

Prevalence of household food insecurity and associated factors among *Bolsa Família* Program families with preschool children in Viçosa, Minas Gerais State, Brazil *

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Abstract

Objective: to investigate food insecurity prevalence and associated factors among *Bolsa Família* Program (BFP) beneficiary families in the municipality of Viçosa-MG, Brazil. **Methods:** this was a cross-sectional study using a structured questionnaire and the Brazilian Food Insecurity Scale; prevalence ratio (PR) and 95% confidence intervals (95%CI) were calculated using Poisson regression. **Results:** 243 families were evaluated; food insecurity prevalence was 72.8% (being 47.3% mild; 10.7% moderate, 14.8% severe); higher prevalence of food insecurity was observed in households with mothers having lower schooling (PR 1.56; 95%CI: 1.21; 2.68) and belonging to social-economic stratum E (PR 1.82; 95%CI: 1.16; 3.48); following multiple regression analysis, food insecurity remained associated with low maternal education (PR 1.86; 95%CI: 1.52; 2.83). **Conclusion:** the high prevalence of food insecurity, associated with low maternal education, justifies the need for targeted government intervention, such as the *Bolsa Família* Program, associated with structuring actions, particularly in education.

Key words: Food and Nutrition Security; Demographic Indicators; Cross-Sectional Studies; Public Policies; Child, Preschool.

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Introduction

Food and nutrition security (FNS) has become an important topic in Brazilian politics.^{1,2} It is a complex concept, which is still being built. FNS was defined in Brazil's Federal Law on Food and Nutrition Security (LOSAN):

[...] Food and Nutrition security is the right to regular and permanent access to quality food in terms of nutrition and quantity, without compromising the access to other essential necessities based on the nutritional practices that actually promote health and respect cultural diversity. They should also be environmentally, economic and socially sustainable.¹

Poverty and social inequalities are the main causes of food insecurity (FI). In order to develop public policies and promote health, it is important to evaluate FI's associated factors. Thus, it is necessary to know indicators that can evaluate and monitor food insecurity. This is, however, a difficult task, given that no indicator alone can measure FNS in its multiple dimensions.³⁻⁵

Many countries have been using the hunger scale proposed by Radimer et al.⁶ to measure FI. Brazilian researchers started the scale's validation process in 2004.⁷ The study was coordinated by the State University of Campinas (Unicamp).⁸ The resulting instrument, called Brazilian Food Insecurity Scale (*EBIA*), makes it possible to evaluate FI as well as monitor the implementation and evaluation of public policies in this given area.⁹

One of Bolsa Família's primary goals is to promote the social inclusion of vulnerable families, as well as improve the nutrition of their children

In Brazil, social inequality is relevant. Consequently, a substantial share of the population cannot keep a minimal, socially accepted standard of life.¹⁰ The Brazilian government seeks to change this scenario through action programs that aim to fulfill constitutionally-guaranteed social rights. A notable example is the *Bolsa Família* Program (BFP),^{11,12} a governmental strategy to fight the country's hunger and poverty through conditional cash transfers. One of *Bolsa Família*'s primary goals is to promote the social inclusion of vulnerable families, as well as improve the nutrition of their children.¹²

Children are the most vulnerable to food insecurity group, which can jeopardize their growth and development. Evaluating the prevalence of food insecurity and its associated factors, therefore, is of particular importance to the development, implementation, and monitoring of more focused, efficient public policies.^{12,13}

The objective of this study was to investigate household food insecurity prevalence and associated factors among *Bolsa Família* Program beneficiary families with preschool children in Viçosa, Minas Gerais State (MG), Brazil.

Methods

This is a cross-sectional study that evaluated BFP beneficiary families with children between 2 and 6 years old, residing in the urban area of Viçosa-MG. The choice of families with children in that age group is due to the fact that they are a biologically vulnerable group, and thus, the most susceptible to the consequences of food insecurity. The data were collected between January and June 2011.

Viçosa-MG is located in the *Zona da Mata*, between the *Serras da Mantiqueira, do Caparaó* and *da Piedade*. According to the last demographic census, carried out in 2010 by the Brazilian Institute of Geography and Statistics (IBGE), Viçosa had an estimated population of 72,220 people, of whom 67,305 (93.2%) lived in the urban area. In that same year, Viçosa's human development index (HDI) was 0.775.¹⁴

For the sample calculation, an 80.3% prevalence of FI in the Southeast Region of the country was considered, based on the results of the study "Repercussion of the *Bolsa Família* Program on Food and Nutrition Security of the Benefitted Families", sponsored by the federal agency Financing Agency for Studies and Projects (Finep).¹⁵ That was the first population-based survey to evaluate how BFP benefitted families perceived food security in their lives. A maximum five percentage points error was estimated, for a 95% confidence level, plus 20% to control confounding factors, resulting in a minimum sample size of 243 families. Epi Info's StatCalc version 6.04 was used for the calculation.

At first, the local welfare agency was contacted for data on the number of BFP beneficiary families who fit the criteria. The agency provided a database with the card-holders' name, sex and ethnicity, as well as their address and number of dependent children.

Of the 1,160 families with children between 2 and 6 years old who lived in the urban area of Viçosa-MG, 243 were randomly selected. All data were collected at the families' households. Three nutritionists and two Nutrition undergrads from the Federal University of Viçosa (UFV) conducted this survey. The research team was trained beforehand in the use of standardized language and equipment calibration.

The criteria used to include families in the sample were: (i) be a BFP beneficiary and (ii) have a child in the studied age group. In order to participate in the study, the household responsible signed a Term of Consent. Not signing the Term was an exclusion criterion. Moreover, families who were not found at home after three meeting attempts, no longer received the benefit, or had moved away from Viçosa were also excluded from the study.

In order to obtain data on socioeconomic and demographic variables, the household responsible answered the structured questionnaire below:

- public water supply (yes, no);
- waste collection (yes, no);
- public sewage system (yes, no);
- water filter at home (yes, no);
- number of residents (up to 3; 4-5; 6 or more);
- parents' education level (none, 4-7, 8 or more years in school);
- skin color of the benefit card-holder (standardized and determined by the interviewers to be one of three: white, brown or black); and
- social-economic stratum (A; B; C; D; E), following the criteria established by the Brazilian Association of Research Companies - ABEP).¹⁶

EBIA, which was composed by 15 Yes/No questions, was used to diagnose food insecurity. The families were classified as food secure or (mildly, moderately, or severely) insecure according to *EBIA*'s criteria.¹⁷ Under that scale, each household is classified by the number of positive answers to those questions. The four categories are defined as follows:

- food security, when there is no food restriction of any kind, not even the fear of, or concern over, lacking food in the future;
- mild food insecurity, when there is the fear of lacking access to food and the quality of the diet is compromised as a way to avoid lacking food;
- moderate food insecurity, when not only the quality but also the quantity of food is restricted, the latter only affecting the adults in the household; and

- severe food insecurity, when the amount of food is restricted both for adults and children; in this situation, the family's eating habits change and starvation becomes very likely.¹⁸

In keeping with *EBIA*'s criteria, in this study, families with children under 18 years old were classified as food secure when all answers to the questionnaire were negative. Families who answered Yes to 1-5 questions were classified as mildly food insecure; those who gave 6-10 Yes answers were classified as moderately insecure; and those who answered Yes to 11-15 were classified as severely food insecure.¹⁷

The database was organized and cross-checked in a digital spread-sheet. The Validate function of Epi Info version 6.04 was used to cross-check the data. All estimates were calculated taking the design effect of the sample into consideration. The data analysis software Stata version 9.0¹⁹ was used in all stages of data analysis.

In the descriptive analysis, the data are presented as absolute values, proportions and their respective 95% confidence intervals (95%CI). In the bivariate analysis, Pearson's Chi-square test and the Chi-square test for linear trend were used to verify the association between food insecurity and socioeconomic and demographic indicators. This variable was dichotomized into the presence of food insecurity (in any degree), and the absence of food insecurity. For the bivariate analysis, the variable parents' education level was dichotomized into fewer than 7 or more than 7 years of formal education.

The variables that were associated with FI at a significance level less than or equal to 20% were selected to be part of the multiple model. For the multiple model, Poisson's regression was used to calculate the prevalence ratios (PR) and their respective 95% confidence intervals (95%CI).²⁰ In the present study, the choice of prevalence ratios as the measure of association is justified by the cross-sectional design and the prevalence of food insecurity found. The backward method was used to build the multiple regression model. In this method, the variables selected in the bivariate analysis were simultaneously added to the model, and then eliminated one at a time, the least significant according to the Wald test.

The research was authorized by the Human Research Ethics Committee of the Federal University of Viçosa: Process No. 0146/2010.

Results

243 families participated in the study. Of the randomly selected households, 52 did not meet the inclusion/exclusion criteria: households that no longer received the benefit (n=17); no family members were found after three meeting attempts (n=10); and families who had moved away (n=25). The application of *EBIA* revealed a 72.8% prevalence of food insecurity, divided into: mild insecurity, 47.3%; moderate insecurity, 10.7%; and severe insecurity, 14.8% (Table 1).

As for sanitation, 98.3% of the families had access to the public water supply system and the

public sewage system. 91.0% had water filters for individual consumption. Most of the mothers (86.5%; 95%CI 80.2; 91.6) and fathers (88.6%; 95%CI 79.2; 89.4) had 4 to 7 years of schooling; 94.3% of the families belonged to the C and D social-economic strata; 80.2% of the households had up to five residents; and the predominant skin color of benefit card-holders was black (42.3%; 95%CI 36.1; 48.5) (Table 1).

An association between maternal education and food insecurity was found. Among mothers with fewer than 7 years of schooling, food insecurity was almost 1.4 times higher than among those with over 7 years of formal education (Table 2).

Table 1 - Characterization of *Bolsa Família* Program beneficiary families (n=243) according to their food security situation, and the socioeconomic and demographic conditions in the municipality of Viçosa, Minas Gerais State, 2011

Characteristics of the household	n	%	95%CI ^a
Food security status			
Food Security	66	27.2	24.1;30.2
Mild food insecurity	115	47.3	44.4;50.2
Moderate food insecurity	26	10.7	8.3;12.9
Severe food insecurity	36	14.8	12.2;17.4
Maternal education (years in school)			
None	2	0.8	1.3;2.7
4-7	210	86.5	80.2;91.6
≥8	31	12.7	7.5;15.5
Paternal education (years in school)^b			
None	6	2.8	0.8;4.8
4-7	186	88.6	79.2;89.4
≥8	18	8.6	6.1;10.2
Socioeconomic stratum			
B	3	1.2	-0.2;2.6
C	175	72.0	66.3;77.7
D	54	22.3	17.1;27.5
E	11	4.5	3.2;5.8
Number of residents			
≤3	50	21.0	19.7;22.3
4-5	144	59.2	57.3;60.5
≥6	49	19.8	16.0;23.6
Sanitation			
Public waste collection	236	97.1	95.0;99.2
Public water supply	239	98.3	96.7;99.9
Water filter at home	222	91.0	87.5;94.5
Public sewage system	238	97.9	96.1;99.7
Benefit card-holder's skin color			
Black	110	42.3	36.1;48.5
Brown	40	19.4	14.8;24.5
White	93	38.3	35.2;41.4

a) 95%CI: 95% confidence interval

b) n=210 since not all mothers could inform the father's education and the latter did not live with the family.

The highest prevalence of food insecurity was found among families that belong to the D and E socio-economic strata, and in households with more than five residents. The prevalence of food insecurity in class E families was three times higher than in class B families (Table 2).

Sanitation conditions did not appear to be associated to food insecurity. Since the results of the sanitation indicators were homogeneous, they could not be used to distinguish FI among the studied families. Likewise, there was no association between skin color and fathers' education with food insecurity. However, the presence of a water filter at home was, indeed, associated with food insecurity (Table 2).

After adjustments for reference or contrast variables (maternal education over 7 years of schooling; belonging to socio-economic stratum B; no more than five residents in the household) with the other categories in the multivariate analysis, only maternal education (PR 1.86; 95%CI 1.52;2.83; $p=0.02$) remained associated with food insecurity (Table 3).

Discussion

This study found a high prevalence of food insecurity (72.8%) among *Bolsa Família* Program beneficiary families with preschool children. These results confirm the social vulnerability of those families and the risk of possible harm to the growth and development of their children due to lack of access to adequate food.

Food insecurity was associated with low maternal education. Low education levels make it harder to enter the formal job market, which implies access to low-paying jobs. Such a situation contributes to the occurrence of food insecurity. In an effort to increase the level of education of children and adolescents, school attendance is one of the conditions imposed by BFP. Low education levels is one of the main causes of the intergenerational cycle of poverty, and keeping children in school can help break it.

EBIA was considered by *IBGE* to be an important tool in the diagnosis of food insecurity, as well as the different levels of insecurity.²¹ Moreover, as a tool capable of (i) identifying the population groups most vulnerable to violations of the human right to adequate food and (ii) highlighting social inequalities, this scale fulfills the provisions set by

art. 21, paragraph 6 of the Decree No. 7272 dated 25 August, 2010.^{21,22}

The *EBIA* was used to measure food insecurity in Brazilian households in the 2004, 2009 and 2013 versions of the National Household Sample Survey (PNAD) conducted by *IBGE*. The results from those surveys confirm: food insecurity is directly associated to socioeconomic factors such as number of household residents, sex, schooling or skin color of the head of the family, family income, among others.²³⁻²⁵

The prevalence of FI in Brazil has reduced from 34.9% in 2004 to 22.6% in 2013.²³⁻²⁵ Despite that, approximately 52 million Brazilians still suffered from food insecurity in 2013.²⁵

Education is still considered to be a main cause of food insecurity. According to PNAD, in households whose person of reference had no schooling or less than a year of formal education, the prevalence of moderate or severe FI was 29.2%. On the other hand, in households whose person of reference had 11 to 14 years of formal education, that percentage was 4.1 times lower (7.1%).²³ In 2009, there was a reduction of food insecurity prevalence regardless of education level, and, although the association remains, the proportion ratio for the aforementioned education levels was reduced to 3.4.²⁴

The National Survey on Demography and Health of Women and Children (PNDS/2006), which also used *EBIA* to diagnose food insecurity, concluded that of all sociodemographic characteristics of the reference person associated to FI (be female, less educated and younger than 60 years), education was responsible for the greatest differences in that prevalence. Those referred to as "no schooling" had a prevalence of severe food insecurity of 10.7%. That percentage was reduced to 1.6% in households whose person of reference had nine or more years of formal education.²⁶

It is worth noting that both PNAD and PNDS did not limit their samples to BFP beneficiaries. The Brazilian Institute of Social and Economic Analysis (*Ibase*) studied the food security situation of *Bolsa Família* beneficiaries in 2007-2008. Our study found a higher prevalence of food insecurity (72.8%) when compared to the aforementioned studies (PNAD, 22.6%; PNDS 37.5%), but is close to the results presented by *Ibase* (83%). This is justified by the fact that BFP beneficiaries are already vulnerable,

Table 2 – Prevalence of food security and insecurity^a in Bolsa Familia Program beneficiary families (n=243) according to the socioeconomic and demographic conditions in the municipality of Viçosa, Minas Gerais State, 2011

Indicators	Food security (%)	Food insecurity (%)	p-value
Maternal education (years in school)			<0,001 ^b
<7	18.2	81.8	
>7	40.1	59.9	
Paternal education (years in school)			<0,289 ^b
<7	25.6	74.4	
>7	35.7	64.3	
Socioeconomic stratum			0,002 ^c
B	66.7	33.3	
C	30.3	69.7	
D	18.5	81.5	
E	9.0	91.0	
Number of residents			0,010 ^c
≤3	28.0	72.0	
4-5	26.4	73.6	
≥6	25.2	74.8	
Sanitation			
Waste collection			0.437 ^b
No waste collection	14.0	86.0	
Public waste collection	27.5	72.5	
Water supply			0.936 ^b
Public water supply	26.8	73.2	
No water supply	25.0	75.0	
Water filter			0.023 ^b
With filter	24.8	75.2	
Without filter	47.6	52.4	
Sewage system			0.223 ^b
Public sewage system	27.2	72.8	
No sewage system	–	100.0	
Benefit card-holder's skin color			0.297 ^b
Black	22.7	77.3	
Brown	25.0	75.0	
White	32.3	67.7	

a) Classification according to the Brazilian Food Insecurity Scale (EBIA)

b) Pearson's chi-square test

c) Chi-square test for linear trend

Table 3 – Association between food insecurity and sociodemographic variables of *Bolsa Família* Program families (n=243) in the municipality of Viçosa, Minas Gerais State, 2011

Variable	Crude PR (95%CI ^a)	p-value ^b	Adjusted PR (95%CI ^a)	p-value ^c
Maternal education (years in school)				
>7	1	0.01	1	0.02
<7	1.56 (1.21;2.68)		1.86 (1.52;2.83)	
Socioeconomic stratum				
B	1	0.14		
C	1.12 (0.91;3.93)			
D	1.54 (0.85;3.74)			
E	1.82 (1.16;3.48)			
Number of residents				
≤3	1	0.22		
4-5	1.28 (0.92;1.79)			
≥6	1.66 (0.88;2.14)			
Water filter				
With filter	1	0.32		
Without filter	0.78 (0.64;1.46)			

a) 95%CI: 95% confidence interval

b) Crude Poisson regression

c) Adjusted Poisson regression

which predisposes them to a situation of food insecurity.^{17,25,26}

According to *Ibase*'s study, the prevalence of food insecurity was higher in the Northeast Region of the country, which both PNAD and PNDS confirm. In the Southeast Region, the prevalence of food insecurity was 80%. Thus, the prevalence of food insecurity among *BFP* families in Viçosa-MG was lower than that of the Southeast and of Brazil.¹⁷

Regarding socio-economic characteristics, the results are similar to those of previous studies. FI was more prevalent among families with an income lower than R\$60.00 *per capita* (less than 1/4 of the minimum wage at the time), whose benefit card-holder had black or brown skin color and had no schooling. The association between food security and the education level of the benefit card-holder was most significant in the South Region. There, the prevalence of severe FI was lower, even among those who could only write a simple note (10.7%),

whereas in the North and Northeast Regions, FI prevalences for that group were, respectively, 21.52% and 22.19%.¹⁷

The nationwide studies²³⁻²⁶ that sought to evaluate factors possibly associated with food insecurity found similar results for the socio-economic indicators despite not having limited their samples to *BFP* beneficiaries. That similarity can also be found in regional studies.

For instance, Salles-Costa *et al*²⁷ found a 53.8% prevalence of food insecurity when analyzing the association of socioeconomic factors and food insecurity among families in Duque de Caxias, Rio de Janeiro State. The variables associated to insecurity were: monthly household income *per capita*, education level of the head of the family, socioeconomic stratum, number of household residents and the presence of a water filter at home. Pimentel *et al*,²⁸ in a study conducted with 402 families with children younger than 30 months,

found a food insecurity prevalence of 72%. The variables "monthly household income *per capita*" and "education level of the head of the family" were inversely associated with levels of food insecurity.

Gubert and Santos²⁹ found a prevalence of food insecurity of 24.8% in households of the Federal District, associated to the following factors: the person of reference was female, had black or brown skin color, had more than three children and had an income lower than 1/4 of the minimum wage.

According to Panigassi *et al*³⁰ in a study conducted in Campinas, São Paulo State, the most important characteristic of the head of the family associated with food insecurity was education level. Heads of the family with less than 8 years of formal education were 4.6 times more likely to suffer from mild FI and 8.4 times more likely to suffer from moderate and severe FI. Those studies show the relevance of education and its impact on food insecurity.

One of the conditions to receive *BFP*'s benefits is to keep the children in school. It is an essential factor for the adequate cognitive development and an investment on human capital. As already discussed herein, education is main cause of food insecurity. Therefore, increasing the education level of poor children can help break the intergenerational cycle of poverty and promote food and nutrition security (FNS).

The results from this research highlight the magnitude of food insecurity according to the socioeconomic and demographic factors of the studied population. Knowing which factors are associated with food insecurity makes it possible to define priorities in minimizing and controlling this problem. The *EBIA* can assist policy makers in monitoring food insecurity and identifying potential groups in need of resources, besides being an important tool for evaluating and monitoring intervention measures.

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It is the State's social responsibility to guarantee food and nutrition security. Social programs, such as *Bolsa Família*, have a major role in improving the quality of life of beneficiary families. Nevertheless, it is necessary to emphasize the importance of governmental investments on education, sanitation and health, among other responsibilities of the State, so that public policies cease to be compensatory, narrow in scope, and isolated.

The limitations of the study were the difficulty of carrying out home visits and the lack of up-to-date information of *BFP* beneficiary families. Many families were not found because they had moved away or no longer received the benefit. Such updates were not in the local welfare agency's records. The use of the Brazilian Food Insecurity Scale (*EBIA*) required prior training and careful implementation to avoid response biases. The design of this study did not make it possible to establish any cause-effect relationships between the researched variables and food insecurity. However, those findings make clear the importance of state intervention in the protection and fulfillment of constitutional social rights such as health and education. In this sense, compliance with the conditions is a form of emancipation and empowerment of *Bolsa Família* Program beneficiaries.

Authors' contributions

Sperandio N contributed to the study conception and design, analysis and interpretation of the results, writing and critical revision of the contents, and final approval of the manuscript.

Priore SE participated in the writing and critical revision of the contents, and final approval of the manuscript.

Both authors approved the manuscript's final version and declared to be responsible for all aspects of the manuscript, assuring its accuracy and integrity.

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