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Socioeconomic and Ecological Factors that Determine Food Security Levels of Households in Central Rift Valley of Ethiopia

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1. Introduction

Widespread poverty, food insecurity, and environmental degradation cause severe human suffering in considerable parts of the world (Pinstrup-Andersen and Pandya-Lorch, 1998). They result in instability of global, regional, and national economic and ecological conditions. In search of meeting basic needs, farmers over-exploit natural resources often driven by high population growth (Upton, 1996). This condition is of critical concern in sub-Saharan Africa where production of food for a rapidly increasing population in semi-arid agroecosystems is a massive challenge (Rockström et al., 2004)**.**

In Ethiopia where most of the farming s rainfed, it is not uncommon to observe food insecure households. Similar to most parts of Ethiopia, food security situation of households in the Central Rift Valley (CRV) region of the country is greatly influenced by the performance of rain-fed farming systems, which fluctuates with variability in rainfall. In order to improve the livelihoods of people in the area, there will be a great need to understand and improve the performance of this sector. However, the food security situation is not similar among households that nearly face similar biophysical conditions. Why this happens remains a question. Regardless of various studies undertaken to address problems individual biophysical conditions, attempts to study socioeconomic contributors are scarce. Thus, this study aimed to answer:

- Why are some farmers food-insecure, while others are food self-sufficient, when they all are facing similar natural conditions?
- What are the major coping mechanisms and/or behavioral adaptations of farmers in handling farming system uncertainties?
- What are the current strengths of the system that can be capitalized on and what are the future opportunities that can be targeted in improving rain-fed farming systems?

2. Methodology

Study area

Adami Tulu Jidokombolcha district in CRV, is located in the heart of Ethiopian CRV, Southwest of Lake Batu at altitude of 1500-2300 m a.s.l. Batu, one of the major towns in CRV, is the capital of this districs. It is located at 150 km from the capital, Addis Ababa. There are several seasonal and permanent rivers. Bulbula, the main river in the district, joins the upstream Lake Batu and

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the terminal Lake Abiyata. The population density of the district is 139 persons/km^2. Minimum and maximum annual mean temperatures are 14 and 27 0C respectively. The district is characterized by bimodal pattern of rainfall; with short rainy season running from February to April and long rainy season from June to September. However, the pattern of rainfall is usually erratic with fluctuations in the start and end of the season, in addition to the total absence of rainfall at times.

Data collection and analysis

A holistic systems analytical approach was used to make the analysis and the description of farming systems. Three food-secure and three food-insecure peasant associations (villages/parishes) were purposively selected for a survey. From each set of villages, thirty-nine households were randomly selected and interviewed about both biophysical and socioeconomic features of the rain-fed farming systems. This information was supplemented with data from repeated farm visits, discussions with selected key farmers, and other stakeholders as well as official record. The data was fed into statistical software SPSS, after which analysis of descriptive, associative (chi-square) and predictive (logit models) variables was made in relation to differences in food security situations among households**.**

3. Major results

Crop productivity in rain fed systems: From fields of Food secure and Food insecure farmers

The productivity of some crops per unit area was found to vary significantly between food-secure and food-insecure villages (Fig. 1). Farmers from food-insecure villages produce significantly less teff ($P<0.05$), wheat ($P<0.01$), and maize ($P<0.05$).

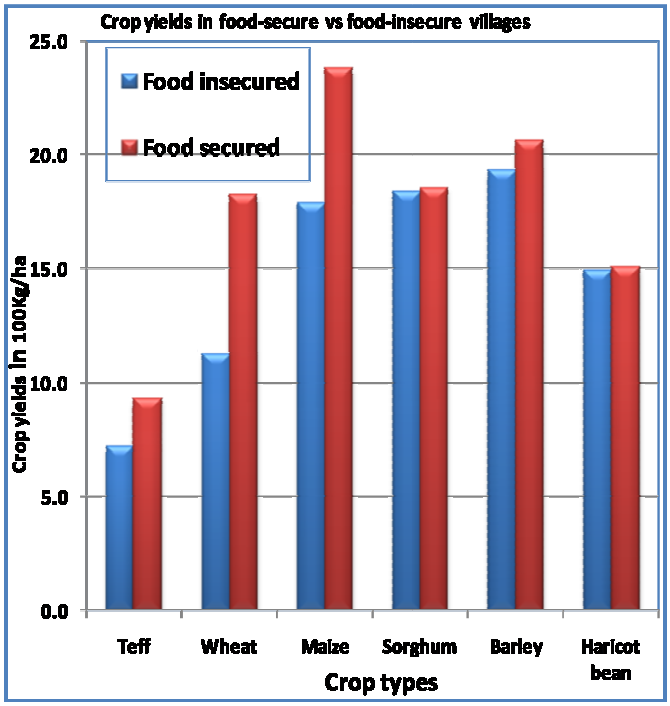

Figure 1: Productivities of the six main crops in food-secure and food-insecure villages

There were no significant productivity differences for sorghum, barley and haricot bean between the two groups of villages. Farmers from food-secure villages were found to use more commercial fertilizers as well as farmyard manure. The productivity difference for wheat, teff and maize can be explained by the fact that these crops are more responsive to fertilizer than the latter three types of crops. Since teff and wheat are the major cash crops in the area, food-insecure farmers earn less income from sale of these crops. This can in turn result in reduced economic capacity to buy productivity-enhancing inputs. In addition, since maize is the most important crop in terms of area coverage and consumption in the area, farmers who produce less of maize can face food shortages to feed their family.

Crop selling time manipulation

There is significant difference in prices of crops between food-secure and food-insecure villages (Fig. 2). Prices of teff, maize and wheat were significantly lower for food-insecure farmers as compared to food-secure farmers (P<0.01).

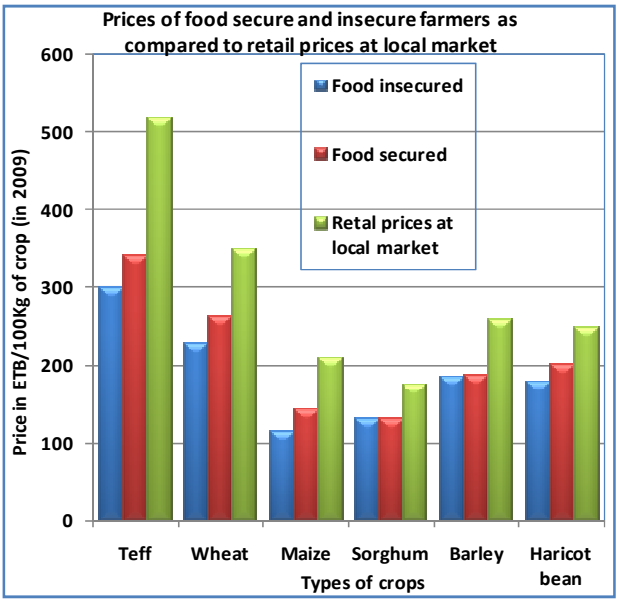

Figure 2: Prices of the six main crops in food-secure and food-insecure villages and retail prices

However, there was no significant difference in prices between the two groups of villages for barley, sorghum and haricot bean. The difference in prices results from the variation in the selling times of crops. Food-insecure farmers sell crops during harvesting time while food-secure farmers have a tendency to store and sell when crop prices rise. Since crops are the most important means of generating cash in the area, this can influence farmers' income level and their ability to invest in fertilizers and other production technologies. Under such circumstances, food-insecure farmers lack the capacity to produce more crops and they are more likely to remain food-insecure. This can result in a vicious cycle of food insecurity, limited production - the fact that they are food-insecure makes them unable to improve productivity of their farms, and limited productivity forces them to stay food-insecure. On the other hand, crop price for both food-secure and insecure farmers were significantly lower than retail price for all crop types (P<0.01).

Although, crop prices were higher at the local market during off-seasons, the largest share of the returns goes to retailers who have relatively well-developed storage and marketing mechanisms. This can worsen the problems of local farmers because they have to buy food crops for family consumption at this time. They sell most of their crops during harvest time when they have to cover fertilizer credit, schooling expenses for children and other locally common expenses. Improvement can be made about this issue. Because, a minor credit service to the farmers during this time of the season may allow them to keep their crops for latter sales at better prices, hence has a potential to improve their food security situation.

Copping strategies against crop failures/natural disasters

There is a significant difference in perception of the causes of environmental constraints between the two groups of villages. More farmers from food-secure villages were found to believe that soil erosion, continuous cropping, lack of fertilizer (P<0.01); poor soil management (P<0.001),

and untimely plowing (P<0.05) are major constraints of soil fertility. In contrast, more farmers from food-insecure villages were found to perceive that cultivation of marginal lands and removal of crop residues (P<0.01) as major concerns. Although there are differences in perception between food-secure and food-insecure farmers concerning some of the factors that constrain their livelihoods, there was no significant difference between the groups of farmers with regard to drought, poor soil fertility and shortage of agricultural land, all considered massive livelihood constraints. Diseases and pests (P<0.01), lack of improved inputs (P<0.01), seasonality of market (P<0.01), tenure uncertainty (P<0.1), poor crop storage structures (P<0.05) and insufficient capital (P<0.01) were significantly identified as major constraints by food-secure farmers. However, food-insecure farmers considered these factors less important in constraining livelihoods in the area.

The way they perceive constraints appear to have impacts on the way they design coping mechanisms against livelihood problems. More farmers from food-secure villages were found to favor migration (P<0.05), use of drought resistant varieties (P<0.01), planting of early maturing varieties (P<0.01), sale of cattle (P≤0.001), and storing crops from relatively better years (P<0.001) as major coping mechanisms against crop failures. Food-insecure farmers were found to favor food aid (P<0.001), relying on traditional system of helping each other ("hirphaa") (P<0.001), seed sources from GO's and NGO's (P<0.01) and getting credit (P<0.01) as their main coping mechanisms in the case of crop failures or other environmental shocks. This shows that food-secured farmers rely on their own mechanisms against risks while food in-secured farmers appear to rely on external helps to survive risky conditions.

4. Conclusions

Differences in biophysical and socioeconomic conditions can be, but not the only factors that create food insecurity situations. In addition, perceptions about constraints, coping mechanisms against shocks, time allocated to on-farm activities, farm management practices, allocation of production resources towards more valuable crops, and manipulation of selling time of crops were found correlated to differences in food security conditions among villages. The differences can be created by differences in households' reactions and decisions to different real world situations.

The mechanisms that farmers use to survive risky conditions can depend on how they perceive their environment, among other things. This implies aiming at solving biophysical conditions that appear responsible for food insecurity of farmers may not be sufficient to reduce food security problems. Socio-cultural issues that improve farmers' attitude can contribute a significant part to any problem-solving agenda.

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