

Prevalence and Factors Associated with Food Insecurity in the Context of the Economic Crisis in Brazil

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Abstract

Background: The Brazilian economy has been officially in recession since 2014. Since then, there has been an increase in the unemployment rate, cost of food, and cuts in the budgets of social programs, among other situations that may interfere with the food security of the population.

Objectives: The aims of this study were to identify the prevalence of and factors associated with food insecurity (FI) in Alagoas, one of the poorest states in Brazil, and to discuss the results in the context of the national economic crisis.

Methods: This was a cross-sectional study in a probabilistic sample of 3366 families. FI was identified on the basis of the Brazilian Food Insecurity Measurement. The associations with independent variables that achieved $P < 0.2$ (by chi-square test) in the crude analysis were submitted to multivariable analysis.

Results: The observed prevalence of FI was 58.3% (33.1%, 17.9%, and 7.3% for mild, moderate, and severe FI, respectively), which is considerably higher than the 34.6% found in 2013 by the Brazilian Institute of Geography and Statistics before the worsening of the economic crisis. The factors independently associated with FI in this study included the following: female head of household, head of the family having no income, female head of household being overweight, ≥ 4 family members, ≤ 4 rooms in the house, household income less than the minimum wage, family belonging to the lower economic classes (D or E), using the *Bolsa Família* program, residing in a nonmasonry house, or not residing in their own house.

Conclusions: The prevalence of FI in Alagoas is very high, and considering previous studies, there was a marked increase in FI during the Brazilian economic crisis. All associated factors are related to the greater social vulnerability of the family. The present data point to the need to strengthen public policies for health promotion, education, employment, and income and to ensure the human right to adequate food, with the aim of reducing social vulnerability within the family in a sustainable way. In addition, this study contributes to the understanding of how national conditions can influence household-level FI. *Curr Dev Nutr* 2017;1:e000869.

Introduction

Access to adequate food and nutrition is a fundamental human right (1), and according to the Brazilian Federal Constitution (2), it is the duty of the government to guarantee this right to all citizens by adequately assisting the most vulnerable individuals and by ensuring that, in the long-term, everyone can have access to adequate food by their own means (3), which is a condition that largely depends on the government's economic stability. In this respect, the Brazilian political and economic crisis is considered a matter of great concern. The Brazilian economy has been officially in recession since the second quarter of 2014 (4, 5). During this period, the National Congress approved the impeachment of the President of the



Keywords: risk factors, socioeconomic factors, nutritional status, public policies, health surveys, cross-sectional studies

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Abbreviations used: BRL, Brazilian Real; FI, food Insecurity; IBGE, Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics); NC, without children; PNAD, Pesquisa Nacional de Amostra de Domicílios (National Household Sample Survey); PR, prevalence ratio; WC, with children.

Republic and installed a new government, which implemented profound changes in economic policy that were justified as being necessary to resume economic growth. In this period, there was an increase in the unemployment rate and in the cost of food, as well as in cuts to the budgets of social programs. Under such circumstances, continuous monitoring of the food insecurity (FI) situation is important at both the national and local levels (6, 7). The difficulty of regular and permanent access to food by a large part of the population can be considered an FI situation, a complex and multidimensional phenomenon that develops as a continuous and differentiated step-by-step process, ranging from the concern about the lack of food, to qualitative changes in feeding, and finally, to hunger itself (8, 9).

Families subjected to FI are more likely to be exposed to inadequate food consumption, not only from a quantitative point of view but also in terms of food variety and quality (10). This situation is associated with various forms of nutritional disorders (specific micronutrient deficiencies, undernutrition, and obesity), which are common conditions in regions undergoing nutritional transition (11, 12). Nutritional deficiencies may reduce the immunologic competence of individuals and favor the development of infectious diseases or, in the case of obesity, increase the susceptibility to chronic noncommunicable diseases (13–15).

FI is a problem that afflicts families throughout Brazil. However, the problem is more acute for people with greater social vulnerability (1, 16). In this respect, the state of Alagoas is one of the poorest Brazilian states, characterized by having worse social indicators than other states, such as a high rate of illiteracy, a precarious infrastructure of basic sanitation services, and high income disparity (17). Since 2000, Alagoas has been ranked as the state with the worst Human Development Index (18).

Given this, it is plausible to assume that the presence of historically unfavorable socioeconomic factors may contribute to a greater exposure of the population to FI. However, according to data from the Pesquisa Nacional de Amostra de Domicílios [PNAD (National Household Sample Survey)] in 2013, Alagoas was in an intermediate position in this regard. Although states such as Maranhão and Piauí had prevalences of FI of 60.9% and 55.6%, respectively, the prevalence of FI in Alagoas was 34.6%. In contrast, substantially lower values were observed in more economically developed states, such as Espírito Santo (10.4%) and Santa Catarina (11.1%), and São Paulo (11.6%) (16). Thus, there is a high level of heterogeneity and wide inequalities between the Brazilian regions and states (6).

It is possible that public investment in assistance programs has contributed to the promotion of food security in Alagoas, because due to the greater social vulnerability of its population, it received priority attention from the federal government (19). This was part of the implementation of public policies for guaranteeing constitutional rights, particularly those related to poverty eradication, such as the *Bolsa Família* program, which is the largest conditional cash transfer program in the world (6). According to the Instituto Brasileiro de Geografia e Estatística [IBGE (Brazilian Institute of Geography and Statistics)], there were 841,117 families in Alagoas (20), of whom 439,655 were beneficiaries of *Bolsa Família* in 2014 (19)—that is, ~52.3% of the population received this support for family subsistence. However, due to the economic crisis in recent years, the budget of this program has been reduced (19), which has

increased the number of families subjected to FI. This study aimed to identify the prevalence and factors associated with FI in the state of Alagoas and to discuss the results in the context of the country's recent economic crisis.

Methods

Type of study and sample planning

This was a cross-sectional study in a representative probabilistic sample of the population from the state of Alagoas (in the Northeast region of Brazil), which is 1 of 27 Brazilian states (including the Federal District). Brazil is a country of continental dimensions, with ~200 million inhabitants, >80% of whom live in urban areas. The 27 states of Brazil are grouped into 5 regions: North, Northeast, Midwest, Southeast, and South. The latter 2 regions are the richest and most developed, whereas the North and Northeast regions are considerably poorer. The smallest administrative divisions in the country are municipalities, encompassing both urban and rural areas (21). Alagoas has 102 municipalities and an estimated population of 3,358,963 inhabitants (22).

The variable of interest used to calculate the sample size was FI, the prevalence of which was 34.7% (all levels of FI) for Alagoas in the last survey conducted by the IBGE (16). The study population was estimated to be 841,117 families (20). The margin of error assumed was 2.0%. The study also considered a sample formed from 120 conglomerates (census tracts; a geographic region defined by the IBGE for census purposes consisting of ~300 families) and the value of 1.5 to correct the effect of the complex design. For a 95% CI, a study sample of 3360 families was needed. To this number, a total of 10% was added to cover possible sample losses (closed or empty houses and refusals), providing a total sample of 3696 families. Therefore, in the case of sample losses, there was no need for replacement (provided that the losses were <10%). Calculations were performed by using the StatCalc tool from Epi-info, version 7.1.4 (CDC).

To attain the required number of families, a multiple-stage process was adopted in 4 steps. In the first stage, 30 of the 102 municipalities of Alagoas were selected by using a random sampling method with proportional probability to the number of inhabitants. This was conducted as follows: All municipalities, listed in a worksheet by geographic region, were arranged in alphabetical order. In a second column, their respective populations were indicated, allowing the accumulated population to be calculated, which was annotated in a third column following the same sequence of municipalities. Then, the sampling jump was calculated [total population/number of municipalities to be selected (3120.494/30 = 104.016)]. To select the first municipality, a random number between 1 and 104.016 was defined. This was achieved by using Excel software with the following command: =RANDBETWEEN (1;104016). Then, in the column referring to the accumulated population, it was identified which municipality had the number assigned as “sampling jump.” This was the first municipality selected. From this value, the sampling jump (104.016) was systematically added, and in each step, a new municipality was selected. Due to its larger population, Arapiraca was selected twice, and

Maceió, the state capital, which consists of one-third of the population of Alagoas, was drawn 10 times.

In the second step, 4 census tracts by municipality were chosen by a simple drawing, respecting the proportion between urban and rural sectors. For the cities of Maceió and Arapiraca, the census sectors were organized in a list and the drawing was conducted by systematic sampling. In a third step, one block in each census tract was randomly selected. Finally (step 4), in each block a starting point (a corner) was randomly chosen, from which, moving in a counterclockwise direction, 31 consecutive households were visited.

In urban areas, the blocks were identified in the maps of the respective census tracts. In rural areas, due to the geographical peculiarities, there was no drawing of a block or corner; instead, the first 31 families who were randomly located by the interviewer team were eligible for the study. This sampling scheme gave every individual in the Alagoas population the same chance of being selected. This study was part of the project “II Diagnosis of Health of the Maternal and Child Population of the State of Alagoas,” which was approved by the Research Ethics Committee of the Federal University of Alagoas. Data collection was only performed in households in which the terms of free and informed consent were signed.

Data collection

Data collection, preceded by training, a pilot study (conducted at the end of 2013, in a municipality not drawn to compose the study), and a test of the forms prepared for the research were conducted through household visits from April 2014 to March 2015. The interviews were carried out with the woman identified as the housewife or, in her absence, with someone who knew the usual family's eating habits. The field team was composed of a general coordinator, a supervisor, 2 anthropometrists, and 12 interviewers. The coordinator was responsible for logistical and administrative matters, whereas the supervisor systematically ensured the quality of the data obtained. Following the sequence of questions contained in structured forms, socioeconomic, demographic, environmental, and anthropometric variables were obtained.

The dependent variable was FI, which was defined according to the Escala Brasileira de Insegurança Alimentar (Brazilian Food Insecurity Measurement Scale). This scale consisted of 15 closed-ended questions on the family's food experience over the past 3 mo and allowed the possibility, according to the number of positive answers, of categorizing families into strata according to their FI status. Each positive answer represented a point, and the sum of the scores was used to rank the households with children (WC) and without children (NC) into 4 categories: food secure (0 points, WC or NC), mild FI (1–5 points, WC; 1–3 point, NC), moderate FI (6–10 points, WC; 4–6 points, NC), and severe FI (11–15 points, WC; 7–9 points, NC) (23).

Three surveys on the prevalence of FI were conducted in Brazil at the time of the PNAD, which occurred in 2004, 2009, and 2013 (16, 24). PNAD data allowed disaggregation by Brazilian regions, states, and urban and rural areas. Therefore, the specific data for the state of Alagoas were used in order to make comparisons with the results obtained in this investigation. As in this survey, the PNAD also used a 4-stage complex probabilistic household

sample, and both samples were representative of all residential households in Alagoas.

The socioeconomic and demographic variables considered in the study were as follows: number of family members, sex, color/race, educational status of the head of the family, work and income status of the head of the family, family income, economic class, and family participation in the *Bolsa Família* program. The criteria proposed by the Associação Brasileira de Empresas de Pesquisa (Brazilian Association of Research Companies) were used to classify the families according to economic class. This method consisted of a points system based on the ownership of consumer goods, number of domestic employees, educational level of the head of the family, and access to public services. The classification was performed through the sum of the scores obtained, with 7 possible classes (A, B1, B2, C1, C2, D, and E), of which class A was the highest level and class E was the lowest economic level (25). Among the environmental variables, the following were studied: the home situation (rural or urban), the type of house (masonry or nonmasonry), the type of house occupation (own house or other means), the number of rooms, and the disposal of garbage.

The anthropometric evaluation was performed on the women (aged 20–49 y) residing in the households. If there were ≥ 2 women, only 1 of them, chosen at random, was evaluated. Weight was determined by using a digital scale (MS6121R; Charder) that was equipped with a capacity of 250 kg and a precision of 100 g and was calibrated daily against a standard weight. To measure height, a portable stadiometer (model 213; Seca) equipped with a measuring tape with a sensitivity of 0.1 cm was used. The nutritional status of the women was evaluated by using BMI, classified as follows: low weight [BMI (in kg/m^2) < 18.5], normal weight (18.5–24.9), and overweight (BMI ≥ 25) (26).

Statistical analysis

The data were entered in a separate double-entry system, in a form generated by the Epi-Info software version 3.5.4 (CDC), which allowed the comparison between the respective spreadsheets for identification and correction of possible typing errors. In the descriptive analysis, absolute and relative frequencies were used. The prevalence of FI was compared according to the different categories of the independent variables, with significance of the differences investigated by using a chi-square test.

The prevalence ratio (PR) and its 95% CI, calculated by Poisson regression with robust variance adjustment, were used as a measure of association. The associations that obtained $P < 0.2$ in the crude analysis were subjected to multivariable analysis. In the final model, the only remaining variables were those that were significantly associated with FI ($P < 0.05$). The exclusion of nonsignificant variables occurred through backward processing. The calculations were performed by using Stata software, version 13.0 (StataCorp).

Results

As defined in the sampling plan, 3720 households were selected for the study; however, 354 (9.5%) of the households were

TABLE 1 Distribution of food insecurity among families in the state of Alagoas (2014–2015), according to demographic, socioeconomic, environmental, and anthropometric variables¹

Variable	n	%	Food insecurity, %			Total
			Mild	Moderate	Severe	
Head of the family						
Sex						
Male	2219	65.9	32.3	16.8	6.1	55.2
Female	1146	34.1	34.7	19.8	9.7	64.2*
Race/ethnicity						
White	941	28.3	34.1	15.3	5.7	55.1
Nonwhite	2386	71.7	32.9	18.6	8.0	59.5*
Years of education						
>4	1971	60.1	33.1	15.0	4.5	52.6
≤4	1308	39.9	33.0	22.1	11.2	66.3*
Without work/income						
No	3043	91.1	32.9	17.4	6.6	56.9
Yes	298	8.9	34.6	22.8	13.1	70.5*
Women's BMI, kg/m ²						
Low weight (<18.5)	89	2.8	37.1	9.0	6.7	52.8
Normal weight (18.5–24.9)	1098	34.8	31.8	15.7	6.7	54.2
Overweight (≥25)	1965	62.4	33.7	19.3	7.6	60.6* ²
Household members, n						
<4	1332	39.6	32.1	14.7	5.7	52.5
≥4	2034	60.4	33.8	19.9	8.4	62.1*
Household members earning minimum wage, ³ n						
>1	2249	72.0	33.2	15.8	4.8	53.8
≤1	873	28.0	32.8	24.5	14.4	71.7*
Economic class ⁴						
A to C2	1641	48.8	31.4	11.0	3.2	45.6
D and E	1725	51.2	34.8	24.4	11.2	70.4*
<i>Bolsa Família</i> program user						
No	1609	47.8	29.8	10.5	4.4	44.7
Yes	1754	52.2	36.2	24.6	10.0	70.8*
Area of residence						
Urban	2659	79.0	33.7	17.3	6.7	57.7
Rural	707	21.0	30.8	19.8	9.6	60.2
Type of home						
Masonry	3339	99.3	33.2	17.1	7.3	58.1
Nonmasonry	24	0.7	20.8	50.0	16.7	87.5*
Type of domicile						
Own home	2092	62.2	31.3	15.8	6.3	53.4
Other	1271	37.8	36.2	21.2	9.0	66.4*
Rooms in the house, n						
>4	2819	83.9	32.9	16.6	6.3	55.8
≤4	512	16.1	34.5	24.5	12.7	71.7*
Garbage disposal						
Public collection	2964	88.1	33.5	17.3	6.7	57.5
Other	399	11.9	30.6	21.5	12.0	64.1*
Household members <18 y of age						
Yes	2577	76.6	35.0	19.0	8.2	62.2
No	789	23.4	26.9	14.2	4.4	45.5*

¹* $P < 0.05$. BRL, Brazilian Real.² Comparing the overweight category with the sum of low-weight and normal-weight categories.³ Minimum wage at the time of the study: BRL 724.00 (1 US\$ = 2.66 BRL as of 31 December 2014).⁴ Criteria of the Economic Classification of the Brazilian Association of Research Companies (25).

considered missing: 106 (2.8%) houses were closed or empty and there were 248 (6.7%) refusals to participate in the survey. A total of 3366 families were investigated, of which 58.3% had some degree of FI. Among these, 33.1% had mild, 17.9% had moderate, and 7.3% had severe FI. The prevalence of FI was even higher among households with family members <18 y of age (**Table 1**) than in those households without members in this age group (62.2% compared with 45.5%; PR: 1.37; 95% CI: 1.26, 1.48).

As shown in Table 1, slightly more than half of the families (52.2%) were members of the *Bolsa Família* program and were characterized by a higher prevalence of FI than were nonusers of the program (70.8% compared with 44.8%; PR: 1.58; 95% CI: 1.48, 1.68). Most heads of family households were male (65.9%). It was also observed that, in female-headed households, the occurrence of FI was more frequent (64.2% compared with 55.2%; PR: 1.16; 95% CI: 1.10, 1.23). The prevalence of overweight among women

TABLE 2 Distribution of food insecurity in families of the Alagoas population (2014–2015) according to sociodemographic, environmental, and anthropometric variables¹

Variable	Crude analysis		Adjusted analysis	
	PR (95% CI)	P	PR (95% CI)	P
Female head of the family	1.16 (1.10, 1.23)	<0.001	1.15 (1.08, 1.22)	<0.001
Head of the family does not belong to the white color/race	1.08 (1.01, 1.15)	0.024	—	—
Years of education of head of the family ≤ 4	1.26 (1.19, 1.33)	<0.001	—	—
Head of the family without work or income	1.24 (1.14, 1.34)	<0.001	1.12 (1.03, 1.23)	0.008
Women considered overweight (BMI ≥ 25)	1.12 (1.05, 1.19)	<0.001	1.14 (1.07, 1.21)	<0.001
Number of family members ≥ 4	1.18 (1.11, 1.26)	<0.001	1.22 (1.14, 1.30)	<0.001
Monthly family income ≤ 1 minimum wage ²	1.33 (1.26, 1.41)	<0.001	1.16 (1.09, 1.24)	<0.001
D and E economic classes	1.54 (1.45, 1.64)	<0.001	1.29 (1.20, 1.38)	<0.001
<i>Bolsa Família</i> program user	1.58 (1.48, 1.68)	<0.001	1.41 (1.31, 1.51)	<0.001
Family resides in rural area	1.04 (0.97, 1.11)	0.232	—	—
Domicile with construction material other than masonry	1.51 (1.29, 1.76)	<0.001	1.33 (1.14, 1.54)	<0.001
Family does not own their home	1.24 (1.18, 1.31)	<0.001	1.21 (1.14, 1.28)	<0.001
Number of rooms at home ≤ 4	1.29 (1.21, 1.37)	<0.001	1.13 (1.06, 1.21)	<0.001
Garbage disposal other than public collection	1.11 (1.03, 1.51)	0.007	—	—

¹BMI is in kg/m². BRL, Brazilian Real; PR, prevalence ratio.

²Minimum wage at the time of the study: BRL 724.00 (1 US\$ = 2.66 BRL as of 31 December 2014).

was 62.4%, which was more prevalent among those families with FI (60.7% compared with 54.1%; PR: 1.12; 95% CI: 1.05, 1.19).

After adjustment (**Table 2**), the following variables were significantly associated with FI: female head of household, head of household having no work or income, women in household being overweight, ≥ 4 family members, ≤ 4 rooms in the house, monthly family income less than minimum wage, and family belonging to the D or E economic classes, using the *Bolsa Família* program, residing in a nonmasonry house, and not residing in their own house. Comparing these results with those obtained in other surveys conducted in the state of Alagoas in 2004, 2009, and 2013 (16, 24) by the PNAD/IBGE (**Figure 1**), there was a pronounced upward trend in the prevalence of FI, particularly among mild cases. **Table 3** presents some economic indicators related to the state of Alagoas, in which there was a decrease in the number of formal

jobs, as well as in the number of *Bolsa Família* program users, and an increase in the unemployment rate and in the cost of the basic food basket, with a concomitant increase in the commitment of family income to the purchase of foodstuffs.

Discussion

The Brazilian Food Insecurity Measurement Scale, like other scales established with the same objective, measures FI at the household level (30). FI is a condition associated with greater susceptibility to the development of diseases that result from the lack of access to adequate food. Periods of economic, political, and social instability tend to affect the diet of the population and to promote FI at the household level, especially among the most disadvantaged

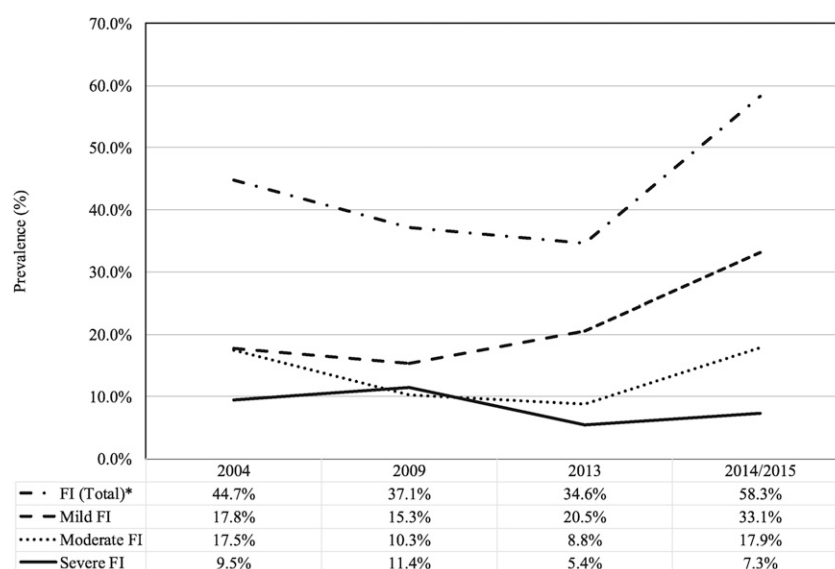


FIGURE 1 FI in Alagoas, Brazil, 2004 to 2014–2015. *FI (Total) indicates mild, moderate, and severe FI. Sources: 2004 (24), 2009 (24), 2013 (16), and 2014–2015 (current study). FI, food insecurity.

TABLE 3 Selected economic indicators for the state of Alagoas, Brazil, 2013–2015¹

Indicators (ref)	2013	2014	2015
Formal employment balance between hirings and dismissals (27)	−628	−2362	−4305
Unemployment rate of persons aged ≥14 y (28), %	9.3	9.4	11.3
Families using the <i>Bolsa Família</i> program (19), n	438,656	439,655	418,405
Consumer Price Index (Índice de Preço ao Consumidor) (29), %	12.2	9.5	14.9
Basic food basket (29) ²			
Salary commitment, %	35.8	34.6	37.2
Average amount expended, BRL	243.06	250.74	293.10

¹BRL, Brazilian Real (1 US\$ = 2.66 BRL as of 31 December 2014); ref, reference.

²The basic foodstuffs usually consumed by families.

population groups (31). As mentioned previously, the prevalence of FI in the families studied (58.3%) was higher than that found in the PNAD 2013 (34.6%) (16).

The Brazilian economy has been officially in recession since the second quarter of 2014 (4, 5), such that the country is facing the worst economic crisis of the past 100 y (7), which has been characterized, among other indicators, by the growth of the unemployment rate and an increase in food prices (17). According to the IBGE, the unemployment rate in Brazil increased from 6.5% in the last quarter of 2014 to 9.0% in the same period of 2016. In Alagoas, this rate was higher than the national average, varying from 9.4% in 2014 to 11.3% in 2015 (17). It is worth noting that Alagoas, which has one of the lowest average family incomes in Brazil, experienced a reduction of ~34.0% in this indicator in the third quarter of 2015 in relation to the national average [Brazilian Real (BRL) 1956.00 compared with BRL 1283.00] (17). As of 31 December 2014, 1 US\$ was equivalent to 2.66 BRL.

The state has also been experiencing an increase in the level of unemployment since 2013. In 2015, 4305 jobs were lost. This was mainly due to the decrease in productivity of the manufacturing industry because of the influence of seasonal factors related to sugar-alcohol production (27, 28).

The National Consumer Price Index showed an 11.3% increase in food and beverage prices in 2015, representing a commitment of 30.6% in relation to other expenses that are included in the index (housing, household goods, clothing, transportation, health and personal care, personal expenses, education, and communication), and this increase in food and beverage prices had the most impact on the family budget (32).

In the city of Maceió, the capital of Alagoas, the Consumer Price Index for the food and beverage group was higher than that found nationally (14.9%) and has increased in recent years, as shown in Table 3. This has generated an increase in the commitment of the family income to the purchase of food from 34.6% in 2014 to 37.2% in 2015. In this context, the cost of the basic food basket—namely, the basic foodstuffs usually consumed by families—increased from 250.74 BRL to 293.10 BRL during the same period (29). Within the scope of public policies, the amount allocated to food security actions in Alagoas was reduced by 39.8% from 2014 to 2015 (490,055.97 BRL compared with 294,830.36 BRL) (19, 33),

resulting in a decrease in investments in this area and, consequently, a reduction in the number of user families from 439,655 in 2014 to 418,405 in 2015 (19).

As mentioned above, more than half the population studied here used the *Bolsa Família* program. In this regard, due to the political crisis that Brazil faced in its recent history that resulted in the replacement of the federal government, Brazilian press agencies (radio, newspapers, television, and Internet sites) have frequently disclosed information about the cuts in the budgets of social programs, resulting in the exclusion of thousands of beneficiaries. Obviously, this creates a situation of insecurity for those families who depend on this income to guarantee access to food. As discussed, families who use the *Bolsa Família* program had a higher prevalence of FI than did nonusers, which shows that the program indeed serves the population with greater social vulnerability.

It is important to highlight that the prevalence of severe FI now observed in Alagoas (7.3%) is >2 times that found in 2013 in Brazil (3.2%), whereas the prevalence of moderate FI (17.9%) was >3 times the national prevalence (4.6%) (16). These categories of FI are associated with changes in the usual diet due to a disruption in feeding patterns, thus reducing the availability of food at home (16). These findings are worrisome given the current outlook on the country's economic indicators (3, 27, 29, 32), because they have a direct relation with access to nutritionally adequate food. Therefore, if these trends are maintained, there is a possibility of regressing to the situation experienced in the country a few years ago, when short stature in children (indicative of chronic malnutrition and hunger) was a serious public health problem (34).

The economic crisis has increased unemployment in Brazil, and actions triggered by the current government, under the umbrella of fiscal adjustment, may put Brazil back on the UN hunger map. These include the exclusion of people from the *Bolsa Família* program and the cuts in the budget of the family agriculture program, which has prevented hundreds of thousands of people from having enough income to buy food (35). The data obtained in this study unequivocally point to the real possibility that Brazil can return to the hunger map. This is a matter of great concern and should reorient the strategies currently adopted by the federal government with the pretext of adjusting the Brazilian economy.

The data presented in Figure 1 show an increase in the prevalence of FI of almost 70% in relation to the data obtained in the previous year by the PNAD 2013 (16). Our study showed the effect caused by the beginning of the political and economic crisis in our country (4, 5); however, the PNAD occurred before such circumstances. Figure 1 shows that the category of FI that increased more dramatically was mild FI, which reflects the concern of the population with the possibility of losing employment, with the elevation in food prices, and with the loss of access to social programs, among other factors.

In general, households that experience mild FI without hunger in the household (6) express concerns about running out of food, having to reduce their dietary quality, or having to practice unusual coping strategies to access food. However, because our study was carried out in the initial phase of the political-economic crisis

in Brazil, it is likely that further investigations will show a worsening situation, with increases in the category of severe FI, in which the affected families would have already experienced hunger.

With regard to the factors associated with FI in the present study, we verified that all factors were related to the greater social vulnerability of the family. According to Anschau et al. (36), the presence of household members <18 y of age and households having the highest number of members were associated with a higher frequency of FI in beneficiaries of income transfer programs, thus corroborating the results of the present study and other surveys conducted at the national level or in specific populations (16, 37). This relation can be explained by the fact that families with a larger number of individuals need more resources to buy food, and family growth is not always accompanied by increased income (36).

Another point to highlight is the association between FI and the family's head of household. According to the PNAD 2013 (16), the prevalence of moderate or severe FI was higher among households headed by a woman, as seen in other studies (36, 38). This suggests that workplace inequalities for women in the labor market result in lower wages when compared with the wages of men (39). Therefore, gender must also be considered in public policies for promoting food security.

In addition to gender, a higher prevalence of FI was observed when the head of the household had no job or income, a fact linked to greater economic instability that negatively influences access to food, especially those foods with better nutritional quality (36). A similar situation was observed in families with a monthly income lower than the minimum wage, the association of which is well documented in the literature (40, 41). Similarly, the prevalence of FI was 29% higher among families belonging to the D and E economic classes when compared with the classes with higher purchasing power, thus confirming findings in previous studies that showed that the lower the average income of a given economic class the higher the exposure to FI (36, 37). Some living conditions, such as residing in a nonmasonry house, not residing in one's own home, and residing in a house with a small number of rooms, were also strongly associated with FI. Previous studies found similar results (41, 42).

The assessment of nutritional status is a complementary measure to the assessment of FI, because, in isolation, it does not cover the multiple dimensions related to the FI due to the diversity of factors involved in its genesis and its diverse consequences (43). In this study, the prevalence of overweight in women was shown to be associated with FI, corroborating the evidence that shows that compromising the food available to families affects the nutritional adequacy of its components (44). Possible explanations for this association include the increase in the consumption of low-cost foodstuffs with high caloric density, a sedentary lifestyle, the presence of eating disorders due to anxiety, the uncertainty associated with involuntary food restriction, and the metabolic adaptations to undernutrition in early life, even in the intrauterine period (11, 30). As emphasized by Kepple and Segall-Corrêa (30), FI may not exclusively be expressed in the form of malnutrition, because there is evidence, observed in the present study, of its association with being overweight.

Currently, the prevalence of obesity and its comorbidities has been increasing in Brazil (45) and has become a relevant issue

for the planning of public policies, because obesity is not always opposite of hunger but also a consequence of it, particularly among the poorest families. Given the high prevalence of FI and its association with unfavorable demographic, socioeconomic, and environmental conditions, the need for systematic monitoring of the situation is reinforced by the oscillations in the political and economic situation of the government, which have probably contributed to the increase in the prevalence of FI.

In conclusion, the prevalence of FI in Alagoas is very high, and considering previous studies, there was a marked increase in prevalence during the Brazilian economic crisis. All of the associated factors with FI are related to the greater social vulnerability of the family. The present data point to the need to strengthen public policies for health promotion, education, employment, and income and to ensure the human right to adequate food, with the aim of reducing social vulnerability within the family in a sustainable way. In addition, this study contributes to the understanding of how national conditions can influence household-level FI.

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