http://dx.doi.org/10.1590/1678-9865201932e180247

ORIGINAL

Food and nutrition (in)security in families of farmers who supply the National School Feeding Program

(In)segurança alimentar e nutricional em famílias de agricultores fornecedores do Programa Nacional de Alimentação Escolar

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ABSTRACT

Objective

The objective of this study was to evaluate the situation of food and nutritional (in)security in families of farmers who supply the National School Feeding Program.

Methods

It is a cross-sectional study with 27 families of farmers (n=91). The socioeconomic, anthropometric, biochemical, food availability and perception of food insecurity indicators of the Brazilian Food Insecurity Scale, as well as the time of supply and annual income originating from the program, were evaluated.

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Article based on the dissertation by PT TRIVELLATO, entitled "*Programa Nacional de Alimentação Escolar (PNAE): participação da agricultura familiar em Viçosa-MG e a situação de (in)segurança alimentar e nutricional de famílias de agricultores fornecedores*". Universidade Federal de Viçosa; 2018.

How to cite this article

Trivellato PT, Priore SE, Franceschini SCC, Santos RHS, Costa BAL. Food and nutrition (in)security in families of farmers who supply the National School Feeding Program. Rev Nutr. 2019;32:e180247. http://dx.doi.org/10.1590/1678-9865201932e180247

 http://dx.doi.org/10.1590/1678-9865201932e180247

Results

Food insecurity, as measured by the scale, was present in 25.9% (n=7) of the families. Food insecurity was associated with socioeconomic factors such as *per capita* income, the presence of children at home and the number of residents. Food and nutritional insecurity caused by a low caloric availability (<2500kcal/day) occurred in 11.0% (n=3) of the families. Presence of dystrophies such as overweight, low weight and short stature individuals occurred in 89.0% (n=24) of the families.

Conclusion

The study reinforces the existence of variables associated with food insecurity. Social and nutritional factors should be monitored, worked on, and improved in order to achieve food and nutritional security.

Keywords: Family Farming. Food and Nutrition Security. National School Feeding Program.

RESUMO

Objetivo

Objetivou-se avaliar a situação de (in)segurança alimentar e nutricional em famílias de agricultores fornecedores do Programa Nacional de Alimentação Escolar.

Métodos

Estudo transversal com 27 famílias de agricultores (n=91). Avaliou-se a situação de (in)segurança alimentar e nutricional das famílias por indicadores socioeconômicos, antropométricos, bioquímico, disponibilidade alimentar e percepção da insegurança alimentar pela Escala Brasileira de Insegurança Alimentar, além do tempo de fornecimento e renda anual advinda do Programa.

Resultados

A insegurança alimentar medida pela escala esteve presente em 25,9% (n=7) das famílias. A insegurança alimentar se associou a fatores socioeconômicos como renda per capita, presença de criança no domicílio e número de moradores. A insegurança alimentar e nutricional pela disponibilidade calórica baixa (<2500kcal/dia) ocorreu em 11,0% (n=3) das famílias. Presença de distrofias como excesso de peso, baixo peso e baixa estatura se deu em 89,0% (n=24) das famílias.

Conclusão

O estudo reforça a existência de variáveis associadas à situação de insegurança alimentar. Os fatores sociais e nutricionais devem sem monitorados, trabalhados e melhorados para alcançar segurança alimentar e nutricional.

Palavras-chave: *Agricultura Familiar. Segurança Alimentar e Nutricional. Programa Nacional de Alimentação Escolar.*

INTRODUCTION

Food and Nutrition Security (FNS) translates the right to adequate food and must be sought, mainly, through the performance of public policies. FNS strategies should integrate access to food and question the adequacy and quality of food, prioritize healthy and sustainable means of production, marketing and consumption, and contemplate actions directed at vulnerable population groups [1].

Although hunger and malnutrition are the most cruel manifestations of Food Insecurity (FI), having the inability to access food as its main cause, other aspects should be considered, such as overweight individuals, diseases associated with a poor diet and the consumption of foods that are harmful to health [2,3].

The poorest populations are more susceptible to Food and Nutrition Insecurity (FNI). Historically, the rural population is in a more serious FI condition than the urban population, as shown in the

2004, 2009 and 2013 editions of the *Pesquisa Nacional de Amostra por Domicílios* (PNAD, Brazilian National Household Sample Survey). The Brazilian rural population presents high levels of poverty, combined with low educational and development levels, which contribute to the establishment of this framework [4-6].

There have been programs and policies aimed at strengthening family agriculture in order to promote FNS and soften the vulnerability framework of the rural sector, including the *Programa Nacional de Alimentação Escolar* (PNAE, Brazilian National School Feeding Program). The participation of family-based agriculture in the PNAE, approved by Law No.11947/2009, brings market opportunities to the rural environment, consequently bringing income generation, the establishment of a social relationship between the countryside and the city, and the improvement in the quality of life of these farmers [7].

Food and Nutrition Insecurity is recognized as a complex and multidimensional phenomenon of multicausal determination [8]. Knowing the determinants of FI in a population or community allows researchers to deduce about its causes and proposing actions.

Considering the vulnerability of the rural population and the potential of the institutional food market in favor of family farming, this study aimed to evaluate the situation of food and nutritional (in)security of families of farmers who are also PNAE suppliers in the city of *Viçosa*, in the state of *Minas Gerais* (MG), Brazil.

METHODS

It is a cross-sectional study with families involved in family-based agriculture, who are suppliers of the PNAE, in the city of *Viçosa* (MG), Brazil. The city of *Viçosa* is located in the *Zona da Mata* mining area with a strong presence of agrarian activity, where it has 268 farmers with active DAP (Declaration of Aptitude for the National Program to Strengthen Family-Based Agriculture). All families of farmers who supplied food to the local PNAE, from 2011 (beginning of the program in the city) to 2016, residents of *Viçosa* and who consented to participate in this study were included. From the records of the City Hall of *Viçosa*, 27 families that had been suppliers in this period and who were still residing in the city were found. All families agreed to participate.

From the invoices for the purchase of food from family-based agriculture for school feeding, filed at the City Hall, it was possible to obtain the time of supply and the annual value received by each family, considering the total value received in the last year which they were suppliers.

The socioeconomic indicators surveyed were the sex and age of the residents, the declared monthly family income, and housing conditions according to the Life Standards Survey (LSS) (1996-1997) [9], which considers the material used for coating, the presence of goods and services, the number of rooms and density of residents, allowing them to obtain scores that classify them as adequate, intermediate or precarious housing conditions, according to the *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics), in 1998. To evaluate the density of residents per household, the mean number of residents was calculated.

Families with a *per capita* income less than ½ minimum wage were considered "in poverty" and families with a *per capita* income less than ¼ minimum salary were considered "in extreme poverty", considering the current minimum salary (BRL937.00/month) [10].

 http://dx.doi.org/10.1590/1678-9865201932e180247

A quantitative survey of all foods available at households was carried out, while answering a questionnaire regarding the quantity of each food available for consumption in the last 30 days, as well as the origin of the food: whether it was purchased, produced or won. The number of items bought and produced per family was counted. The foods and quantities available were registered in the Avanutri® Software, version 4.0 (*Três Rios, Rio de Janeiro*, Brazil), in order to have the household calorie availability per month and hence the *per capita* availability per day, per resident. Families that obtained a caloric availability below 2500kcal *per capita*/day, being considered as households with low calorie availability, are in a situation of FNI. Values between 2500 and 3000kcal/*per capita*/day were considered as households with average calorie availability, and above 3000kcal/*per capita*/day, were considered as households with high calorie availability [11].

Measures of weight and height were taken from all family members. In order to classify the nutritional status of children and adolescents the corresponding scores were observed, according to sex: Stature/Age and Body Mass Index (BMI)/Age indices [12,13]; for adults and elderly individuals, the BMI according to the World Health Organization (WHO) [14] and Lipschitz [15], respectively.

The height/age of adults were evaluated in order to verify the presence of previous malnutrition in this age group, since this index is considered a social indicator related to a cumulative nutritional deficit [16,17]. The WHO [13] curve and a cut-off point for short stature (<-2 z score) at 19 years of age were used, for at the end of adolescence the individual has already stopped growing.

Families were classified as in situation of FNI by their nutritional status, when at least one of their members had a low stature, or if they were low weight or excess weight individuals (overweight and/or obese).

The presence of anemia was evaluated by measuring the hemoglobin concentration of a blood sample taken from one of the fingers of each individual's hand, using a portable hemoglobinometer. The equipment does the reading and the diagnosis is instantaneous. The cut-off points in g/dL, according to sex and age group, were used as recommended by the WHO [18].

The direct investigation of food (in)security of the families was carried out by applying the *Escala Brasileira de Insegurança Alimentar* (EBIA, Brazilian Food Insecurity Scale) to the person in charge of food purchasing at home, allowing them to be classified as in a situation of food security when the score is zero, or light, moderate, or severe food insecurity, according to the score obtained. The EBIA does not consider the nutritional aspect of foods in its evaluation [6].

The research was approved by the Human Research Ethics Committee of the *Universidade Federal de Viçosa* (UFV, Federal University of *Viçosa*) (registration No.1.881.839). Participation in the project was voluntary and authorized through the signing of an Informed Consent Term. The participation of volunteers under 18 years-old was authorized by their legal responsible through the Consent Term. This research originated from a dissertation [19].

Data were statistically descriptive, with the associations between the food (in)security dependent variable and socioeconomic, food and nutritional variables were verified using Fisher's exact test and Odds *Ratio*. The Statistical Package for the Social Sciences software (SPSS Inc., Chicago, Illinois, United States) was used. Spearman correlations were calculated to quantify correlations of food security, socioeconomic, food and nutritional indicators. The significance level was lower than 0.05.

RESULTS

A total of 27 families (n=91 individuals) of family farmers were evaluated. In this population the proportion of adults 61.4% (n=56) stands out. Of this sample, a total of 20.0% (n=18) of individuals were under 18 years-old, and 18.6% (n=17) were elderly individuals.

Considering the current minimum wage (BRL937.00) and the monthly family income declared, 26% (n=7) of the families have a monthly *per capita* income between ¼ and ½ of the Brazilian minimum wage and 11% (n=3) had a monthly income less than ¼ of the minimum wage, thus being classified in a situation of poverty and extreme poverty, respectively.

Following the EBIA criteria, 25.9% (n=7) of the households were in a mild situation of FNI, which reflects the concern about the lack of food. Regarding the housing conditions, according to the PPV score, 44.0% (n=12) of the households had a high score, being classified in adequate housing conditions (A) and 56.0% (n=15) in intermediate housing conditions (B). There were no households in precarious housing conditions, classified as C and D. As for the number of residents per household, a mean of 3 individuals (minimum of 2 and maximum of 6) per household was observed.

The mean supply time of the families to the PNAE was 4 years (minimum of 2 and maximum of 6), and the annual value received by the families, in the last year of supply, had a mean value of BRL10,000.00 (minimum of 1,000.00 and maximum of 20,000.00).

The socioeconomic variables associated with FI according to the EBIA were: *per capita* income/month lower than ½ minimum wage (p=0.049), presence of children under 9 years-old at home (p=0.001), and a number of household residents greater than three (p=0.043). With respectively 7.50, 14.167 and 7.50 times more chances of a family with these characteristics to be in a situation of FI (Table 1).

The EBIA score correlated positively with the number of residents in the household, and the higher the number of residents, the higher the EBIA score (r=0.418; p=0.030) and while having the opposite effect on the *per capita*/month income, where a higher EBIA score meant a lower *per capita*/month income (r=-0.549, p=0.003) and lower the score for the LSS (r=-0.438, p=0.022).

Food and Nutrition Insecurity was also evidenced by the presence of inadequate nutritional status. Overweight individuals were present in 78% (n=21) of the households, while low weight individuals were present in 11% (n=3) of households; short stature individuals, in 41% (n=11), the latter being present in adults and elderly, indicating that they had a nutritional deficit in the growth phase. A total of 89% (n=24) of the families had at least one resident with dystrophy.

Based on an inadequate nutritional status, Food and Nutrition Insecurity was higher than the classification by the EBIA. Anemia was present in 30% (n=8) of the households and was not found in children, which is an important risk group.

Households that presented a caloric availability <2500kcal/*per capita*/day, were thus classified as in situation of FNI, in a total of 11% (n=3) of households. High caloric availability was found in most households (59%, n=16).

The availability of food produced for self-consumption had a mean of 15 varieties of items, distributed among legumes, meat and egg, vegetables, fruits, milk and dairy products, oils and fats. It was verified that 48% (n=13) of families produce more than 15 types of food for self-consumption.

 http://dx.doi.org/10.1590/1678-9865201932e180247

Table 1. Socioeconomic variables and food security situation detected through the Brazilian Food Insecurity Scale (EBIA) in families of family farmers supplying the National School Feeding Program (PNAE). *Viçosa* (MG), Brazil, 2017.

Variables	FI (n=7)		FS (n=20)		OR* (95%CI)	*p***
	n	%	n	%		
Per capita income/month[1]						
≤½ MS	5	71.4	5	25	**7.500**	**0.043**
>½ MS	2	28.6	15	75	(1.09-51.51)	
PNAE family income/year[2]						
≤10,000	4	57.1	10	50	1.333	0.546
>10,000	3	42.9	10	50	(0.235-7.556)	
Time of supply to the PNAE[3]						
≤4 years	3	42.9	12	60	0.500	0.364
>4 years	4	57.1	8	40	(0.87-11.439)	
Presence of under 18 year-old individuals in the household						
Yes	5	71.4	7	35	4.643	0.110
No	2	28.6	13	65	(0.799-30.418)	
P*resence of children in the household*						
Yes	5	71.4	3	15	**14.167**	**0.011**
No	2	28.6	17	85	**(1.827-109.857)**	
LSS classification[4]						
B	6	85.7	9	45	7.333	0.062
A	1	14.3	11	55	(0.740-72.632)	
Number of household residents[5]						
>3	5	71.4	5	25	**7.500**	**0.043**
≤3	2	28.6	15	75	**(1.09-51.51)**	

Note: *OR: Odds *Ratio* (95%CI [Confidence Interval]); **Fisher's exact test. In bold, results that present statistical relevance ($p<0.05$).
[1]Minimum wage in 2017=BRL937.00; [2]Classification of family income in the PNAE in the last year of supply, according to the mean value; [3]Classification of the time of supply to the PNAE, according to the mean value; [4]Classification according to housing conditions where A means adequate housing conditions and B means intermediate housing conditions; [5]Number of residents in the household, according to the mean value. FS: Food Security; FI: Food Insecurity; LSS: Life Standard Survey; PNAE: *Programa Nacional de Alimentação Escolar* (National School Feeding Progam).

It was not observed an association of FI and the EBIA with the nutritional and nutritional status variables, such as overweight individuals, obesity, anemia, calorie availability and production for home consumption (Table 2).

The monthly household availability of fat (kg) correlated positively with the monthly availability of salt (kg) (r=0.567, p=0.002) and sugar (r=0.638, p=0.001), showing that, as the household availability of one item increases, the availability of the others also increases.

DISCUSSION

The FI detected through the EBIA was more prevalent in this population when compared to the rural population of the Southeast region (16.50%) and less than the national rural population (35.30%) [4]. It also presented a lower prevalence in relation to studies with rural families in the

Table 2. Nutritional and food variables, and the food (in)security situation detected through the Brazilian Food Insecurity Scale (EBIA), in farming families supplying the National School Feeding Program (PNAE). *Viçosa* (MG), Brazil, 2017.

Variables	FI (n=7)		FS (n=20)		OR* (95%CI)	*p***
	n	%	n	%		
Presence of anemia						
Yes	4	57.0	4	20	5.33	0.088
No	3	42.9	16	80	(0.834-34.092)	
Presence of excess weight[1]						
Yes	6	85.7	15	75	2.000	0.498
No	1	14.3	5	25	(0.191-20.898)	
Presence of obesity						
Yes	3	42.9	6	30	1.750	0.429
No	4	57.1	14	70	(0.296-10.340)	
Presence of low stature						
Yes	2	28.6	9	45	0.489	0.383
No	5	71.4	11	55	(0.076-3.145)	
Low caloric availability[2]						
Yes	1	14.3	2	10	1.500	0.610
No	6	85.7	18	90	(0.115-19.640)	
High caloric availability[3]						
Yes	5	71.4	11	55	2.045	0.383
No	2	28.6	9	45	(0.318-13.159)	
Availability of produced foods[4]						
≤15	2	28.6	12	60	0.267	0.161
>15	5	71.4	8	40	(0.041-1.727)	

Note: *OR: Odds *Ratio* (95%CI [Confidence Interval]). **Fisher's exact test.

[1]Excess weight (overweight+obesity); [2]Availability below 2500 kcal/*per capita*/day; [3]Availability over 3000kcal/*per capita*/day; [4]Mean availability of items produced for self-consumption.

same city, where Gusmão [20] identified situations of FI through the EBIA in 38.33% of the 92 rural households analyzed, and Lopes [21], in 38.71% of 62 families.

The characteristics of the rural families of this study that differ from the abovementioned studies are the fact that they are family farmers with an unanimous participation in the institutional market of the PNAE, which may have contributed to the lower FI levels due to the support in the family income given by the Program. In addition, they are food-producing families, consequently favoring the production for self-consumption, which can improve the prospects of food (in)security.

Even in the case of families with characteristics of food production for self-consumption and with a high caloric availability, there was presence of mild FI, following the EBIA criteria.

The fact that the EBIA does not mention food production but rather the financial conditions for guaranteeing food, the perception of FI is tied to income and factors such as caloric availability and food production at home are on a more indirect level, in the measure of the perception of families in relation to food (in)security. Therefore, the need to complement the instrument with other ones capable of measuring aspects of FNS, including food production and/or the way of obtaining food, especially in rural areas [22].

http://dx.doi.org/10.1590/1678-9865201932e180247

Family income is one of the most important determinants of FI, so important that the EBIA itself conditions the access to food to family income, identifying that FI is caused by lack of money. This is because access to food usually occurs through purchase [5,23].

However, the EBIA is able to measure an event of social nature, so its association with different variables contributes to a more in-depth understanding of FNS, being especially useful in identifying the factors that determine or condition FI [24].

The degree of food deficiency is directly associated with the income level of the family or individual [24]. A nationwide study such as the PNAD shows that 64.8% of the rural households with moderate or severe FI levels were in the income strata of less than ½ minimum wage/*per capita*/ month and that, in general, the lower the monthly income *per capita* in a household, the higher the proportion of FI [4]. This situation was also verified in this study, where a lower *per capita* income was associated with FI.

In rural areas, FI can be influenced by both the seasonality of work, due to the greater availability of temporary work, especially in harvesting periods, and the production of food by families, which change according to the climate/weather [23]. Therefore, the presence of a continuous market, with a source of monthly income and that aims to absorb seasonal production, as is the case of PNAE, is valuable in promoting FNS.

As in the present study, the PNAD data show that in the households with children, the prevalence of FI was higher [4]. In particular, for families in situation of risk, children represent the biological segment which is most vulnerable to FI and its most immediate and serious nutritional consequences [25].

Considering income as a determinant of FI, bigger families need more resources to buy food, and income growth does not usually follow family growth [8], so a higher density of residents is an indicator of FI.

In addition to the conditionalities of low income, the presence of children and a greater number of residents per household, there is a social situation that presents a greater vulnerability.

Social characteristics are more aggravated in the rural environment when compared to the urban environment, such as lower educational levels, less access to goods and services and lower family income [26] due to the historical process of urbanization, rural industrialization and rural exodus. These conditions undermine reaching FNS, which justifies the existence of programs that give preference and opportunity of income generation focused on the rural population, giving them conditions to remain in the countryside, and that encourage the production and sales of local foods by family-based agriculture.

The average and high caloric availability in most families may be a reflection of the PNAE, both by the source of income and by the promotion of production for self-consumption. Although a high caloric availability is classified as a FNS situation, since calories are available and not actually consumed, the positive correlation found between the availability of fat, sugar and salt and the prevalence of nutritional dystrophies should be considered. Excessive energy and excessive consumption of saturated fats and sugars are causes of excessive weight gain and obesity [27].

Regarding the nutritional situation, it is verified that the Brazilian population in general presents an increase in the prevalence of overweight individuals, an increased consumption of processed foods and a low fruit consumption [28]. Food and nutritional education, added to the incentive for the production and consumption of fresh foods reinforced by the PNAE, could represent measures to contain this situation.

The PNAE promotes FNS from the development of the local economy with family-based agriculture and the supply of locally produced natural foods, favoring the public benefited, public school students and the suppliers.

CONCLUSION

The study reinforces the existence of variables associated with the situation of FI. The social conditions highlight the increase of policies and programs in the various governmental spheres that incentive the generation of income, housing and life conditions, in order to improve the socioeconomic aspects of impact in FNS.

The results also highlight the occurrence of nutritional dystrophies in the population studied and demand actions that circumvent the condition and prevent diseases related to food and nutrition, promoting quality of life through the ingestion of adequate and healthy food. This demand is populational and emerging.

Even though there is no evidence of an association between the variables of food supply to the PNAE to the variables of FNS in the food suppliers of the city of *Viçosa*, the benefit of the Program is legitimized to family-based agriculture, but it is important to monitore social and nutritional characteristics through comparative and longitudinal studies.

CONTRIBUTORS

PT TRIVELLATO was responsible for data collection, design, final writing and article revision. SE PRIORE was responsible for the academic guidance, conception, final writing and revision. SCC FRANCESCHINI, RHS SANTOS, and BAL COSTA were responsible for the critical review and final writing.

ACKNOWLEDGMENTS

To the *Fundação de Amparo à Pesquisa do Estado de Minas Gerais* (FAPEMIG, *Minas Gerais* State Research Support Foundation), the Postgraduate Program in Agroecology (UFV), to the municipality of *Viçosa*, MG, the *Empresa de Assistência Técnica e Extensão Rural* (EMATER, Technical Assistance and Extension Company) of *Viçosa* and the family farmers involved for their collaboration and incentive.

REFERENCES

1. Leão M, Maluf RS. A construção social de um sistema público de segurança alimentar e nutricional: a experiência brasileira. Brasília: Ação Brasileira pela Nutrição e Direitos Humanos; 2012.
2. Maluf RS, Menezes F, Marques SB. Caderno 'Segurança Alimentar'. 2000 [citado 7 dez 2017]. Disponível em: https://ideiasnamesa.unb.br/upload/bibliotecaldeias/1391606568Caderno_Seguranca_Alimentar.pdf
3. Souza MM, Pedraza DF, Menezes TN. Estado nutricional de crianças assistidas em creches e situação de (in) segurança alimentar de suas famílias. Ciênc Saúde Coletiva. 2012;17(12):3425-36.
4. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios (PNAD): Segurança Alimentar: 2013. Rio de Janeiro: IBGE; 2014.
5. Hoffmann R. Brasil, 2013: mais segurança alimentar. Segur Aliment Nutr. 2014;21(2):422-36.
6. Morais DC, Dutra LV, Franceschini SDCC, Priore SE. Insegurança alimentar e indicadores antropométricos, dietéticos e sociais em estudos brasileiros: uma revisão sistemática. Ciênc Saúde Coletiva. 2014;19(5):1475-88.

7. Marques AA, Fernandes MGM, Leite IN, Viana RT, Gonçalves MCR, Carvalho AT. Reflexões de agricultores familiares sobre a dinâmica de fornecimento de seus produtos para alimentação escolar: o caso de Araripe, Ceará. Saúde Soc. 2014;23(4):1329-41.
8. Bezerra TA, Olinda RAD, Pedraza DF. Insegurança alimentar no Brasil segundo diferentes cenários sociodemográficos. Ciênc Saúde Coletiva. 2017;22(2):637-51.
9. Instituto Brasileiro de Geografia e Estatística. Pesquisa sobre Padrões de Vida: 1996-1997. Rio de Janeiro: IBGE; 1998.
10. Maluf RSJ. Definindo segurança alimentar e nutricional. In: Maluf RSJ, organizador. Segurança alimentar e nutricional. Petrópolis: Vozes; 2007. p.17-9.
11. Smith LC, Subandoro A. Food security in practice: Measuring food security using household expenditure surveys. Washington (DC): International Food Policy Research Institute Washington; 2007.
12. World Health Organization. WHO Child growth standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva: WHO; 2006.
13. Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bull World Health Organ. 2007;85(9):660-7.
14. World Health Organization. Obesity: Preventing and managing the global epidemic: Report of a WHO consultation on obesity. WHO Technical Report Series, n.894. Geneva: WHO; 2000.
15. Lipschitz DA. Screening for nutritional status in the elderly. Prim Care. 1994; 21(1):55-67.
16. World Bank. World development indicators 2004. Washington (DC): World Bank; 2004 [cited 2017 Oct 20]. Available from: http://documents.worldbank.org/curated/en/517231468762935046/World-development-indicators-2004
17. Oliveira JS, Lira PIC, Veras ICL, Maia SR, Lemos MCC, Andrade SLLS, *et al*. Estado nutricional e insegurança alimentar de adolescentes e adultos em duas localidades de baixo Índice de Desenvolvimento Humano. Rev Nutr. 2009;22(4):453-65. http://dx.doi.org/10.1590/S1415-52732009000400002
18. World Health Organization. Iron deficiency anemia: Assessment, prevention and control: A guide for programme managers. Geneva: WHO/Unicef/UNU; 2001.
19. Trivellato PT. Programa Nacional de Alimentação Escolar (PNAE): participação da agricultura familiar em Viçosa-MG e a situação de (in)segurança alimentar e nutricional de famílias de agricultores fornecedores [Dissertação]. Universidade Federal de Viçosa; 2018.
20. Gusmão LS. Educação alimentar e nutricional: contribuições para a segurança alimentar e nutricional de famílias de zona rural [Dissertação]. Universidade Federal de Viçosa; 2016.
21. Lopes SO. Impacto de ações de nutrição e saúde no incentivo à produção para o autoconsumo na situação de (In)Segurança Alimentar e Nutricional em agricultores familiares no município de Viçosa – MG [Dissertação]. Universidade Federal de Viçosa; 2017.
22. Nascimento AL, Gonçalves FCLSP, Maia SR, Schneider S, Lira PIC. A construção de capacidades e meios de vida na garantia da segurança alimentar do rural pernambucano. Segur Aliment Nutr. 2012;19(2):50-62.
23. Silva EKP, Medeiros DSD, Martins PC, Sousa LDA, Lima GP, Rêgo MAS, *et al*. Insegurança alimentar em comunidades rurais no Nordeste brasileiro: faz diferença ser quilombola? Cad Saúde Pública. 2017;33(4):1-14.
24. Kepple AW, Segall-Correa AM. Conceituando e medindo segurança alimentar e nutricional. Ciênc Saúde Coletiva. 2011;16(1):187-99.
25. Oliveira JS, Lira PIC, Veras ICL, Maia SR, Sequeira LAS, Amorim RCA, *et al*. Insegurança alimentar e estado nutricional de crianças de Gameleira, zona da mata do Nordeste brasileiro. Rev Bras Saúde Matern Infant. 2010;10(2):237-45.
26. Ministério do Desenvolvimento Agrário (Brasil). Estatísticas do meio rural 2010-2011. 4.ed. São Paulo: MDA; 2011.
27. Louzada MLC, Martins APB, Canella DS, Baraldi LG, Levy RB, Claro M, *et al*. Alimentos ultraprocessados e perfil nutricional da dieta no Brasil. Rev Saúde Pública. 2015;49:1-11.
28. Ministério da Saúde (Brasil). Sistema de vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico VIGITEL. 2016. Brasília: MS; 2017.

Received: December 4, 2018
Final version: April 7, 2019
Approved: May 29, 2019