



# Food Insecurity in Rural Households of Cameroon: Factors Associated and Implications for National Policies

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## ABSTRACT

Using data from the third Cameroonian Household Consumption Survey conducted in 2007 by the National Institute of Statistics, this paper aims to estimate the food security status and identify the factors associated to food insecurity in rural households of Cameroon. It is found that the incidence of food insecurity in rural area is about 33.8% using the household caloric acquisition method of estimating food security status. Further analysis using the bivariate logistic regression method identified region of residence, landless status, and household-head's age as important determinants of food insecurity. Far-north's households are at least 1.5 times more exposed to food insecurity than other households of the country. Moreover, households who are sharecropper have 1.7 times more chance to experience food insecurity than those who are landowners. In addition, having a household head aged 40-49 and 50-59 increases the risk to be in food insecurity by 1.5 and 1.3 respectively, compared to households that head's age is less than 30. The region of the Far North should be preferred for eventual policies of fighting against food insecurity. Also, rural households that the head's age is high must have priorities, and resident rural population should be encouraged and helped to own land.

**Keywords:** Food Insecurity, Calorific contribution, Cameroon.

## PAPER

### 1. Introduction

Due to its agro-ecological diversity<sup>1</sup>, Cameroon shows great potentialities for agricultural production and livestock. Up till the late 1980s, the country was considered self-sufficient in agricultural production and played a role of food granary for its neighbouring countries (Gabon, Central African Republic, Chad, etc.). In the early 1990s, the country began importing massive quantities of cereals and other foodstuffs. This situation leads the Government and International Organisations to pay more attention to food security questions in the country.

In 2007 and 2011, the World Food Programme (WFP) conducted a Comprehensive Food Security and Vulnerability Analysis (CFSVA) in Cameroon in order to provide an understanding of food security and vulnerability situation of rural households. The results of these studies indicate that the particular case of rural households in Cameroon is not rejoicing. This situation is particularly weakened due to the level of poverty in rural area. Indeed, according to the results of the third Cameroonian Household Consumption Survey conducted in 2007 by the National Institute of Statistics, the rate of poverty in rural area was 54.5% against 11.9% in urban area.

It is then imperious to know for rural households, what are the socioeconomic and demographic factors that influence their food security situation. Accordingly, this paper aims to estimate the food security status and identify the factors associated to food insecurity in rural households of Cameroon.

The rest of the paper is organized as follows. Materials and methods are presented in section 2, results are presented and discussed in section 3 and section 4 concludes the paper.

### 2. Material and Methods

In this section, we give the definition of food security, and present the methodology that is used to measure it. We also describe the methodology that is used to identify the key determinants of food security status.

<sup>1</sup> The country is divided into five agro-ecological zones, with each of them suitable for specific agricultural production and livestock.

## 2.1. The food security concept

The standard definition of food security in use is that adopted during the World Food Summit held in 1996. According to this definition, "food security exists when all people, at all times, have physical, social, and economic access to the sufficient food which meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996). This definition points out four distinct but interrelated elements of food security, which are essential to achieve food security: *food availability, accessibility, utilization, and sustainability of access.*

## 2.2. Instruments of measuring food security

In this paper, we use an indicator related to the calorific contribution approach of measuring food insecurity (see Kidane et al., 2005, and Muhoyi et al., 2014). The quantities of food consumed by households or individuals, recorded during a survey, are converted into calories using calories tables. The Household Calories Availability per adult equivalent (HCAeq) is then computed for each household as follows:

$$HCA_{eq} = \frac{\sum_{j=1}^m Q_j A_j}{\sum_{i=1}^k u_i}$$

Here,  $u_i$  is the number of adult equivalent of the household  $i$ ,  $Q_j$  is the quantity of the product  $j$  (food) acquired by the household, and  $A_j$  is the quantity of calories contained in 100 grams of product  $j$ . Calories consumption per "adult equivalent" is needed to take into account the variation of individual dietary energy needs by age and sex and the difference between households in their demographic composition.

We now need a threshold to decide, given the value of the HCAeq, if a given household is food-secure or not. In this regard, we calculate the daily required calories for each household's member depending upon the recommended (FAO, 1996) caloric requirement for a person, considering its age and sex, and sum it up for each household. The household calories availability per adult equivalent is used to compute calorific indicator of food insecurity similar to a monetary poverty indicator:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^q \frac{(Z - D_i)^\alpha}{Z}$$

Here,  $D_i$  is the threshold of calories consumption. When  $\alpha = 0$ ,  $P_0$  defines the food insecurity rate (headcount); when  $\alpha = 1$ ,  $P_1$  defines the food insecurity gap (depth); and when  $\alpha = 2$ ,  $P_2$  defines the squared food insecurity gap (severity).

## 2.3. Data

The Data used in this study are from the Third Cameroonian Household Consumption Survey (ECAM3) conducted from September to December 2007 by the National Institute of Statistic (NIS) of Cameroon. The survey, which main focus has been on measuring household's living standards, concerned about twelve thousands households. With respect specifically to food, data are collected on all foods acquired by households, including their food purchases, foods consumed from their own farms or garden and food received in kind. The survey collected detailed information on daily expenditures of households in food consumption for two weeks. Our sample consists of 3,800 rural households.

The major difficulty encountered in calculating calorific contribution is the fact that in most cases, food items acquired by households was measured using Local Unit of Measure (LUM). The main operation done in data set has consisted to transform household's food acquisitions in standard units (Kilogram) by using appropriate coefficients of conversion.

## 2.4. Determinants of food security

In order to quantify the probability of risk to food insecurity according to socioeconomic factors, we perform a logistic model. The binary form of the dependent variable i.e. „0 for food secure and „1 for food insecure, guided us to use this model (see for example Feleke et al., 2005; Babatunde et al., 2007 and Bashir et al., 2012). The explanatory variables in our model are: household head age, gender of household head, education of household head, household size, farmland size, region of residence, distance between households and the nearest market, household-head's socioeconomic group and diversification of household-head's activities.

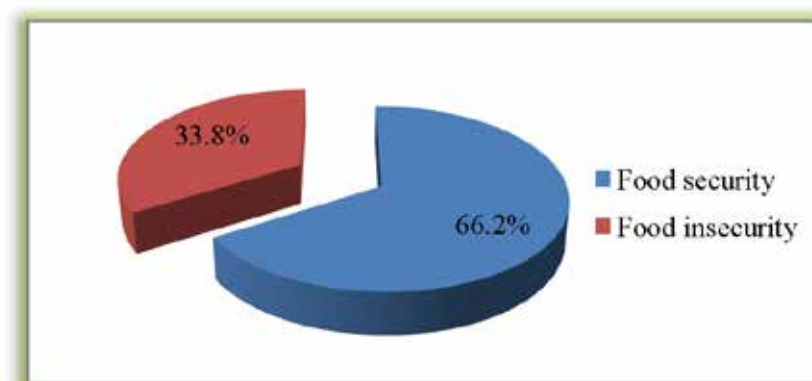
## 3. Results and discussions

### 3.1. Descriptive statistics on food insecurity

Here, we present the mains results obtained from the computation of the proxy indicator of food

insecurity. It is important to recall that threshold of food insecurity using calorific approach is variable<sup>2</sup> (see the section on materials and methods); that is two different households can have different thresholds according to their composition. For comparison, we also provide results obtained using a fixed threshold of 2,400 KCAL per person per day.

**Figure 1 - Situation of food insecurity of Cameroonians' rural households**



**Source:** Authors' calculations using CHCS 2007

From the Figure 1, we see that the incidence of food insecurity in rural area is about 33.8%, showing that more than one-third of rural households were subsisting on less than daily per capita calorie requirement during the survey period in 2007. This rate is not very far from the one that was found by the WFP during his Comprehensive Food Security Household Survey, using the Food Consumption Score to analyze food insecurity.

The results of the test performed to compare food insecurity incidences obtained using variable and fixed threshold respectively are reported in the last column of Table 1. They reveal at  $p < 5\%$  that the two food insecurity incidences are significantly different for all regions. We also note a strong variation in the incidence of food insecurity across regions.

This can be explained by differences in eating habits from one region to another or by inequalities between regions in term of food accessibility.

**Table 1 - Incidence and depth of food insecurity**

Region	Variable threshold		Fixed threshold		p-value (test for comparison of incidences)
	Incidence	Severity	Incidence	Severity	
Adamawa	0.374	0.048	0.484	0.054	0.000
Centre	0.247	0.011	0.291	0.012	0.000
East	0.295	0.017	0.344	0.022	0.000
Far-north	0.512	0.036	0.642	0.044	0.000
Littoral	0.210	0.009	0.229	0.007	0.000
Nord	0.386	0.031	0.475	0.036	0.000
North-west	0.236	0.020	0.277	0.025	0.000
West	0.289	0.008	0.399	0.010	0.000
South	0.325	0.021	0.389	0.025	0.000
South-west	0.270	0.030	0.319	0.031	0.000
<b>Total</b>	<b>0.338</b>	<b>0.025</b>	<b>0.418</b>	<b>0.029</b>	<b>0.000</b>

**Source:** Authors' calculations using CHCS 2007

At the level of the different regions of Cameroon, it is evident that, the North and the Adamawa regions are the most exposed to food insecurity. The incidence of food insecurity in these regions is respectively 38.6% and 37.4%. This is expected considering that the northern part of Cameroon is confronted with harsh climatic conditions.

To know how far the food insecure households are below the recommended daily caloric requirement, food insecurity gap was calculated. Food insecurity gap provides the possibility to estimate resources required to eliminate food insecurity through proper targeting. The calculated value of this indicator were found to be 2.25% (see Table 2) using variable threshold and 2.9% using fixed threshold. The gap is higher in the northern part of the country (4.8% and 3.6% for the Adamawa and Far-north regions respectively).

<sup>2</sup> Some studies often use a standard threshold of 2,400 kcal/capita/day.

## 3.2. Determinants of household food insecurity

The results of the binary logistic regression are presented in Table 2. Model evaluation is done by looking at Likelihood Ratio Test. The LR chi2 value is 318.09 with p-value of 0.00, so the model is fit and there is at least one variable that can describe household food security status. The coefficients are interpreted at 1%, 5% and 10% significance level.

The fact that household head has a secondary job or practices hunting, is not related to the food security status of the household. Nevertheless, practice of agriculture is related to food security status of the household. The fact for a household head to practice agricultural activities as sharecropper positively affects food insecurity of the household. The odd ratio in favour of food insecurity is increased by 1.70 as the household head is sharecropper as compared to the situation where he is land owner. This result can be due to the fact that farmers who are sharecroppers have to sell or offer part of their production to fulfil the land's rights of exploitation, which can limit their food supply.

**Table 2 - Results of the logistic regression**

Variables	Odds ratio	P >z
Level of education of the household's head (Ref: No education)		
Primary	-0.83	0.10
Secondary1	1.03	0.84
Secondary2	1.70	0.03**
University	-0.44	0.21
Household-head's gender (Ref: male)		
Female	-0.57	0.0***
Household size (Ref: 1 person)		
2-3 persons	-0.65	0.00***
4-5 persons	-0.34	0.00***
6-7 persons	-0.25	0.00***
8 persons and +	-0.21	0.00***
Household-head's socioeconomic group (Ref: senior executive in public private)		
Farmer	-0.86	0.56
Own behalf	-0.94	0.81
Region (Ref: Adamawa)		
Centre	-0.36	0.00***
East	-0.58	0.04**
Far-north	1.54	0.02**
Littoral	-0.26	0.00***
North	-0.85	0.47
North-west	-0.47	0.00***
West	-0.71	0.12
South	-0.49	0.06**
South-west	-0.55	0.02**
Hunting (Ref: yes)		
No	1.09	0.57
Household-head's age (Ref: less than 30 years)		
30-39 years	-0.79	0.11
40-49 years	1.52	0.01***
50-59 years	1.35	0.06*
60 years and +	-0.90	0.53
Practice agricultural activities (Ref: yes, owner)		
Yes, sharecropper	1.70	0.04**
Yes, free exploitation	-0.80	0.51
Secondary job (Ref: yes)		
No	-0.87	0.18
Distance between household and the nearest market (Ref: less than one kilometer)		
1-2 kilometers	1.02	0.86
3-4 kilometers	0.97	0.84
5 kilometers and +	1.23	0.11
Quantitative variables		
Area of land cultivated	-0.99	0.86
Constant	-	-
Summary statistics of the model		
LR chi2(17) = 318.09		Prob>chi2 = 0.00
Log likelihood = 1,634.15		Pseudo R2 = 0.09
Number of observations = 2,826		Corrected Classification Rate (CCR) = 0.64

Source: Authors' calculations using CHCS 2007

\*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%.

The farmland size appears not to be related to the food security status of the household. This result is similar to that obtained by Babatunde (2007), in his study on the food security of rural households in northern Nigeria. In that study, as it is the case with this one, the unit of cultivated surface is hectare, which can be considered as huge for household for which access to land is not easy.

Our results highlight a link between region of residence and food insecurity. Except North and West regions, the effect of other regions on food security is significant at 5%. In light with our descriptive statistics, the sign (positive) of the coefficient related to the Far north region means that as compared to a household living in Adamawa, the risk for a household living in Far north to be food insecure is 1.54 times higher. In addition, this risk is 0.58, 0.55, 0.47, 0.36 and 0.26 times lower for the Littoral, Centre, North-west, South-west and East regions respectively. The order of vulnerability to food insecurity by region can be established as follows: Far north, Adamawa, Littoral, Centre, North-west, South, South-west and East.

Household size has a positive and significant relationship with the probability of being food secure. The magnitude of the effect decreases with the size of the household, ranging from 0.65 for households having 2-3 persons to 0.21 for those having more than 8 persons. Here, we can consider the size of the household as a factor of diversification of agricultural labor force and source of income at the household level.

Households headed by females have a higher probability of being food secured than their male counterparts. Indeed, the risk for a rural household headed by a woman to be food insecure is 0.57 times less than that of a household headed by a man. This result was not unexpected since most women are more adept than men in issues involving expenditure and calorie. There is another argument that food activities (purchasing, preparation, etc.) is most of time concerned with the female, so a household having female household head is more independent in these spending on food as compared to household headed by males.

The age of the household's head seems to negatively influence the household food security situation. Two of the categories of this variable are significant (this is 40-49, and 50-59). Having household head aged 40-49 and 50-59, the chances of the household of being food insecure are 1.52 and 1.35 times respectively higher as compared to a household whose head is less than 30 years. The younger people are stronger than the elders and can perform tougher jobs in field. Moreover, households with older heads are the multigenerational households having more retired and/or older persons to feed. This may explain the negative effect of this variable on household food security. On the other hand, there is equal possibility that the older household heads have low tendency of adopting improved technology in agriculture and also economically not much active compared to younger one. In a related study, Bashir et al. (2012) found that an increase of one year in the age of household head decreases the chances of the household to become food secure by 3%. Similar relationship was observed by Titus and Adetokundo (2007) for Nigeria.

Summing up our results, the key determinants of rural household's food insecurity, according to CHCS 2007, are the region of residence, mode of farmland ownership, household size, household head's age and household head's gender.

#### **4. Conclusion and policy implications**

This study has two main objectives: determine the food security status of rural households in Cameroon and identify the main determinants of household's food insecurity. We used the household caloric acquisition method of estimating food security status. We also performed a bivariate logistic regression to identify key determinants of food insecurity.

The results reveal that 34% of the rural households were not able to meet the daily recommended caloric requirement. Concerning descriptive analysis, we noticed a considerable disparity of food insecurity distribution across regions. The northern part of the country is more vulnerable to food insecurity.

Further, the study has shown that the major factors affecting food security of rural households are: region of residence, mode of farmland ownership, household size, household head's age and household head's gender. More specifically, compared to a household living in Adamawa, the risk for a household living in Far north to be food insecure is 1.54 times higher. The econometric analysis allowed us to establish an order of vulnerability per region. It also allowed us to have some socioeconomic and demographics factors of food insecurity.

In the light of these results, we can make recommendations concerning policy of fighting against food insecurity, and give some orientations for future researches. The region of the Far North should be preferred for eventual policies of fighting against food insecurity. Rural households that the head's age is high must have priority, and resident rural population should be encourage and help to own land. It is also suggested that income generating opportunities need to be created along with improvements in secondary and technical education systems.

Finally, we recommend that further studies should be conducted in the area of food insecurity by considering detail and accurate information on various variables including political, climatic and weather (rainfall and temperature), topology, natural disasters, ecological conditions and other factors that affect food insecurity.

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