (IBGE 1998). Despite this homogeneity in classification, differences in the physical structure of the houses were found regarding the floors, with 53.2% of them made out of cement and 43.0% of ceramic tiles; and the roof material, with 50.6% of the houses covered with unlined colonial tile. Another relevant distinction factor was the disposal

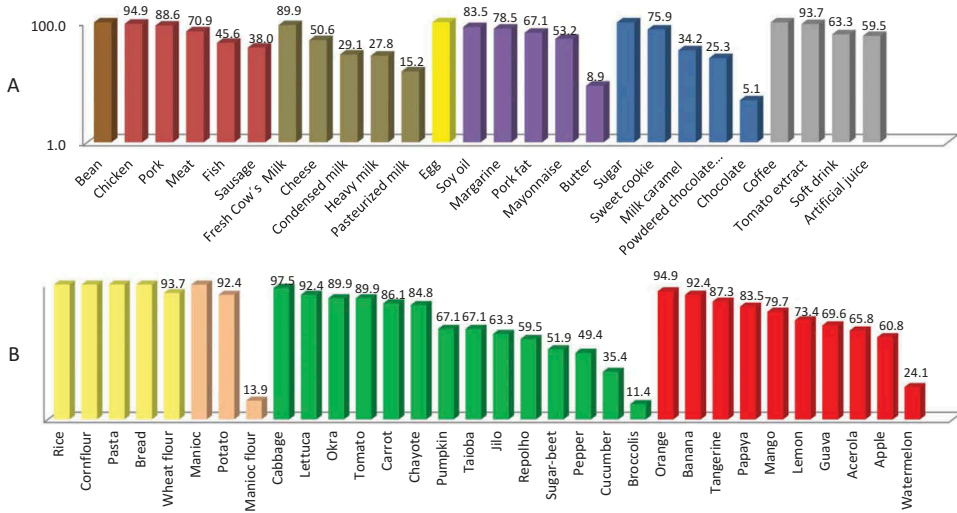


Figure 1. Percentage of families reporting food availability in rural area, Minas Gerais, Brazil, 2012. (A) Group of cereals, tubercles, vegetables, and fruits. (B) Group of beans, meat, dairy products, eggs, fats, sugars, beverages, and processed.

of waste, since 48.1% had a collection system. Water supply was 100% from wells or springs, and all households had electricity, but no sewage treatment. The highest prevalence of number of residents per house was up to 3 (55.7%).

All households ($n = 79$) had availability of rice, pasta, bread, corn flour, cassava, beans, milk, eggs, meats, coffee, and sugar. Within the groups of fruits and vegetables, orange was present in 94.9% of the households and cabbage in 97.5%. Chicken meat (94.9%), tomato extract (93.7%) and fresh cow's milk (89.9%) were also prominent in terms of availability in the households. Foods less frequently available in the households were chocolate (5.1%), butter (8.9%), broccolis (11.4%), cassava flour (13.9%), and pineapple (15.2%). Availability of industrially produced food such as sweet cornstarch biscuits (75.9%), soft drinks (63.3%), artificial juice (59.9%), and meat broth (46.8%) was considerably high. Pork fat, of regular use in the region, was present in 67.1% of the households (Figure 1).

Table 1. Necessity and caloric average availability (kcal/day), standard deviation, median, minimum and maximum power of macronutrients analyzed calories in households in rural area, Minas Gerais, Brazil, 2012.

		Mean \pm SD	Median	Minimum	Maximum
	Necessity caloric	2163.8 \pm 540.7	2112.7	456.0	3570.9
Availability	Energy	3505.4 \pm 1457.2	3121.2	1457.3	8333.4
	Protein	383.9 \pm 156.0	365.9	152.8	883.8
	Lipids	1127.4 \pm 546.1	973.3	301.1	2854.9
	Carbohydrates	2034.5 \pm 952.3	1738.3	872.0	5364.3

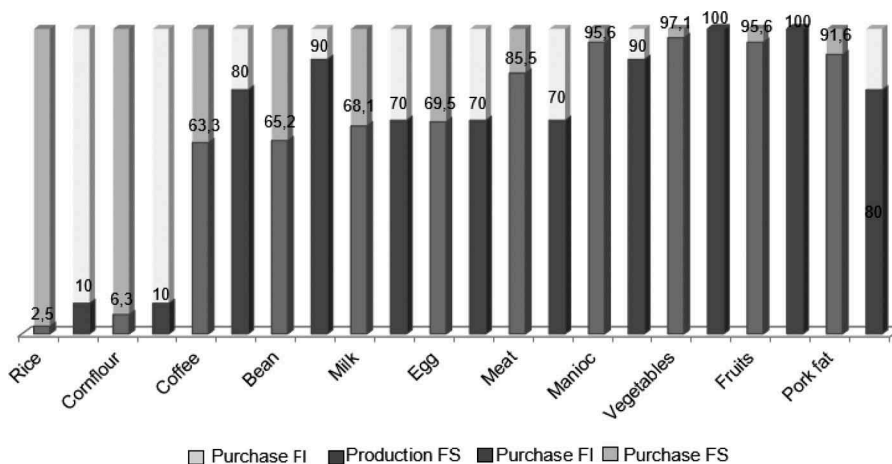


Figure 2. Percentage of purchase and production of food according to the food security classification of rural households, Minas Gerais, Brazil, 2012. Fisher's exact test, $p > 0.05$ Pork fat was available in 67.15% of all households.

The evaluation of alimentary availability in calories and the EER in the studied population revealed a median energy requirement equal to the ingestion of 2112.7 kcal/day and an availability of 3121.2 kcal/day (Table 1). The requirement was calculated individually, just as the availability data were calculated for each household. The data in this table are only intended to describe the average found in the 79 households. Anthropometric data were used for EER calculation.

An evaluation of the situation of food insecurity in the studied households using the concept of “availability of food energy in the household” according to the methodology suggested by FAO was performed for each household with their respective residents. Thus, after subtracting the sum of the energy requirement of the inhabitants of the total calories available at home, 12.7% of the households had insufficient calorie available and were therefore classified as insecure, meaning that the available amount of energy per day in the household was not enough to meet the daily energy requirements of all residents.

Considering the available foods in all households, Figure 2 presents the purchase frequency and production according to the household situation in terms of food security or insecurity. Although there was no statistical difference, it can be noticed that in the insecure households there was a higher frequency of production of coffee (80%), beans (90%), milk (70%), eggs (70%), fruits (100%), and vegetables (100%); in turn, the secure ones produced more frequently meats (85.5%), pork fat (91.6%), and cassava (95.6%). The production of rice and corn flour was lower for both secure and insecure households, with 2.5 and 10% and 6.9 and 10%, respectively.

An examination of the variety of available foods in the 79 households evaluated in this study showed 70 types of food, being within the alimentary

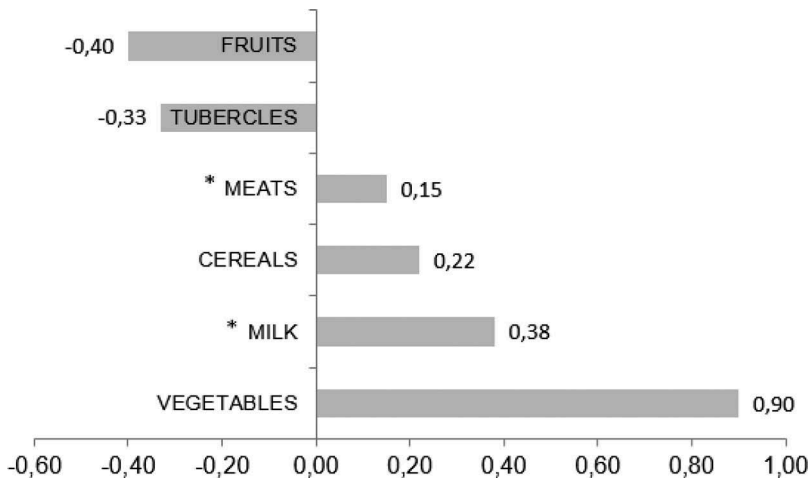


Figure 3. Correlation between variety of foods for groups on food security situation in households in rural area, Minas Gerais, Brazil, 2012.* $p < 0.05$.

Table 2. Monthly per capita availability of sugar, oil, salt, and pork fat in rural in rural area, Minas Gerais, Brazil, 2012.

Variables	Mean \pm SD	Median	Minimum	Maximum
Sugar (kg)	4.6 \pm 3.0	3.75	0.78	15.0
Salt (kg)	0.47 \pm 0.45	0.33	0.03	3.0
Vegetal oil (L)	1.2 \pm 1.0	1.0	0	4.5
Pork fat (L)	0.97 \pm 1.0	0.75	0	5.0

groups as follows: from 3 to 6 types of foods in the cereals group, 1 in the leguminosae group, from 1 to 4 in the tubercles group, from 1 to 4 in the meats, from 1 to 5 in the milk and derivatives group, from 3 to 24 in the vegetables group, and from 2 to 15 in the fruits group. It was observed that among the households in a food secure situation, 14.5% made use of less than 5 types of fruits, and 1.2% of only 3 types of vegetables. In the group of insecure households, 80% did not make use of any type of dairy product, and 60% were offered more than 10 varieties of fruits.

For the group of meats and of milk or derivatives, there was a positive correlation between the variety of foods inside each group and the situation of food security, that is, the higher the variety of foods inside these groups, the higher the energy availability (Figure 3).

The monthly *per capita* availability of sugar found in this study presented values between 0.78 kg and 15 kg, with a median of 3.75 kg. For salt, this value was 0.33 (0.03–3.0) kg, for vegetal oil 1.0 (0–4.5) L, and for pork fat 0.75 (0–5.0) L (Table 2). A great part of the households presented *per capita* availability of oil, sugar, salt, and saturated fat above the recommended levels. However, there was no significant difference between the food secure and insecure groups (FS and FI, respectively) (Table 3).

Table 3. Comparison of the households in the security situation and food insecurity about the availability per capita daily sugar, oil, and salt in rural households in rural area, according to recommendation, Minas Gerais, Brazil, 2012.

	Individual recommendation	FS <i>n</i> (%)	FI <i>n</i> (%)	<i>p</i>
Vegetal oil^a	Up to 16 mL	68 (29.7)	14 (32.5)	0.26
Adequate		161 (70.3)	29 (67.5)	
Above the recommended				
Sugar^a	Up to 56 g	39 (17.0)	9 (20.9)	0.35
Adequate		190 (82.9)	34 (79.1)	
Above the recommended				
Salt^b	Up to 5 g			0.09
Adequate		19 (8.3)	7 (16.3)	
Above the recommended		210 (91.7)	36 (83.7)	
Pork fat^c	<10%*			0.10
Adequate		22 (45.8)	4 (18.0)	
Above the recommended		26 (54.2)	1 (20.0)	

Recommendation: ^aBrasil (2008); Sociedade Brasileira de Cardiologia/Sociedade Brasileira de Hipertensão/Sociedade Brasileira de Nefrologia (2010); ^cSociedade Brasileira de Cardiologia (2013).

*Amount related for saturated fat.

Chi square, $p > 0,05$.

Table 4. Participation of carbohydrates, proteins, and lipid composition of total calories determined by household food availability in rural area. Minas Gerais, Brazil, 2012.

Macronutrients	%	% Participation	
		Purchase	Production
Carbohydrates	57.3	91.1	8.9
Saccharose	12.2	100	–
Other carbohydrates	45.1	87.9	12.1
Proteins	10.8	57.3	42.7
Animal	4.5	27.6	72.4
Vegetal	6.3	65.3	34.7
Lipids	31.9	59.0	41.0
Monounsaturated fat acids	10.4	44.4	55.6
Polyunsaturated fat acids	10.8	76.8	23.2
Saturated fat acids	9.4	38.0	62.0

In this study, from the total available energy, only 22.7% originated from family production, with the remaining coming from purchases. Table 4 presents the relative contribution of the macronutrients to the domiciliary food availability, indicating that 57.3% of the total energy came from carbohydrates, 10.8% from proteins, and 31.9% from lipids. Such values were divided according to their origin of acquisition, which revealed a higher monthly expense on the purchase of carbohydrates (91.1%), mainly sugar (12.2%), and a higher percentage of animal proteins coming from production (72.4%), which was accompanied by an increased availability of saturated fat acids also from production (76.8%). In this analysis, the comparison between households in terms of food security and insecurity is not presented, since it did not show any statistical differences.

Discussion

This study was planned and carried out with the objective of evaluating how the production for self-consumption contributes to the availability of food and one of the most important findings was that only 22.7% of the available calories are of this production, which directly affects the situation of the analyzed data combined with the other factors investigated.

Different from this survey, a comparative observational survey of climatic seasonality on household food security among 94 rural households performed in Kenya showed that the households were able to meet about 88% of their energy requirements which came mainly from own production with purchases contributing only 12% (Kigutha et al. 1998).

In Brazil, as in this study, family farmers, in general, have low levels of education and diversify their cultivated products in order to reduce costs, increase income and benefit from the opportunities generated by the environmental offer and labor availability. They are responsible for the production for self-consumption and, directly or indirectly, by jobs in commerce and provision of services in the cities (Noce and Ferreira Neto 2016; Schneider and Xavier 2013).

Although this study found 12.7% of families with food insecurity, the Food Balance Sheet, calculated by FAO, registered 3100 kcal available for per capita consumption/day in 2012 in Brazil. This value classifies all Brazilians in a situation of food security, because is above the 2300 kcal recommended by FAO to meet the average daily energy needs of a Brazilian citizen (FAO 2000, 2013). Already, the Family Income Research (Pesquisa de Orçamentos Familiares [POF]) 2008–2009 carried out by the Brazilian government, presented results of the average availability of rural household food below those found in this study: 1973 kcal/person/day (IBGE 2010b).

It should be emphasized that food availability data in a country or household only reflect the availability of food for all and not actual consumption by individuals. Thus, the analysis of these data does not provide information for the evaluation of the nutritional adequacy of individual food consumption (IBGE 2010b). However, considering that food insecurity manifests itself at the individual and household levels, and that data from household surveys are obtained directly from households, it is expected that these data will be more related to access, habit and culture than those collected in instances such as the Food Balance Sheet (Smith 2002).

Regarding food availability, similar to this study, data from the POF 2008–2009 revealed greater availability of food groups of drinks and infusions, dairy products, cereals, leguminosae, fruits, vegetables, and meats. A comparison of these data with that from 2003 revealed that Brazilian purchased less sugar, rice and beans, but more soft drinks and beer in 2009 (IBGE 2010b). Still, according to POF, agricultural zones

present an average acquisition that is lower for fruits and higher for polished rice, leguminosae, and bovine meat, when compared to the national average of per capita domiciliary acquisition. The acquisition of fresh cow's milk is highlighted, as its average in rural areas is 211% higher than the national average, and it is part of the greater non-monetary acquisition of dairy products in rural areas.

It is worth highlighting the high availability of processed foods in the households (tomato sauce, sweet biscuits, soft drinks, artificial juice, and bouillon cube) noticed, and this resembles the situation in the rural areas of Brazil, where industrially produced food substitutes the local food produced in the households (Araujo et al. 2013; Martins et al. 2013). The change in the diet due to the introduction of industrially produced food, usually of less nutritional value, is combined with the maintenance of old habits such as the use of pork fat, which is a source of saturated fat (Silva et al. 2014).

Despite the most of the population in this study has been classified in a situation of alimentary security, it also has to be considered the quality of food because the high-energy density of food that contains saturated fats and fine carbohydrates, along with the increase of sedentariness and the reduction of environments offering opportunities for physical activity can generate an excess of energy leading to obesity (Pan American Health Organization 2015).

In accordance with POF 2008–2009, the most common way of food acquisition all over the country is monetary acquisition, even in rural areas. In countryside properties, nonmonetary acquisition (production) exceeds monetary acquisition only for the dairy products and fishes. Other alimentary groups present a significant contribution of non-monetary acquisition: vegetables (38%), fruits (43%), and meats (21%) (IBGE 2010b). These data are of extreme importance; however, the production for self-consumption is of difficult evaluation due to bias of memory and omissions of information (De Cock et al. 2013).

In a study conducted with 42 families in a rural settlement in São Paulo state, 23.8% of them produced rice for self-consumption, 35.7% beans, 42.8% eggs, 72.5% meat, 76.2% cassava, and 81.0% milk (Norder 1998). Similarly, all families in this study always consumed vegetables from their own kitchen garden in bigger quantities than bought vegetables, and only 1 out of 4 families with access to milk actually produced cheese.

Hypothetically, family food consumption can be fully supplied by self-production. Even if this is not the case, it can be considered that the self-consumed foodstuffs are produced without a commercial purpose; therefore, the attribution of monetary value is approximately equivalent to what a given family would spend to obtain such products in the market (Garcia 1990; Norder 1998).

For some authors, the fact that not all consumed products are produced by the farmers is a consequence of the commercialization of the production

originally destined for family consumption. The modernization of agriculture through productive specialization has weakened self-consumption among family farmers. This process of transformation has led the farmer to modify his logic of production by turning to the development of highly specific productive systems such as soybean, corn, and coffee and losing their rights over their food sovereignty (Gazolla and Schneider 2007; Teixeira 2007).

One may notice the potential of the alimentary self-supply for the autonomy of family agriculture and the confluence of this practice with the principles of food security, such as access to foods and diversity of the produced and consumed food in family units. Food security is derived exactly from the food multiplicity that can be obtained in family units and is supplied to their members for consumption in a constant way (Grisa 2009; Maluf 2006; Schneider and Xavier 2013).

Over the years, the feeding centered in the consumption of plants (fruits, vegetables, and greens) has been substituted by excessively caloric and fat-rich diets, poor in vitamins, iron and zinc. Processed foods are made with an increasingly lower number of species and cultivated plants, and the derivatives of corn and soybean, for example, are present in the majority of the industrial food products. It is estimated that there are from 250,000 to 420,000 species of superior plants, of which 30 would correspond to 95% of the human nutrition, and only seven of them (wheat, rice, corn, potato, manioc, sweet potato, and barley) would account for 75% of this total (Fowlwe and Mooney 1990; Santilli 2009).

A study conducted with 11 families living in the agricultural area of the Brazilian municipality of Manacapuru in Amazon reports the use of 173 vegetal species, with 68 of them being used for human feeding (Costa and Mitja 2010). A number similar to that found in this study, 70. In this region, the vegetation provides different resources for the agriculturists, who look for alternatives to improve their quality of life, and the cultivation of fruitful species is common and provide diversification and improvement in the alimentary quality and security.

The high values of availability of processed foods, sugars, and fats in this study are worrisome. In accordance with the Dietary Guidelines for the Brazilian Population (Brasil 2008), the consumption of simple sugars and saturated fats should each not exceed 10% of the total daily energy. It must be noted that an excess of sugar contributes to an energy increase in the families' diet; however, the nutritional content is deficient, since this product contributes with "empty calories." Another important point is that high lipid content can lead to increased satiety, promoting the sensation of gastric fullness, and diminishing the hunger sensation, which can be a justification for the choice of these foods among rural families (Barbosa, Franceschini, and Priore 2004).

The excessive consumption of these products can also be justified as a function of the alimentary habits characteristic in this region of Minas Gerais, where feeding practices are marked by the presence of very flavorful recipes, large amounts of sugar in coffee and sweets, as well as the habit of people in this state to consume *sautéed* vegetables and green leafy vegetables in preference to raw ones, which adds a high amount of oil and fat to the meals. Another old and still present habit is the conservation of pork meat immersed in pork fat, where it remains for long periods until being consumed (Grisa 2009; Priore et al. 2002).

Regarding fat, sugar and salt availability in the studied households, it must be noted that there were isolated cases where we found high amounts of such products, for instance, 15 kg of sugar per capita/month when the maximum amount accepted by the food pyramid would be 1.5 kg per capita/month. In another household, we found 4.5 L of oil available per capita/month, when the maximum consumption based on the food pyramid would be 0.9 L per person per month. On the other hand, pork fat reached 5 L per month in a household, and the median indicated that 50% of the individuals had monthly availability equal or superior to 0.75 L (Brasil 2008).

These data confirm the food habits of rural families of this Brazilian region. They purchase large amounts for to use for a month, when they visit larger shops in urban areas. In a study conducted in Viçosa, Minas Gerais, a similar city of this study, in urban and agricultural households with teenager residents, more than 60% of the rural households had per capita availabilities of oil, sugar, and salt above the recommended levels, with inadequate levels of sugar and salt being associated with the living in rural zones (Silva et al. 2014).

A tendency towards a lower consumption of total and saturated fats, sugar, and sodium (salt) is necessary in the face of the scientific evidence that links the extreme consumption of these groups of food to an increased risk of overweight population and developing non-transmissible chronic illnesses, which is reflected in the national and international statistics of morbidity and mortality (Brasil 2008). It is believed that including overweight and inadequate consumption as a food insecurity situation is a necessary reflection.

According to the distribution of macronutrients, the results of the present study resemble Brazilian data. In POF 2008–2009, the relative contribution of the macronutrients in food availability was found to be 59% for carbohydrates, 12% for proteins, and 29% of lipids; these values are close to those obtained in this study, evidencing the adequacy of food availability among Brazilians according to nutritional recommendations (IBGE 2010b). In a similar study with family agriculturists, they found a high consumption of energetic food, with carbohydrates being consumed in excess, and insufficiencies in the consumption of fruits and potherbs, which also resembles the results of the present study and suggests a trend among family agriculturists (Ozelame, Troian, and Cavalheiro 2007).

Despite the adequacy of the carbohydrate availability in this study, there is a relative excess of the fraction of sucrose, representing 12.2% of the total energy availability, when the maximum fixed by the World Health Organization is 5% (WHO 2015). The availability values were divided according to their origin of acquisition, which revealed a higher monthly expense on the purchase of carbohydrates (70.9%), mostly sucrose, and an increased availability of saturated fatty acids, mostly coming from animal production (68.7%), primarily from pork fat.

The agricultural families in this study produced and consumed their own products, but also did business in the market with both agricultural and nonagricultural products in order to be able to purchase what they judged necessary for their feeding. This is due to several factors found in the literature, such as the fact they do not produce the totality of their consumed products and merchandises, the seasonality of agricultural production, the lack of storage possibilities for some foodstuffs, unexpected weather events that affect production, and whether or not the agriculturist wish to produce his/her own food and their food sovereignty (Gazolla and Schneider 2007; Martinez and Peil 2010; Melo 2013).

Conclusions

The prevalence of food insecurity identified in this study in relation to energy availability is far from expected for the population. Although 87.3% of households are secure, the production for self-consumption is low, the origin of available foods seems vulnerable as it is dependent on monetary value and the quality of the diet in this population does not present the expected adequacy, and further to the large presence of industrially produced foods. Although we did not find significant differences in the availability of energy and macronutrients between secure and insecure households, the distribution of macronutrients showed a high domiciliary availability of fats and sugars in all households.

The food security is a multifaceted problem and should be analyzed for several strands. The evaluation of energy availability is able to diagnose a situation of household food security. However, it is recommended that food availability studies be accompanied by individual food consumption assessments to completely analysis. This is a study limitation.

It is believed that production for self-consumption should be encouraged because it is capable of generating principles of sovereignty and food security, namely, access to and availability of food of nutritional quality and wider diversity for consumption, as well as a supply of sufficient and permanent amounts of foods taking into account families' cultural habits. Moreover, the attribution of economic value to self-consumption can modify the results of research conducted in Brazilian rural areas.

In this sense, analyzing the situation in households provides a wider picture of the food security status and access to food, and as a consequence, the possibility to promote more holistic and hopefully even more effective interventions.

References

- Abrandh. 2005. Ação Brasileira pela Nutrição e Direitos Humanos. *Diretrizes voluntárias para o direito humano à alimentação adequada*. Versão resumida. Brasília. Accessed May 23, 2016. <http://www.abrandh.org.br/downloads/cartilha.pdf>.
- Araujo, M. C., et al. 2013. Consumo de macronutrientes e ingestão inadequada de micronutrientes em adultos. *Revista De Saúde Pública* 47(supl. 1):177–89. doi:10.1590/S0034-89102013000700004.
- Barbosa, K. B. F., S. C. C. Franceschini, and S. E. Priore. 2004. A importância da visita domiciliar na avaliação do hábito alimentar e dos condicionantes de saúde e nutrição de adolescente e suas famílias. *Nutrição Brasil* 3(6):341–50.
- Bicalho, P. G., P. C. Hallal, A. Gazzinelli, A. Goularte, and G. Velásquez-Meléndez. 2010. Atividade física e fatores associados em adultos de área rural em Minas Gerais, Brasil. *Revista De Saúde Pública* 44(5):884–93.
- Brasil. 2006. *Lei n. 11 346, de 15 de setembro de 2006*. Brasília: Cria o Sistema Nacional de Segurança Alimentar e Nutricional – SISAN.
- Brasil. 2008. *Guia alimentar para a população brasileira: Promovendo a alimentação saudável*. Brasília, Brazil: Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Brasília.
- Brasil. 2011. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Orientações para a coleta e análise de dados antropométricos em serviços de saúde: Norma Técnica do Sistema de Vigilância Alimentar e Nutricional – SISVAN. Brasília.
- Caporal, F. R., and J. A. Costabeber. 2006. Segurança alimentar e agricultura sustentável: Uma perspectiva agroecológica. *Revista Brasileira De Agroecologia* 1 (1):87–90.
- Castro, J. F. M., and T. L. Soares 2010. Análise das potencialidades socioeconômicas da Zona da Mata de Minas Gerais (1991-2000): Uma proposta metodológica. I Encontro de Pesquisadores da História da Zona da Mata Mineira, 2010, Rio Pomba. Anais do I Encontro de Pesquisadores da História da Zona da Mata Mineira, vol. 1, Rio Pomba. IFET, 1–17.
- Costa, J. R., and D. Mitja. 2010. Uso dos recursos vegetais por agricultores familiares de Manacapuru (AM). *Acta Amazonica* 40(1):49–58. doi:10.1590/S0044-59672010000100007.
- De Cock, N., M. D’Haese, N. Vink, C. J. Rooyen, L. Staelens, H. C. Schönfeldt, and L. D’Haese. 2013. Food security in rural areas of Limpopo province, South Africa. *Food Security* 5:269–82. doi:10.1007/s12571-013-0247-y.
- Dutra, L. V., L. M. Souza, R. H. S. Santos, and S. E. Priore. 2014. Disponibilidade alimentar para famílias residentes na zona rural: Situação de segurança ou insegurança alimentar e nutricional. *Segurança Alimentar E Nutricional* 21(1):320–29.
- FAO. 2000. *Nutrition country profiles - Brazil*. Rome: Food and Agriculture Organization of the United Nations. Accessed March 16, 2013. <http://www.fao.org/ag/agn/nutrition/bra-e.stm>.
- FAO. 2002. *The state of food insecurity in the world 2001*, 4–7. Rome, Italy: Food and Agriculture Organization of the United Nations. <http://www.fao.org/docrep/003/y1500e/y1500e00.htm>
- FAO. 2013. Food and agriculture organization of the United Nations. FAOSTAT. Food Balance Sheets. Accessed March 15, 2017. <http://www.fao.org/faostat/en/#data/FBS>.

- Fowlwe, C., and P. Mooney. 1990. *Shattering: Food, politics, and the loss of genetic diversity*. Tucson: The University of Arizona Press. IX–XI.
- Galeazzi, M. A. M., H. Bonvino, F. Lourenço, and R. P. T. Vianna. 1996. Inquérito de consumo familiar. Metodologia para identificação de famílias de risco alimentar. *Cadernos De Debate* 4:32–46.
- Garcia, A. R., Jr. 1990. *O sul: Caminho do roçado: Estratégias de reprodução camponesa e transformação social*. Marco Zero, São Paulo e Brasília, DF: Editora Universitária de Brasília; MCT-CNPq.
- Gazolla, M., and S. A. Schneider. 2007. A produção da autonomia: Os “papéis” do autoconsumo na reprodução social dos agricultores familiares. *Revista Estudos Sociedade E Agricultura* 15:89–122.
- Grisa, C., and S. Schneider. 2014. Três gerações de políticas públicas para a agricultura familiar e formas de interação entre sociedade e estado no Brasil. *Revista De Economia E Sociologia Rural* 52:1. doi:10.1590/S0103-20032014000600007.
- Grisa, C. A. 2009. Produção para autoconsumo na agricultura familiar: Uma análise a partir da teoria da sociedade de risco. *Revista Varia Scientia* 8(14):171–00.
- IBGE. 1998. *Pesquisa sobre Padrões de Vida: 1996-1997*. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística.
- IBGE. 2010a. *Pesquisa Nacional por Amostra de Domicílios – PNAD – Segurança Alimentar*. 2009. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística.
- IBGE. 2010b. *Pesquisa de Orçamentos Familiares – POF – 2008-2009 – Antropometria e estado nutricional de crianças, adolescentes e adultos no Brasil*. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística.
- IBGE. 2010c. *Censo 2010*. Instituto Brasileiro de Geografia e Estatística. Accessed March 14, 2012. <http://www.ibge.gov.br/censo2010>.
- Institute of Medicine. 2002. *Dietary References Intakes of energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids*. Washington, DC: The National Academy Press.
- Kepple, A. W., and A. M. Segall-Corrêa. 2011. Conceituando e medindo segurança alimentar e nutricional. *Ciência & Saúde Coletiva* 16(1):187–99. doi:10.1590/S1413-81232011000100022.
- Kigutha, H. N., W. A. Van Staveren, W. Veerman, and J. G. A. J. Hautvast. 1998. Effects of seasonality on household food availability among smallholder rural households in Kenya: Impact of land size, household size and composition. *Ecology of Food and Nutrition* 37 (1). doi:10.1080/03670244.1998.9991538.
- Leão, M. M. (2010). O direito à saúde e à alimentação adequada e saudável. Saúde e acesso a serviços de saúde. *A Segurança Alimentar e Nutricional e o Direito Humano à Alimentação Adequada no Brasil Realização - Indicadores e Monitoramento - da Constituição de 1988 aos dias atuais*. Conselho Nacional de Segurança Alimentar e Nutricional – Consea. Brasília.
- Leão, M. M., and E. Recine. 2011. *O direito humano a alimentação adequada*. In *Nutrição em Saúde Pública*, ed. J. A. Taddei, 1st ed., 471–88. Rio de Janeiro, Brazil.
- Levy, R. B., R. M. Claro, L. Mondini, R. Sichieri, and C. A. Monteiro. 2012. Distribuição regional e socioeconômica da disponibilidade domiciliar de alimentos no Brasil em 2008-2009. *Revista Saúde Pública* 46 (1). doi:10.1590/S0034-89102011005000088.
- Levy-Costa, R. B., R. Sichieri, N. S. Pontes, and C. A. Monteiro. 2005. Disponibilidade domiciliar de alimentos no Brasil: Distribuição e evolução (1974-2003). *Revista Saúde Pública* 39 (4). doi:10.1590/S0034-89102005000400003.
- Maluf, R. S. 2004. Mercados agroalimentares e a agricultura familiar no Brasil: Agregação de valor, cadeias integradas e circuitos regionais. *Ensaio FEE* 25(1):299–322.
- Maluf, R. S. 2006. *Segurança alimentar e fome no Brasil – 10 anos da Cúpula Mundial de Alimentação*. Relatórios técnicos, n. 2 CERESAN. Rio de Janeiro: Centro de Segurança Alimentar e Nutricional.

- Marques, P. E. M. 2010. Embates em torno da segurança e soberania alimentar: Estudo de perspectivas Concorrentes. *Segurança Alimentar E Nutricional* 17(2):78–87. doi:[10.20396/san.v17i2.8634795](https://doi.org/10.20396/san.v17i2.8634795).
- Martinez, E. A., and R. M. N. Peil. 2010. Caracterização da comercialização e da diversidade da produção dos agricultores familiares associados à cooperativa sul ecológica. *R. Bras. Agrociência* 16(1–4):149–52.
- Martins, A. P. B., R. B. Levy, R. M. Claro, J. C. Moubarac, and C. A. Monteiro. 2013. Participação crescente de produtos ultraprocessados na dieta brasileira (1987-2009). *Revista De Saúde Pública* 47:4. doi:[10.1590/S0034-8910.2013047004968](https://doi.org/10.1590/S0034-8910.2013047004968).
- Melo, D. F. 2013. *O papel da Extensão Rural e do Cooperativismo na inserção do uso de ferramentas de gestão e desenvolvimento de produtores rurais familiares: O caso da Cooperativa Multiflor*. Relatório Faculdade UnB de Planaltina FUP, Universidade de Brasília.
- Monterio, C. A., G. Cannon, R. B. Levy, et al. 2016. NOVA. The star shines bright. [Food classification. Public health]. *World Nutrition* 7 (1–3):28–38.
- Nascimento, R. C. 2009. *Avanços e Desafios da Implementação do Direito Humano à Alimentação Adequada no Brasil*. Relatório Técnico. Brasília, Rio de Janeiro: Abrandh; Ceresan; Consea; FAO-RLC/ALCSH.
- Noce, M. A., and J. A. Ferreira Neto. 2016. Uma análise de política pública brasileira de desenvolvimento rural, com foco no combate à pobreza no campo. *Cadernos De Ciências Sociais Da UFRPE* 1 (8):36–56.
- Norder, L. A. C. 1998. A Construção da Segurança Alimentar em Assentamentos Rurais: Questões, contextos e métodos. *Cadernos De Debate* 6:40–58.
- Ozelame, D., A. Troian, and A. N. Cavalheiro. 2007. Valorizando o autoconsumo: Alimentação e independência. *Revista Brasileira De Agroecologia* 2:1267.
- Pan American Health Organization. 2015. *Ultra-processed food and drink products in Latin America: Trends, impact on obesity, policy implications*. Washington, DC: PAHO.
- Priore, S. E., C. A. S. Pereira, S. M. R. Ribeiro, I. P. Cintra, S. P. Oliveira, S. N. Freitas, and S. C. C. Franceschini. 2002. *Um, Dois, Feijão com Arroz: Alimentação no Brasil de Norte a Sul*, Vol. 1, 142–209. M. Fisberg, J. Wehba, and S. M. F. Cozzolino Org. São Paulo: Atheneu.
- Santilli, J. 2009. *Agrobiodiversidade e direitos dos agricultores*. Embrapa Amazônia Ocidental. São Paulo: Peirópolis.
- Schneider, S., and L. A. Xavier. 2013. *Produção para Autoconsumo no Brasil uma análise a partir do Censo Agropecuário 2006 – Relatório de Pesquisa*. Brasília, Brazil: Instituto de Pesquisa Econômica Aplicada. IPEA.
- Silva, D. A., S. C. C. Franceschini, J. F. Novaes, R. H. S. Santos, and S. E. Priore. 2014. Dyslipidemias and related factors in Brazilian adolescents from rural and urban areas. *Health (Irvine)* 6:1991–1200.
- Silva, J. R. S. 2008. *Segurança Alimentar Produção Agrícola Familiar e Assentamentos de Reforma Agrária no Maranhão*, 1st ed., 309. São Luis: EDUFMA.
- Smith, L. C. 2002. *The use of household expenditure surveys for the assessment of food insecurity*. Proceedings – Measurement and assessment of food deprivation and under-nutrition. International Scientific Symposium, Roma. doi:[10.1044/1059-0889\(2002/er01\)](https://doi.org/10.1044/1059-0889(2002/er01)).
- Sociedade Brasileira de Cardiologia. 2013. I Diretriz sobre o Consumo de Gorduras e Saúde Cardiovascular. *Arquivos Brasileiros De Cardiologia* 100(1Supl.3):1–40. doi:[10.5935/abc.2013s002](https://doi.org/10.5935/abc.2013s002).
- Sociedade Brasileira de Cardiologia/Sociedade Brasileira de Hipertensão/Sociedade Brasileira de Nefrologia. 2010. VI Diretrizes Brasileiras de Hipertensão. *Arquivos Brasileiros De Cardiologia* 95(Supl):1–51.

- Takagi, M., J. G. Silva, and M. D. Grossi 2001. Pobreza e Fome: Em busca de uma metodologia para quantificação do problema no Brasil. Texto para Discussão. IE/ UNICAMP, (101).
- Teixeira, I. B. C. 2007. *Desvendando o padrão alimentar de famílias rurais: O que tem no prato?* Natal: Universidade Federal do Rio do Norte.
- WHO. 2015. *Information note about intake of sugars recommended in the WHO guideline for adults and children.* Geneva, Switzerland: Department of Nutrition for Health and Development, World Health Organization.