

Food insecurity and associated factors in the Portuguese population

Lúisa Álvares and Teresa F. Amaral

Abstract

Background. The burden of food insecurity in Portugal, and the socioeconomic and demographic factors that are related to this condition, are unknown.

Objective. To evaluate the frequency of food insecurity and to identify its associated characteristics in the Portuguese population.

Methods. Data from 3,552 heads of family respondents of the 2005/06 Portuguese National Health Survey were analyzed in a cross-sectional study. Food insecurity was evaluated with the use of the US Department of Agriculture Household Food Security Survey Module 6-Item Short Form. Chi-square tests and multivariate logistic regression models were conducted. Significance was indicated at $p < .05$.

Results. Among the respondents, 16.5% were food insecure and 3.5% had very low food security. The odds of being food insecure were highest for women (OR, 1.51; 95% CI, 1.20 to 1.91), smokers (OR, 1.56; 95% CI, 1.20 to 2.02), younger people (OR, 2.54; 95% CI, 1.69 to 3.80), unemployed people (OR, 3.04; 95% CI, 2.01 to 4.60), those with lower education (OR, 7.98; 95% CI, 4.73 to 13.49), and those with lower income (OR, 6.27; 95% CI, 4.23 to 9.30).

Conclusions. The present study explored for the first time the burden of food insecurity in Portugal, revealing that it was highly prevalent, affecting one in six Portuguese citizens. Low education and low income were the main factors associated with food insecurity.

Key words: Associated factors, food insecurity, food intake, Portugal

Introduction

Food security exists when “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” [1]. It is a broad concept that encompasses not only the availability of food, but also the accessibility and proper use of food, as well as the stability of these dimensions over time [1].

Although food insecurity is more prevalent in lower- and middle-income countries where a greater part of the population lives in poverty, it has also been documented in many high-income countries. Some nations have evaluated their food insecurity at the household level through national health surveys. In Brazil, using the Brazilian Food Insecurity Scale, a prevalence of 30.2% was found [2]. In the United States, the latest data revealed a prevalence of food insecurity of 14.9% measured by the US Household Food Security Survey Module [3]. A lower prevalence of 7.7% was found in Canada by the Household Food Security Survey Module [4]. In the Republic of Korea, using the US Department of Agriculture Household Food Security Survey Module 6-Item Short Form, a lower prevalence of 5.3% was found [5]. In Europe, only France has estimated its population food insecurity, reporting a prevalence of 12% according to the US Department of Agriculture Food Sufficiency Indicator *. Recently, using an adapted version of the US Department of Agriculture Household Food Security Survey Module, a prevalence of 6.3% food-insecure households was identified in the Paris metropolitan area [6].

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Some studies show that lower age, lower educational level, marital status, low self-rated health status, body mass index, smoking, and household composition are related to food insecurity [2, 7–12]. A growing number of studies consistently show that higher incomes are associated with greater food security, but even households with incomes above the poverty line can experience food insecurity [3, 7–9, 13, 14], especially under circumstances that affect the household budget, such as unemployment, childbirth, and loss of social benefits [9].

Food insecurity is consistently associated with worse food habits. People who have less money to spend on food are forced not only to buy cheaper food, often with higher contents of fat and simple sugars, but even to reduce their food intake [15]. Furthermore, some studies report lower intakes of fruits, vegetables, and dairy products in food-insecure households [7, 11, 16], and these unhealthy eating patterns are consistently related to worse health outcomes, including development of chronic disease [17]. There is strong evidence linking food insecurity and diseases such as obesity, hypertension, diabetes mellitus, and depression [17–19]. An even more serious problem is that children who live in food-insecure households are at greater risk for health, developmental, and behavioral problems [20].

In the last few years, Portugal has been facing a severe economic crisis that has increased the unemployment rate and caused reductions in household budgets [21, 22]. According to the Portuguese General Directorate for Health, food intake has already been altered because of economic constraints [23]. Because the prevalence of food insecurity is still unknown in our country, it is important to document this problem. The Portuguese National Health Survey conducted during 2005 and 2006 included information about food insecurity. Despite the fact that these data were collected before the current economic crisis, they are still relevant to document food insecurity, since they are the only available information in Portugal.

The present study aimed to evaluate the burden of food insecurity and to describe the factors associated with food insecurity in the Portuguese population.

Methods

Study population

The Portuguese National Health Survey is a cross-sectional study that relies on a multistage random probability sample of Portuguese households and aims to evaluate the health status of the Portuguese population [24]. The data used in the present analyses came from the fourth Portuguese National Health Survey conducted between February 2005 and January 2006. Information on food security was gathered in the last

quarter of the Health Survey from 9,837 individuals, and only respondents who claimed to be the head of the family ($n = 3,658$) were questioned about food security. Data from subjects who had missing data for food insecurity ($n = 28$), were under 20 years of age ($n = 8$), or had missing values for the analyzed variables ($n = 70$) were excluded. Our final sample consisted of 3,552 individuals.

Consequently, 6,285 individuals were not included. Compared with nonparticipants, the participants' group had higher proportions of men (59.9% vs. 41.5%, $p < .001$), employed persons (51.3% vs. 38.5%, $p < .001$), older adults (≥ 60 years; 43.1% vs. 18.0%, $p < .001$), and individuals with lower income (≤ 250 euros per month; 6.8% vs. 1.7%, $p < .001$) and a lower proportion of individuals with no education (16.4% vs. 19.7%, $p < .001$).

Face-to-face interviews were used to collect information. No approval from an ethics committee was necessary, since the data were taken from a compulsory national survey. All interviews were carried out in compliance with the Helsinki Declaration.

Measures

Food-security status was determined by the US Department of Agriculture Household Food Security Survey Module 6-Item Short Form [25], using a form previously translated into Portuguese and validated in Brazil [26]. This brief form of the original module with 18 questions is robust when classifying the food-security status of households in the general population [27]. In surveys that cannot implement the 18-Item US Household Food Security Module, the six-item module may provide an acceptable substitute. It has been shown to identify food-insecure households and households with very low food security with reasonably high specificity and sensitivity and minimal bias compared with the 18-item measure. However it does not measure the most severe levels of adult food insecurity, those in which even children's food intake has probably been reduced [25]. Food-security status was stratified into three categories: "food-secure" if no items or one item was scored as affirmative, "low food-secure" if two to four items were scored as affirmative, and "very low food-secure" if five or six items were scored as affirmative [25]. Food-security status was dichotomized for analysis as "food-secure" vs. "food-insecure." "Food-insecure" includes "low food-secure" plus "very low food-secure."

Information about socioeconomic variables was obtained from the previous month's household income (defined as a categorical variable), the highest level of education achieved (no education, 1st to 4th grade, 5th to 9th grade, 10th grade or higher) and occupation (employed, unemployed, retired, housewife, permanently disabled, and others, which include student and unpaid internship, among others). The demographic

variables were sex, age, and marital status. Data on smoking habits, self-reported diabetes mellitus, hypertension, and depression were also obtained. Body mass index (the weight in kilograms divided by the square of the height in meters) was calculated based on self-reported weight and height. It was classified according to World Health Organization criteria [28]. To evaluate associations of food insecurity with food intake, data on the foods eaten on the previous day and the number of main daily meals were obtained by closed-end questions.

Statistical analysis

Categorical variables were expressed as frequencies and percentages. Chi-square tests examined the significance of the comparison between categorical variables. Logistic regression analysis was used to build a model of food insecurity; food security was the dependent variable and sex, age, marital status, education, occupation, and household income were the covariates. Statistical tests were two-sided, with $p < .05$ considered to indicate statistical significance. All analyses were conducted with SPSS, version 20.0.

Results

Food insecurity was present in 16.5% of households, and 3.5% had very low food security. **Table 1** shows the distribution of food insecurity across demographic, socioeconomic, and health-related variables and the crude and adjusted odds ratios for their association. Low educational level was the main factor associated with food insecurity. Having no education, compared with at least a 10th-grade education, increased the likelihood of food insecurity by eight times (OR, 7.98; 95% CI, 4.73 to 13.49). Being a woman increased the odds of food insecurity by 51% (OR, 1.51; 95% CI, 1.20 to 1.91). The unemployed had the highest odds of food insecurity when compared with employed people. A household with a previous month's income of 240 euros or less had six times the odds of food insecurity (OR, 6.27; 95% CI, 4.23 to 9.30). Smoking increased the odds of food insecurity by 56% (OR, 1.56; 95% CI, 1.20 to 2.02).

Differences between food-secure and food-insecure respondents regarding the foods consumed on the previous day and adjusted odds ratios for the intake of each food on food-security status are displayed in **table 2**. Bread or sandwiches (97.9% vs. 96.0%, $p < .02$) and soft drinks (5.3% vs. 2.2%, $p < .001$) were consumed by a higher proportion of food-insecure individuals than food-secure ones. In the multivariate analysis, eating bread or sandwiches and consuming soft drinks on the previous day were associated with increased odds of being food insecure.

Discussion

In 2005/06, 16.5% of Portuguese households were food insecure and 3.5% had very low food security. These numbers are higher than those documented in the Republic of Korea, which also evaluated the food-insecurity status of its population using the US Department of Agriculture Household Food Security Survey Module 6-Item Short Form [5]. Caution should be taken in comparing the prevalence of food insecurity in the present study with other previously reported figures, since they were obtained using different tools. The prevalence of food insecurity is higher in Portugal than in France, the only other European country for which data are available [5]. The prevalence of food insecurity in Portugal is also higher than in the United States and Canada but lower than in Brazil [2–4]. Only Canada had a prevalence of very low food insecurity that was lower than the results reported in the current analysis [3].

In the present study, education was the strongest factor independently associated with food-security status, considering the joint effect of the other variables incorporated in the regression model. Having no education increased the odds of food insecurity by eight times compared with having at least a 10th-grade education. Similar results have been found by other authors, confirming that educational level is a central factor in food insecurity [8, 13].

Households with a monthly income of 250 euros or less had more than six times the odds of being food insecure. Although income and food insecurity displayed a strong association [7, 8, 12, 13, 29], income alone does not fully explain food-security status [30]. Currently financial management skills are perceived as a possible modifier of this association. In line with this, Gundersen and Garasky have shown that households with greater financial management skills are less likely to be food insecure, even those with incomes under 200% of the poverty line [31]. An analysis of data restricted to the low-income participants would have been helpful in further clarifying the differences between low-income, food-secure and low-income, food-insecure households, but the small sample size prevents this approach.

The unemployed and the youngest had greater odds of food insecurity. These findings are consistent with previous studies [9, 13, 32]. However, contrary evidence exists on the link between food security and employment [30]. When the wages earned are inadequate to meet budgetary needs, even those who rely on employment income are exposed to food insecurity [29].

Smoking was also associated with food insecurity, in line with similar results described by other authors. Smokers seem to allocate part of their resources to tobacco instead of food, endangering their household

TABLE 1. Association between demographic, socioeconomic, and health characteristics and food insecurity ($n = 3,552$)

Characteristic	Food-insecure— <i>n</i> (%)	Food-secure— <i>n</i> (%)	χ^2 <i>p</i> value	Crude ^a OR (95% CI)	Adjusted ^{a,b} OR (95% CI)
Sex			< .001		
Male	265 (45.3)	1,862 (62.8)		1.00	1.00
Female	320 (54.7)	1,105 (37.2)		2.04 (1.70, 2.43)	1.51 (1.20, 1.91)
Age (yr)			.040		
≥ 60	279 (47.7)	1,251 (42.2)		1.00	1.00
40–59	217 (37.1)	1,188 (40.0)		0.82 (0.67, 1.00)	1.94 (1.44, 2.62)
≤ 39	89 (15.2)	528 (17.8)		0.76 (0.58, 0.98)	2.54 (1.69, 3.80)
Marital status			< .001		
Married	335 (57.3)	2,099 (70.7)		1.00	1.00
Single	69 (11.8)	269 (9.1)		1.61 (1.20, 2.15)	1.01 (0.72, 1.42)
Other	181 (30.9)	599 (20.2)		1.89 (1.55, 2.32)	0.87 (0.67, 1.13)
Education			< .001		
≥ 10th grade	24 (4.1)	620 (20.9)		1.00	1.00
5th–9th grade	102 (17.4)	703 (23.7)		3.75 (2.37, 5.92)	3.00 (1.86, 4.85)
1st–4th grade	280 (47.9)	1,240 (41.8)		5.83 (3.80, 8.95)	4.83 (3.00, 7.77)
No education	179 (30.6)	404 (13.6)		11.46 (7.34, 17.85)	7.98 (4.73, 13.49)
Occupation			< .001		
Employed	211 (36.1)	1,613 (54.4)		1.00	1.00
Unemployed	50 (8.5)	81 (2.7)		4.72 (3.23, 6.90)	3.04 (2.01, 4.60)
Retired	222 (37.9)	1,021 (34.4)		1.66 (1.36, 2.04)	1.20 (0.89, 1.62)
Housewife	89 (15.2)	202 (6.8)		3.37 (2.53, 4.49)	1.64 (1.16, 2.31)
Permanently disabled	12 (2.1)	26 (0.9)		3.53 (1.75, 7.10)	2.06 (0.98, 4.33)
Other ^c	1 (0.2)	24 (0.8)		0.32 (0.04, 2.37)	0.30 (0.04, 2.35)
Monthly household income (euros)			< .001		
≥ 901	93 (15.9)	1,377 (46.4)		1.00	1.00
501–900	173 (29.6)	843 (28.4)		3.04 (2.33, 3.97)	2.34 (1.77, 3.09)
251–500	218 (37.3)	565 (19.0)		5.71 (4.40, 7.43)	4.01 (2.97, 5.41)
≤ 250	94 (16.1)	147 (5.0)		9.47 (6.78, 13.21)	6.27 (4.23, 9.30)
Does not know/does not want to respond	7 (1.2)	35 (1.2)		2.96 (1.28, 6.85)	2.79 (1.15, 6.79)
Smoking (yes or no)	121 (20.7)	587 (19.8)	.619	1.06 (0.85, 1.32)	1.56 (1.20, 2.02)
Diabetes (yes or no)	80 (13.7)	290 (9.8)	.005	1.46 (1.12, 1.91)	1.22 (0.92, 1.63)
Hypertension (yes or no)	222 (37.9)	966 (32.6)	.012	1.27 (1.06, 1.52)	0.99 (0.80, 1.22)
Depression (yes or no)	63 (10.8)	241 (8.1)	.037	1.37 (1.02, 1.83)	1.02 (0.73, 1.42)
BMI, overweight (reference: < 25 kg/m ²)					
Men	140 (52.8)	1,191 (64.0)	< .001	0.63 (0.49, 0.82)	0.67 (0.51, 0.89)
Women	194 (60.6)	580 (52.5)	.010	1.40 (1.08, 1.80)	1.12 (0.84, 1.47)
Total sample	334 (57.1)	1,771 (59.6)	.243	0.90 (0.75, 1.08)	0.86 (0.71, 1.05)

BMI, body mass index.

^a. Logistic regression models.^b. Adjusted for sex, age, marital status, education, occupation, and household income.^c. Includes students, unpaid internships, and other occupations.

TABLE 2. Reported food intake and association with food insecurity ($n = 3,552$)

Intake in the previous day	Food-insecure (%)	Food-secure (%) ^a	Adjusted ^b OR (95% CI)
Alcoholic beverage	5.6	5.4	1.32 (0.87, 2.00)
Beans/chickpeas	23.6	20.8	1.20 (0.96, 1.51)
Bread/sandwich	97.9*	96.0	2.10 (1.11, 3.96)
Cakes/chocolates/desserts/other sweets	22.7	30.6	0.80 (0.64, 1.00)
Dairy	80.2*	87.9	0.72 (0.55, 0.92)
Fish	38.5*	51.7	0.68 (0.56, 0.83)
French fries	0.7	0.8	0.98 (0.30, 3.16)
Fruit	77.6*	87.3	0.57 (0.45, 0.73)
Fruit juice/fruit nectar	3.9*	8.1	0.60 (0.37, 0.96)
Meat	70.6*	76.3	0.94 (0.76, 1.17)
Potatoes/rice/pasta	81.9*	87.7	0.77 (0.59, 0.99)
Salad/boiled vegetables	52.0*	70.1	0.55 (0.45, 0.66)
Savory pastry	1.9	3.3	0.71 (0.37, 1.40)
Soft drink	5.3*	2.2	3.11 (1.91, 5.07)
Soup	69.6	72.5	0.83 (0.67, 1.03)
No. of main daily meals			
3	88.5*	92.3	1.00
2	10.1*	6.8	1.26 (0.90, 1.77)
1	1.4*	0.9	1.00 (0.41, 2.46)

*Significantly different from food-secure ($p < .05$).

a. Chi-square tests were used to access bivariate associations.

b. Logistic regression model adjusted for sex, age, marital status, education, occupation, and household income.

food-security status [33]. In the present sample, participants with very low food security reported the highest proportion of smokers (25.4%). Similar [34] and opposite [33] results have been previously described. As nicotine decreases the appetite, we hypothesize that these individuals smoke in order to stave off hunger [35].

The lower intake of fruit, vegetables, dairy, fish, and meat in food-insecure households is a matter of concern and is consistent with previously reported data * [7, 8, 11]. The lower intake of cakes, chocolates, desserts, and other sweets by food-insecure individuals probably suggests such a lack of money that even the acquisition of this type of foods, usually cheaper than healthier ones, is compromised [15]. The intake of bread and sandwiches was also positively associated with food insecurity, probably because bread is a Portuguese staple food, often replacing a meal of potatoes, rice, or pasta. The heads of food-insecure households consume more soft drinks than do the heads of food-secure households, and consuming soft drinks was the

dietary factor strongly associated with food insecurity. It should be taken into account that the difference is slight (3.1 percentage points), and the number of persons who consume soft drinks in Portugal is small. In consistency with our findings, other studies also reported higher intakes of soda and sweet drinks by food-insecure individuals * [36].

Improving the quality of the diet of these food-insecure households seems a difficult task. Although providing low-income households with vouchers or discounts for vegetables and fruits actually increases their intakes of these foods [37], Smith et al. highlighted that if the household members are given the choice on how to spend food vouchers or discounts (on food items or not), food expenditure increases, but not necessarily expenditure on healthier foods [38]. Otherwise, nutrition education has significantly improved food-security status in low-income families [39, 40].

A significantly higher proportion of food-insecure individuals reported having fewer main meals a day. Zizza et al. also reported a reduced meal frequency among food-insecure individuals, but since the caloric content of meals and snacks was higher, their daily energy intake was similar to that of food-secure individuals [41]. In our study, data on the quantity of the foods eaten were absent, limiting the comparison of

* Darmon N, Vieux F, Bocquier A, Caillavet F. Dietary quality and food insecurity in France. II World Congress of Public Health Nutrition, Porto, Portugal, 23–25 September 2010 (poster)

energy intake.

To our knowledge, only one study, conducted in 2003 by the Instituto Nacional de Saúde Dr. Ricardo Jorge, has attempted to investigate the food insecurity burden in Portugal. Of the 647 households interviewed, 8.1% reported a reduction in their usual intake of a basic food item. No significant statistical associations were detected, but food insecurity tended to be associated with households with four or more individuals, a mean age of 65 years or more, a lower proportion of individuals who contribute to the family budget, and a higher number of individuals by room. [42]. Although this study encouraged discussion about food insecurity in the Portuguese population, it has several limitations. It only analyzed data from households with a landline telephone and whose respondent was a woman, and only assessed changes in the intake of an essential food in the previous 30 days. These limitations justified our new and improved analysis.

The main strength of the present study is that representative data from the Portuguese population in 2005/06 were analyzed. Furthermore, as far as we know, no other study attempted to evaluate factors associated with food insecurity.

Some limitations of the present study should be mentioned. First, its cross-sectional design did not allow the exploration of a causal relation between the identified factors and food insecurity. Second, significant differences existed between the participants and the individuals excluded from this analysis. The participants had a higher proportion of men, of employed persons, and of older people and a lower proportion of individuals with no education, which could have resulted in an underestimate of the prevalence of food insecurity. However, the included sample had a higher proportion of individuals with lower income, which could have resulted in an overestimate of the prevalence of food insecurity. The higher proportion of individuals with lower income could be interpreted as a selection bias, due to the fact that, compared with nonparticipants (non-household heads), household heads were more likely to be at home at the time of the survey. Since a higher proportion of the participants (household heads) were found to be employed, it can be hypothesized that they were in lower-paying jobs and therefore had a lower income. Third, classifying the whole household as food insecure based on the response of the household head to a questionnaire could be a source of bias. Intrahousehold food allocation differs, and not all members of the household are affected by food insecurity in the same way. Additionally, the perception of food insecurity seems to change according to the sex of the respondent [43]. The authors of the US Household Food Security Survey Module state that "this scale evaluates the food insecurity situation of the household members as a group and not necessarily the condition of any particular household member" [44].

Consequently, it is not possible to determine the food-insecurity status of each individual member living in the household. Once the household food-security level has been determined, it can be assumed that at least one household member experiences this condition [44]. Fourth, it was impossible to determine associations between food insecurity and household composition, since no information on the characteristics of the household members other than the head of the household was available in the 2005/06 Portuguese National Health Survey. Because of this lack of information, we could not determine whether food insecurity in Portugal is, as described for other populations, associated with factors such as a household headed by a single man or woman, the number of children in the household, the number of individuals in the household, etc. [3, 29, 45]. Fifth, data from 361 individuals who stated they were not the right person to provide information about income were included in the analyses. Although this represents a small proportion of this sample, we are not able to predict the occurrence of biased results. Moreover, we only had information on total household income, and information about how many people rely on income from the head of the household was absent. Sixth, data obtained on food intake were based on a one-day snapshot and could not be representative of the individual's dietary habits. Lastly, these data were collected in 2005 and 2006 and may not be up to date.

The present study exposes the burden of food insecurity in Portugal in 2005/06 and reveals that a low educational level and low income are the main factors associated with food insecurity. Considering recent economic changes in Europe, and specifically in Portugal, we can hypothesize that the food-insecurity burden in Portugal and all over Europe is on the increase, and therefore more up-to-date information is required to better understand this issue and to help design preventive public health strategies.

Authors' contributions

Luísa Álvares participated in the design of the study, statistical analysis, and drafting of the manuscript. Teresa F. Amaral contributed to the design of the study, analysis and interpretation of the data, and critical revision of the document. Both authors read and approved the final manuscript.

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