

## Household Vulnerability on Food Security in Niger

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### Abstract

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This article studies the households' vulnerability on food insecurity. It makes possible to see the determinants of vulnerability to food insecurity in Niger. On the other hand to find the opportunity for reinforce the households' resilience vis-a-vis this shortage. The study uses the linear regression model (OLS), inspired by the study made by Randriamiandrisoa and Ballet in 2014. The data are from the agricultural ministry (ECVM/A 2015) and the sample size is 9,354 households on national areas except Agadez region. Variables such as: number of land parcels, number of animals, own production, sale of land, sales of assets, secondary activity, sale of animals, migration, number of children aged from 5 to 10 and gender of the household's head, are the households' resilience factors in food insecurity. On the other hand, variables such as shock, off farm labor, number of children aged below five, are households' vulnerability factors. The study shows that the households of Niger are vulnerable to food insecurity. To reduce this vulnerability, it is significant to stress the households' characteristics which make them resilient. For that, the government must ensure a permanent follow to predict the risk of insecurity and to limit its consequences of food insecurity.

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**Keywords:** cereal, food insecurity, vulnerability, resilience, shock.

### Introduction

Food insecurity is a topical matter that deserves particular attention to create self-sufficiency to poor households. Food security can be defined as the availability, stability and access to food in quality and quantity of the population. If these conditions are not meet, we are in a case of food insecurity. The latter can cause among other things, hunger, malnutrition and all other food deficiencies.

According to FAO, (2010), in the 2050 horizon, African population will reach 1.8 billion and to provide food for this population, African agriculture has to realize a growth rate of 260% in the same horizon. Ended, the current growth of African agriculture does not make possible to achieve this goal. This is why famine and malnutrition are frequently observed in the continent.

The famine and malnutrition have harmful effects on the vulnerable fringe of the population (Yabile, 2011). We can define this vulnerability as the capacity of the households to be resilient vis-a-vis a shock (Dilley and Boubreau, 2001). In Africa, the increasing harmful effects of the climate become an additional factor worsening the vulnerability and compromising the efforts of reduction of poverty (Ulrichs, 2016). To mitigate the vulnerability of these countries, short and long run interventions are necessary in the agricultural system (Angeon, 2015; Angeon and *al.*, 2007).

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A study of the World Food Program (WFP) noticed that in 2010, the food insecurity affected 47.7% of the population of Niger (PAM, 2010). Retrospectively in 2005, approximately 800,000 children aged below 5 years are underfed (OMS, 2005). This situation gangrenes continuously the socio-economic stability of the country. It deserves to be taken into account in the economic policy to ensure the vital minimum for this poor population.

Niger has recorded a cereal production of 5,856,530 tons during the crop year 2016–2017, that is about 9% bigger than the level of the cereal production of the crop year 2015–2016 (FEWS-NET, 2017). The authors noticed that, acute food insecurity will be observed only in Diffa because of a fall in the pastoral production and the insecurity issues by the sect “*boko haram*”, while in other regions the food insecurity will be minimal.

To solve this problem, the Government made provisions like: free distribution of food, sales at moderated price, transfers, agricultural inputs intensification etc. But here remains an important question: can these Governmental and Non-Governmental Organizations’ (NGO) interventions act in an effective way to mitigate the food insecurity in Niger?

That leads us to raise our research question: **what are the determinants of food insecurity in Niger?**

The objective of this article is to clearly determine the mitigating and the worsening characteristics of the households’ food insecurity, based on cereals stock in Niger.

## 1. Methodology

The econometric model is estimated following Randriamiandrisoa and Ballet, (2014). The estimation will proceed into two stages, the first stage will not take into account the variations related to the individual characteristics of the households, while the second stage considers these characteristics. The addition of the individual characteristics of the households in the second stage makes possible to see the weight of these characteristics on the significance of the model.

### 1.1. Specification of the model

The econometric model can be written as follows:

Without variables of control:  $Y_i = \alpha_i + \beta X_i + \varepsilon_i, i = 1 \dots n$  and

With variables of control we have:  $Y_i = \alpha_i + \beta X_i + \theta Z_i + \varepsilon_i$

The dependent variable  $Y_i$  is the duration of months of the stock of cereals of the household, as the proxy of food cover rate of household  $i$ ,  $X_i$  is the vector of the explanatory variables of households  $i$ ,  $Z_i$  is the vector of the variables of control related to the characteristics of the household  $i$ ,  $\varepsilon_i$  the vector of terms of the error,  $\alpha_i$  the constant and  $\beta, \theta$  vectors of coefficients to be estimated.

### 1.2. Functional Form of the model

The functional form of the model is as follows:

$$Y_i = \alpha_i + \beta_1 \text{nparcel}_i + \beta_2 \text{nanimo}_i + \beta_3 \text{sup}_i + \beta_4 \text{Pcppt}_i + \beta_5 \text{vterre}_i + \beta_6 \text{vbien}_i + \beta_7 \text{activ1}_i + \beta_8 \text{activ2}_i + \beta_9 \text{vanimo}_i + \beta_{10} \text{choc}_i + \beta_{11} \text{aideta}_i + \beta_{12} \text{main\_oeuvre}_i + \beta_{13} \text{migrant}_i + \theta_1 \text{ratiodep}_i + \theta_2 \text{enf\_descol}_i + \theta_3 \text{enf\_5an}_i + \theta_4 \text{enf\_5\_10an}_i + \theta_5 \text{instruc}_i + \theta_6 \text{age}_i + \theta_7 \text{gender}_i + \varepsilon_i$$

All the variables will be explained in the next section.

## 2. Presentation of the area of study and the data

### 2.1. Area of study

Niger republic covers 1,267,000 km<sup>2</sup>. It has a Sahelian, hot and dry climate, and its current population is 20 million, of which 90% are in agriculture (INS, 2016).

### 2.2. Data

The data used in this study is that of the National survey for the Living conditions and Agriculture of the Households (ECVM/A) of 2015. The survey was conducted by the National Institute of Statistics (INS) with the technical and financial assistance from the World Bank (INS, 2016).

It contains enough variables to get sufficient information on the real-life of the population. The sample size is 9,354 households covering all the regions of the country.

Table 1 presents the variables taken into account by the study.

**Table 1: description of the variables of the model**

Variables	Type of variable	code	modality	Expected sign
Duration of the stock (in months)	Continuous	DurSto	---	
Number of Plots	Continuous	nparcel	---	+/-
Number of animals (in heads)	Continuous	nanimos	---	+/-
Area (in ha)	Continuous	sup	---	+
Production (in sacs of 25 kg)	Continuous	Pcppt	---	+
Plots sale	Dummy	vterre	0=no, 1= yes	+
Sale of assets of the household	Dummy	vbien	0=no, 1= yes	+
Main activity of the household's head (in FCFA)	Continuous	activ1	---	+
Secondary activity of the household's head (in FCFA)	Continuous	actv2	---	+
Sale of Animals (in heads)	Dummy	vanimo	0=no, 1= yes	+
Chocks by the household	Dummy	choc	0=no, 1= yes	-
Government aid to the household	Dummy	aideta	0=no, 1= yes	+
Off farm labor	Dummy	main_oeuvre	0=no, 1= yes	-
Migration	Dummy	migrant	0=no, 1= yes	+
Ratio of Dependency (number of inactive/ number of active)	Continuous	ratiodep	---	-
Non-schooled children	Dummy	enf_descol	0=no, 1= yes	+/-
Children below 5 years	Continuous	enf_5an	---	-
Children between 5 and 10 years	Continuous	enf5_10an	---	+
Education	Dummy	instruc	0=not-educated, 1=educated	+
Age of the household's head	Continuous	age	---	+
Gender of the household's head	Dummy	gender	0=woman, 1=man	+

**Source :** Authors from literature reviews.

### 3. Results and Discussion

Here we have descriptive statistics of the data, and econometric estimated results

#### 3.1. Descriptive Statistics

This part includes the descriptive statistics of the various variables of the model.

The statistics are presented in table 2 below.

**Table 2: qualitative variables statistics**

Variables	Modalities	Proportion
Plots sale	No	99.15
	Yes	0.85
Sale of assets of the household	No	98.09
	Yes	1.91
Animals sale	No	92.58
	Yes	7.42
chock	No	0.35
	Yes	99.65
Government's aid	No	32.29
	Yes	67.71
Off farm labor	No	76.77
	Yes	23.23
migration	Non	93.53
	Yes	6.47
Non-schooled children	No	99.76
	Yes	0.24
Education	Not-educated	52.72
	Educated	47.28
Gender of the household's head	Woman	10.46
	Man	89.54

**Source** : authors from the data ECVM/A 2015

Results show that the majority of the households have never sold their plots (99.15%), the assets of the household (98.09%) and the animals (92.58%) to feed the household. Moreover, an important share of households endured at least one shock (99.65%) and the majority of these households had governmental and/or NGO assistance (67.71%). To assist the household 23.23% of the sample practiced off farm labor, 6.47% migrated, and 0.24% of the households had non-schooled children. We noticed that 52.72% of surveyed have no schooling and 89.54% of the households are directed by men.

For quantitative variables, table 3 shows that the average duration of stock is 2.1 months.

**Table 3 : Statistics of quantitatives variables**

variable	mean	minimum	maximum
Duration of the stock (in months)	4.10	0	22
Number of Plots	2.21	0	85
Number of animals (in heads)	13.11	0	264
Area	4.63	0	176
Production (in bags of 25 kg)	31.45	0	100
Main activity of the household's head	52,617.63	10,000	8,000,000,000
Secondary activity of the household's head	10,150.42	0	350,000
Children below 5 years	1.36	0	13
Children between 5 and 10 years	0.41	0	5
Age	43.64	1	99

**Source** : authors from the data ECVM/A 2015

The households on average have approximately 2 plots and have on average of 13 animals. The Area cultivated by the household is on average 4.63 hectares with a production of 32 bags of 25 kg. The income resulting from the principal activity of the household is on average 52,617 FCFA. As for the secondary activity, it brings to the households an average of 10,150 FCFA. We have a maximum of 13 children below 5 years for the households, an average of 5 children between 5 and 10 years, and a maximum age of respondent of 99.

The results of table 4 show that the majority of the households whose stock of cereal stands less than 6 months are from Tahoua (23.5%) and most of households that have a stock standing higher than 6 months are from Maradi (3.8%). However, the greatest numbers of households that have borne at least a shock are from Tahoua (25.95%) and the most resilient households from Maradi (0.1%).

**Table 4: distribution of frequencies and percentages of the stock duration and shock by region**

		Regions						
		Diffa	Dosso	Maradi	Tahoua	Tillabery	Zinder	Niamey
Duration of the stock	≤ 6 months	279 (0.029)	889 (0.095)	1637 (0.175)	2191 (0.235)	1618 (0.173)	890 (0.095)	151 (0.017)
	>6 months	321 (0.035)	246 (0.026)	362 (0.038)	238 (0.025)	268 (0.028)	250 (0.027)	14 (0.002)
Choc	Yes	593 (0.063)	1130 (0.1208)	1990 (0.2128)	2427 (0.2595)	1878 (0.2007)	1139 (0.1218)	164 (0.0176)
	No	7 (0.0008)	5 (0.0006)	9 (0.0010)	2 (0.0003)	8 (0.0009)	1 (0.0001)	1 (0.0001)

Proportions of respondent in brackets

**Source :** Authors, from the estimation of data ECVN/A 2015

Agadez region is not taken into account in this study because we considered only the cereal-producing regions of Niger.

### 3.2. Econometric results

Table 5 shows that the model is globally significant at 1% level and that the exogenous variables explain the food cover rate at 10.43%.

Variables such as: number of plots, number of animals, level of production, plot sales, asset sales, secondary activity, sale of animals, shock, off farm labor, migration are significant to explain the food cover rate.

The number of own plots has a positive and significant coefficient at 5%. That means that if the number of own plots increases by a unit, the cover rate of food increases by 0.19 points. It means the more the producer has in plots, the more he produces to cover himself from food insecurity.

The number of own animals is positive and significant at 1%. It proves that those who practice animal breeding are resilient from food insecurity. This result confirms the significance of the coefficient related to the variable sale of animals. Indeed, these animal breeders manage to sell their animals to mitigate food insecurity.

The shock born by the household has a negative and significant effect at 1%. That means all the households that born at least one shock see their stock decrease. Therefore, this catastrophe acts negatively on the food cover rate. Thereafter the household becomes more vulnerable to the food insecurity.

The off-farm labor has a negatively and significant coefficient at 1%. The fact that part of the family labor leaves to be hired to assist the household, decreases the family production and thereafter the level of the stock of the household.

However, migration has a positive and significant coefficient at 1%. This result is explained by the fact that most of that diaspora transfers money home to support the family, and therefore reinforces the food cover rate of the household.

**Table 5: model without variables of control**

variable	coefficient	t-stat
nparcel	0.196**	2.53
nanimo	0.03***	23.78
sup	-0.05	-1.62
Pcppt	0.01***	12.52
vterre	0.58*	1.79
vbien	0.81***	3.59
activ1	-3.09	-1.04
actv2	8.62***	4.91
vanimo	0.47***	3.98
choc	-1.60***	-3.20
aideta	0.07	1.12
main_oeuvre	-0.19***	-2.82
migrant	0.57***	4.74
constant	-0.40	-0.46
Dependent variable =	duration of the stock of cereals	
Number of observation		9,328
F (13 ; 9,314)		83.46***
Prob> F		0.000
R-squared		0.1043

\*= significant at 10%, \*\*= significant at 5%, \*\*\* significant at 1%

**Source** : Authors, from the estimation of data ECVN/A 2015

Table 6, describes us the model with the variables of controls. In this model, variables such as the number of children aged below 5, numbers of children aged between 5 and 10, gender of the household's head significantly explain the food security cover rate. The number of children aged below 5 is negative and significant at 1% level. That means, the more number of children below 5 there are in the household, the more vulnerable to food insecurity is the household. Those children are ended only a charge for the household and can't provide it with revenue. The number of children aged between 5 and 10 has a positive and significant effect on the household food security. The more number of children between 5 and 10 the household has, the more food secure it is. That is explained by the fact that a great numbers of households use the children of this age as an additive labor

**Table 6: model with variables of control**

variable	coefficient	t-stat.
nparcel	0.26***	3.23
nanimo	0.03***	23.64
sup	-0.07**	-2.19
Pcppt	0.01***	12.49
vterre	0.50	1.52
vbien	0.80***	3.51
activ1	-3.30	-1.12
actv2	8.76***	4.93
vanimo	0.48***	4.05
choc	-1.54***	3.10
aideta	0.07	1.26
main_oeuvre	-0.18**	-2.58
migrant	0.59***	4.84
<b>Variables of control</b>		
ratio dep	0.01	0.35
enf_descol	1.01	1.62
enf_5an	-0.12***	-3.83
enf5_10an	0.21***	3.66
instruc	0.03	1.58
age	0.001	0.91
gender	0.27***	2.81
constant	-2.75*	-1.92
Dependent = duration of the stock		
Number of observation		9,226
F (20;9205)		56.42***
Prob> F		0.0000
R-squared		0.1092

\*= significant at 10%, \*\*= significant at 5%, \*\*\* significant at 1%

**Source :** Authors, from the estimation of data ECVM/A 2015

The gender of the head of the household has a positive and significant at 1% on the food cover rate. This result shows that the households directed by women are more vulnerable to the food insecurity than those directed by men. That explains the capacity of men to manage better to come across the needs of the family compared to women.

### Conclusion and Recommendations.

This study made possible to say that the households of Niger are vulnerable to food insecurity. But, in spite of this vulnerability they have means which make them able to mitigate food insecurity, which is among other things: the diversification of activity like the breeding and other activities generating income. This is why, it is necessary to support these households via these means of impact strength to reduce the level of food insecurity in Niger. But it is more necessary to support the households in the production of agricultural input as Gerber indicates it (Gerber, 2016).

The governmental policy must be focused on the reinforcements of the capacities of the households to overcome food insecurity. These policies pass through employment, assistance to the small producers and the evaluation and monitoring of these programs.

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