

# Determinants of Food Insecurity and Coping Mechanisms among Rural Farm Households: The Case of Shashogo and East Badewacho Districts, Hadiya Zone, South Nation Nationalities People Region, Ethiopia

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**Abstract:** *This study was attempted on analyzing the determinants of food insecurity and coping mechanisms among rural farm households the case of Shashogo and East Badewacho districts, Hadiya zone, south nation nationalities people's region, Ethiopia using primary data. Structured questionnaires administered through personal interviews. Both descriptive statistics and econometric methods were used to analyses the data. In this study the researchers identified that rural farm household's was basically categorized into two, food secured and food insecure households based on the amount of caloric intake. Indeed, in this study the result of Foster Greer Thorbecke (FGT) indices namely head count ratio  $P(\alpha = 0)$ , short-fall  $P(\alpha = 1)$  and severity of food insecurity  $P(\alpha = 2)$  are used to show how much the magnitude of food insecurity looks like in the study area. So, that the headcount ratio  $P(\alpha = 0)$ , short-fall  $P(\alpha = 1)$  and severity of food insecurity  $P(\alpha = 2)$ , were 56 %, 23 % and 11 %, respectively. While analysis of determinants of food insecurity was done by logit regression model, in which probability of households' being food secure were used as dependent variable. In this case years of schooling of household head, cultivated land size, off-farm activities, family size, application of chemical fertilizer, death of household head, saving and distance to the market center were found significant. The most common coping strategies households' practices to reduce food security problem is reducing number and size of meal, sales of animals to meet purchase of grain and borrowing cash or grains from others and purchasing grain were the main coping strategies. Besides this the government taking an action to reduce food security problem through providing safety net program. Overall the result of this study suggests those stakeholders and concerned bodies who focus on eradicating food insecurity, encouragement and expansion of different coping mechanisms are expected to enhance educational level of household head, to provide aids and subsidized inputs to improve agriculture which in turn increases farm income, to develop rural infrastructure, to create off-farm job opportunity, sensitizing households to develop saving habit and to take into consideration health condition of households head.*

**Keywords:** Determinants, Food insecurity, coping mechanisms, FGT, Logit, East Badewacho and Shashogo district

## 1. Introduction

### 1.1 Background

Historically, our world had suffered from different economic and non economic problems which make a difference in their economic progress. Food security is expected to be highly associated with standard of living. i.e., countries in general households in particular with better characteristics demonstrate lesser food insecurity. This economic characteristic is highly insecure in least developed countries. For instance, in Bangladesh indicators of food security (housing, electricity, present occupancy, status, etc) are only 37.9% of the whole population are accessed with electricity connection (Rushad, 2010). Associated with this, there are different countries which can alleviate those problems and move on the right direction while others still highly tied up with these problems.

From the last three consecutive decade's problem of food has become the most important issue in any discussion of development in Africa. About 50% of farming households, 30% of rural landless, 20% of urban poor are highly food insecure in Africa. To this end, there are some attempts to bring the minimum requirement food access to have a

healthy life (ECA, 1992). Even if there is an intention to focus on the development of food production in Africa, especially in sub Saharan Africa. As a result, the number of food insecure people reached about 80 million in 1970's, which surpass to a level exceeding to 10 million in 1984 (Nhane *et al.*, 2006)

Like that of most sub Saharan African countries, Ethiopia is highly suffered from challenging problems ranging from those induced by environmental crisis to those caused by demographic and socio economic constraints, which affect negatively the production system. Ethiopia has a long history of famine and near famine most recently in 2002-2003 and remains extremely poor. a combination of factors like, recurrent drought, limited source of alternative income, population pressure, limitation in technology, lack of product differentiation and market integration, limited capacity in planning and implementation, environmental degradation, limited access to credit etc remain a key constraint for seeking food security (Nhane *et al.*, 2006). Previous studies showed that the country is generally characterized by; extreme poverty, high population growth rate, severe environmental degradation, and recurrent drought (WB, 1992 and Getachew, 1995)

Hadiya administrative zone has a total area of 3850.2 km<sup>2</sup>. Topographically the zone lies with an elevation range of 1500 to 3000 meters above sea level. The slope in general declines east to west with most drainage being direct to the Gibe River. The total population of the zone is estimated about 1412347 (2007) and it has a population density of 366 inhabitants per km<sup>2</sup>. The zone has three agro-ecological Zones which include; Dega (23.7%), Woinadega (64.7%) and Kolla (11.6%). The annual average temperature of the zone is 22.02o Celsius & the mean annual rainfall is 1260 mm. With regard to land use, the largest area (57%) of the zone is intensively cultivated for annual crops, 12% is covered with tree crops, 7% is a grazing land, 6% is forest land, 16% is covered by others and the remaining 2% is cultivable land. Hadiya Zone is one of the 13 Zones of SNNPR which is highly dependent on maize, wheat, teff, and other staple food crops. Of those districts of Hadiya Zone, the study lies on Shashogo and East Badewacho districts. This is due to the fact that, the two are highly vulnerable to erratic food short fall and also exposed to flooding and shortage of rain fall. The agro-climatic zone in the study area is characterized as Kolla. In Shone district recurrent drought is very common (HZADO, 2012).

### 1.2 Statement of the Problem

Most of our country dwellers adopt different ways of financing their food security problem, but they are not still far from this suffering. The livelihood of most households were highly depend on consumption of agricultural products, but these agricultural products are not fully available in the whole part of the country especially, in the border desert area of the country, and some districts of semi-desert areas. Not only the desert area but also some of the peoples who live in part of the highland of the country don't have access to enough food for consumption. According to central statistics authority (CSA) report between 1991/92-2001/02 production year the dominant production were cereals crop productions which accounts 7.2 million tones of the total production. Despite this, the country continued by being food importer to lesser extent and collector of too much food aid.

In Ethiopia the seriousness of food shortage problem varies in different parts depending on the state of natural resource availability and extent of development (WEEB, *et al.*, 2001).

One of the prone areas is the range bared on pastoral economy of lowland Ethiopia (ranging from Wollo in Northern Ethiopia through Harerghe and Bale to Sidamo and Gamogoffa in the south). Apparently, in few districts of Hadiya Zone (Shashogo and East Badewacho), problem of food short fall and crisis has been intensified. For this reason, agricultural extension and food safety net program is implemented. Despite the measure currently taken, no study has been undergone in this area to alleviate the problem constantly and to determine the factors influencing food security status in the study area. Therefore, this paper is aimed at in charge of digging out the aforementioned impediments that hinder the front towards food security maintenance in the study area.

### 1.3 Objectives of the Study

#### General objective

The main objective of the study is to examine the determinants of rural household food security problem and coping mechanisms in the study area.

#### The specific objectives are:

- To assess major factors causing food insecurity among rural households of the study area.
- To identify the coping mechanisms of the rural household in the study area
- Assessing the severity of food insecurity in the study area

### 1.4 Research Questions

Basically, this paper tries to answer the following research questions

- Why most of the households in the study area face food security problems?
- How households can cop up from the food insecurity problem?
- What is the extent of food insecurity in the study area?
- What are the factors that determine food security in the study area?

## 2. Methodology

### 2.1 Description of the Study Area

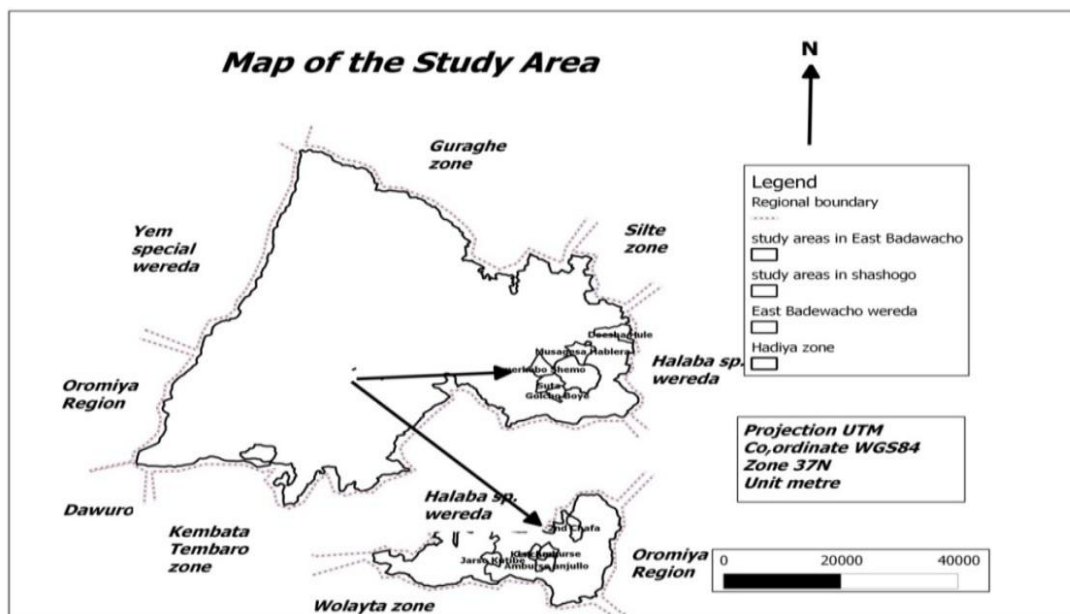


Figure 1: Map of the study Area

Source: own computation from SNNPR data, 2013

## 2.2. Sample Size and Sampling Technique

### 2.2.1 Site Selection

The two Districts (Shashogo and East Badawacho) are selected purposively. This is due to the fact that, these two districts are under the problem of food insecurity relative to other districts of the zone. Household samples were taken randomly from food in secured kebeles totaling 178 respondents.

### 2.2.2 Sample Size Determination

Numerous rules-of-thumb have been suggested for determining the minimum number of subjects required to conduct regression analyses. These rules-of-thumb are evaluated by comparing their results against those based on power analyses for tests of hypotheses of multiple and partial correlations (Green, 1991). Accordingly, in this study sample size selection is based on the rule of thumb  $N \geq 50 + 8m$ , where,  $N$ , is sample size and 'm' is the number of explanatory variables ( $X_i$ ) where  $i=1, 2, \dots, 16$ . Based on this rule the researcher will take a total sample of 178 [ $50 + (16 \times 8)$ ] respondents from the selected two district.

## 2.3 Data

### 2.3.1 Nature and Source of Data

For this study, in order to reach at a good finding and to achieve the aforementioned objectives, both primary and secondary data sources were used. Primary data were collected from the selected respondents in the study area. While, the secondary data were collected from different publications like; NBE, EEA, CSA, MOFED, ATA, EGTE, SNNPR FED.

### 2.3.2 Method of Data Collection

Before actual data collection under taken, pre-testing questionnaires were conducted in order to revise and adjust those questionnaires that can provide the required answers. Next to that, the required data were collected through farm household survey using revised structured questionnaire.

The interview was conducted by enumerators who are train on the subject matter of the questionnaire, able to understand the language and culture of the society in the study area.

### 2.3.3 Model Specification and Data Analysis

In this study Econometrics model were used to analyze the relation between the household characteristics and food security.

To access the association between food security (dependent variable) and the relative importance of independent variable, the study were used binary logit model to examine factor influencing food security.

According to Gujarati (1995) the logistic model can be specified as follows;

$$P_i = E(Y_i=1/X_i) = B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n + U_i$$

Where  $P_i$  is the probability of a person being food secure,  $X_1, X_2, X_n$  – the explanatory variable that affect food security  $B_0, B_1, B_2, B_n$ , parameters to be estimated  $U_i$  = stochastic term

Now consider the following representation

$$P_i = E(Y_i=1/X_i) = \frac{1}{1 + e^{-(B_1 + B_iX_i)}}$$

We can write this as follows 
$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^{Z_i}}{1 + e^{Z_i}}$$

where  $Z_i = B_1 + B_iX_i$

$Z_i$  ranges from  $-\infty$  to  $\infty$ ,  $P_i$  ranges from 0 to 1. If  $P_i$  is the probability of a person being food secure, the probability of being food insecure is;

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad \text{therefore, we can rewrite it}$$

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad P_i/1 - P_i \text{ is an odds ratio in favor}$$

of food secured. It is the probability of an individual being

food secured to the probability of being food insecure. Now take the natural logarithm of the above then we get;

$$Li = \ln \left( \frac{pi}{1 - pi} \right) = Zi = B_1 + B_2 x_i + U_i$$

Giving equal weight to the severity of food insecurity among all food insecure households is equivalent to assuming that  $\alpha = 1$ . Summing the numerator gives the food insecurity gap; dividing this by  $m$  expresses this figure as a ratio. This index  $p(1)$  will provide the possibility to estimate resources required to eliminate food insecurity through proper targeting. That is, the product  $(n * z * p1)$  gives the total calorie commitment required to bring the food insecure households to the given daily calorie requirement level.

Further giving weight to the severity of food insecurity among the most food insecure households is equivalent to assuming that  $\alpha > 1$ . The most common approach in poverty literature is to set  $\alpha = 2$ , yielding

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left( \frac{Z - Y_i}{z} \right)^\alpha \text{ Where, if } Y_i > Z \text{ then } Z - Y_i = 0;$$

is the cut off level of calorie used to classify a household as a food secure or not, here it is 2200Kcal/day;  $Y_i$  is the per capita intake of household  $i$ ;  $q$  is the number of food insecure households and  $n$  is the total number of sample households.

### 3. Data Analysis and Interpretation

Generally, this section is organized in the following manner: First, the general information about respondents were presented and analyzed. Second, data collected through questionnaires and interviews were analyzed concurrently. Moreover, the results of FGT and Econometric analysis were analyzed.

#### 3.1 Descriptive Analysis

##### 3.1.1 The most dominant crop production in the study area

The result of descriptive analysis on primary activity shows that about 140 (85 percent) of those surveyed are fully engaged in maize production. This is closely followed by those engaged in sorghum production 100(60 percent) the remaining engaged in other crop production constitutes 75(45.73 percent) of haricot bean, 70(42.68 percent), 60 (36.58 percent) and 34(20.73 percent) respectively. These products were not drought resistant, as the result the area is vulnerable to food insecurity problem.

##### 3.1.2 Shocks Which Face Respondents

Survey result shows that most of respondents are faced by crop falling due to variability in weather conditions which accounts 94 (27 percent) followed by famine 82 (24 percent), drought in the past and its effect 34(10 percent), illness of household head 28(9 percent), death of other families 24(8 percent) and other accounts 23(7 percent). These results respondents in different sectors of the economy face various types of problems especially it leads to food insecurity. Households in the study area may face difficulties in managing risks and disturbances/agricultural crop failure during serious food shortages.

#### 3.1.3 Coping Mechanisms

In this study the survey results further revealed that very few member of food insecure households practiced Planting drought resistant plants (Enset) which is very common in other districts of the zone the reason for this shortage as the respondents response is the fear of wild animal which ate Enset i.e. *jard* (in local name Gandadicho) and lack of experience how to plant Enset, Change planting and cropping pattern, Purchasing grains, Borrowing cash or grains from others, Sales of key productive assets, Collecting and eating wild food, Reducing number and size of meal, Sales of animals to meet purchase of grain, Receiving relief food aid, Involve in off-farm and on farm job, Sales of fire wood, Temporary migration to other area (Town), Receiving gifts and remittances and Rent out land as coping strategies.

#### 3.1.4 Foster Greer Thorbecke (FGT) result of total food insecurity

The Foster Greer Thorbecke (FGT) indices namely head count ratio  $P(\alpha = 0)$ , short-fall  $P(\alpha = 1)$  and severity of food insecurity  $P(\alpha = 2)$  are used to show how much the magnitude of food insecurity looks like in the study area.

The survey result show that the headcount ratio  $P(\alpha = 0)$ , short-fall  $P(\alpha = 1)$  and severity of food insecurity  $P(\alpha = 2)$ , were 56 %, 20 % and 11 %, respectively. This implies 56 % of the sampled households cannot meet the energy requirement recommended for subsistence. Each food insecure household needs 23 % of the daily caloric requirement to bring them up to the recommended daily caloric requirement level besides their per capita income and the relative deficiency among food insecure households is 11 %. This is nearly related with works of (Girma, 2012).

The predicted incidences of food insecurity by socio economic characteristics of respondents' show that food insecurity was high for age group greater than or equal to 46 years with food insecurity headcount index  $P(\alpha = 0)$ , short-fall index  $P(\alpha = 1)$  and severity  $P(\alpha = 2)$  of 70.41 %, 25.86 % and 12.85 %, respectively. This implies that incidence of food insecurity increased with age of household head in the study area and/or the elder head households live great deficiency than younger head households. Also, food insecurity was more severe in the large family size, in female headed household, household head without formal education, without access to off farm activities, with no access to credit and households with no participate on saving.

#### 3.2 Econometric Analysis

##### 3.2.1 Binary Logistic regression result

**Table 2:** Binary Logistic regression result

Explanatory Variables	Estimated Coefficients	Standard Error	Sig.	Odds ratio
CONSTANT	-3.719	1.614	0.021**	0.024
FAMSIZ = X1	-0.106	0.060	0.100*	0.691
SEX HHH = X2	-0.417	0.824	0.613	0.659
EDUC = X3	0.222	0.134	0.097*	1.248
AGEHH = X4	0.011	0.019	0.558	1.011
OFFI = X5	2.414	0.983	0.014**	11.180
LAND CULT = X6	0.637	0.267	0.017**	1.890



TLU = X7	-0.148	0.095	0.118*	0.862
AGRO = X8	-0.291	0.493	0.556	0.748
CRASS = X9	-0.544	0.475	0.252	0.581
ROHH = X10	2.664	2.833	0.347	14.351
DHH = X12	1.619	0.732	0.027**	5.047
FOOD AID = X13	-0.528	0.463	0.254	0.590
DTM = X14	-1.108	1.275	0.081*	0.121
APCF = X15	0.118	0.068	0.084*	1.125
SAVING = X16	3.364	1.058	0.001***	28.893
AGRPF = X17	-1.389	1.345	.302	0.249
SAMPLE SIZE = 164		-2 Log likelihood = 175.829 <sup>a</sup>		

\*\*\*, \*\*, \* are significant at 1, 5 and 10% probability level, respectively

Source: Computed from survey data, 2014

#### 4. Interpretation of Significant Variables

As expected the result of Logistic regression in this study show that, the **level of education** (years of schooling) is significant at 10% level of significance and positive correlation with the probability of being food secured. This implies as the level of education of the farmer increases, the probability of household being food secured increases. In fact, the odds ratio of education implies that if education of the household head increases by one year, the likelihood of the rural farm households being food secured increases by a factor of 1.25, *ceteris paribus*. This result is in agreement with the works of (Schwarze, 2004).

As expected, the **cultivated land owned** by the household is a significant at 5% level of significance and positive correlation with the probability of household being food secure. The results of this study suggest that rural households with more cultivated land tend to produce more agricultural product. In fact, the odds ratio of cultivated land size implies that if cultivated land size of the farmer increases by one hectare, the probability of the farmer being food secure by a factor of 0.145, *ceteris paribus*. This is consistent with works of (Shumetie, 2009 and Lanjouw, 1995).

Involvement in various **off-farm activities** is influenced by different human capital variables and development of infrastructure which affect the capacity of rural inhabitants to divert from pure farm activities. Thus, better educated individuals, especially with higher or vocational education, are more likely to choose pure different activities or a mixture of farming and off- farming, mostly because they are better qualified for formal off- farm jobs (Atamanov, 2011). Likewise, it is also interesting to find that off-farm income is found significant at 5 % level of significance and has a positive relationship with the probability of household's being food secure. This is congruent with findings of (Zerihun and Getachew, 2012).

As expected, the **distance from market** center was found negative relation with probability of household being food secure. It is significant at 10% significance level. This result implies that when we far one kilometer away from market center the probability of household food secure will decrease. Other variables holding constant in fact, the odds ratio of distance from market center implies that if one kilometer far (increases) away the likelihood of the farmer

being food secure decreases by a factor of 0.121. This is consistent with finding of (Tesfaye, 2005).

As pinpointed in various literatures, **family size** is identified as one of the important demographic factors that affect household food security status. The coefficient for family size was found to be negatively related with food security and statistically significant at 10 percent probability level. This indicates that larger household size tends to be food insecure compared to smaller family size in the study area. This finding is congruent with findings of (Girma G. 2012, Frehiwot, 2007 and Abebaw, 2003)

**Saving:** As expected, in this study the saving is positive correlation with probability of household being food secure. This implies as the household saving increases, the probability of the farmers being food secure. In fact, the odds ratio of households saving implies that if households saving increases, the likelihood of the households being food secure increases, *ceteris paribus*. It is significant at 1% significance level.

**Application of chemical fertilizer:** This variable is significant at 10% probability level. It has a positive relationship with food security in the study area. The positive relation indicates that households who have used chemical fertilizer are more likely food secure than not access to use chemical fertilizers.

**Death of household head:** in this study as expected death of household head is significant at 5% probability level. It has negative relationship with food security in the study area. The negative correlation indicates that if household head is dead the probability of family to become food insecure increase. Here, the odds ratio implies that if the household head is dead the probability of families being food secured were decreases by a factor of 5.05 *ceteris paribus*.

#### 5. Summary, Conclusions and Recommendations

##### 5.1 Summary and Conclusions

In this study researchers were attempted on identifying and analyzing the determinants of food insecurity and coping mechanisms among rural farm households the case of Shashogo and East Badewacho districts, Hadiya zone, south nation nationality of people's region, Ethiopia using primary data. Structured questionnaires administered through personal interviews. Both descriptive statistics and econometric methods were used to analyses the data. Out of the total 164 sampled households 94(58.32 %) were food insecure while the remaining 70(42.68%) were food secured. Hence, we identified that rural farm household's was basically categorized into two, food secured and food in secured based on the amount of caloric intake. So, the researchers can conclude that most sampled households in the study area were food insecure.

Indeed, in this study the result of Foster Greer Thorbecke (FGT) indices namely head count ratio P ( $\alpha = 0$ ), short-fall P ( $\alpha = 1$ ) and severity of food insecurity P ( $\alpha = 2$ ) are used to show how much the magnitude of food insecurity looks like in the study area. So, that the headcount ratio P ( $\alpha = 0$ ),

short-fall P ( $\alpha = 1$ ) and severity of food insecurity P ( $\alpha = 2$ ), were 56 %, 23 % and 11 %, respectively. This implies 56 % of the sampled households cannot meet the energy requirement recommended for subsistence. Each food insecure household needs 23 % of the daily caloric requirement to bring them up to the recommended daily caloric requirement level besides their per capita income and the relative deficiency among food insecure households is 11%.

Out of the significant variables years of schooling of household head, cultivated land size, participation on off-farm activities, application of chemical fertilizer and saving are positively and significantly determine food security of households in the study area. While variables like death of household head, distance from the market center and family size as expected negatively influence households being food secure.

The most common coping strategies households' practices to reduce food security problem is reducing number and size of meal, sales of animals to meet purchase of grain and borrowing cash or grains from others and purchasing grain were the main coping strategies.

## 5.2 Recommendations

- Enhancing the capability of farm households through education and strengthening both formal and informal education and vocational or skill training should be promoted to reduce food insecurity in the study area.
- The results of this finding suggests that household with large cultivated land size is more likely to be food secure. So, policy makers and other concerned bodies supposed to create, expand and encourage off-farm job opportunities, particularly for small landholders and rural farmers to improve food security status.
- A need for government to provide more rural roads and rehabilitate eroded ones in order to reduce the high transaction cost of buying from or selling to markets, as transaction cost reduces the returns from market sales.
- Development actors involved on population issue should encourage households having acceptable number of children through provision of especial offer such as covering schooling cost, giving training and other related incentives.
- Finally, attention should be focused at understanding and developing the rural non-farm sector in the study area to make the sector more jobs providing and rewarding as more farm households members involved in the activities but without put in danger the food basket sector of the nation to insure food security.

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