

Food insecurity and risk management of smallholder farming systems in Ethiopia

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Abstract: *Agriculture is the economic mainstay of Ethiopia. About 80% of the Ethiopian population depends on smallholder agriculture whilst about 6 million of people are food insecure due to limited availability and access to food. Food insecurity has complex interfaces with environment, climate, economy, health, gender etc. Through the study of farming systems and livelihoods in two Ethiopian food insecure areas, a suited methodology is presented how to incorporate livelihoods into vulnerability and how to match economic and social dimensions with environmental and spatial analysis. The results show natural, market and health shocks constitute a major challenge to rural economy.*

Keywords: *Food Insecurity, Smallholder Farming Systems, Resilience Strategies of Rural Population, Ethiopian Agriculture.*

Food insecurity and vulnerability in smallholder farming systems

“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” (FAO, 1996, Paragraph 1). This definition issued by the 1996 World Food Summit incorporates all the key elements to assess status, magnitude and timing of food security, which is characterised by availability, access and utilization “at all times” of food, including the aspects related to sound nutritional status and growth, by means of dietary intake (conversion efficiency of food by the body), diversity and quality, together with health and care factors. Another definition utilised by the United States Department of Agriculture (USDA) states that “food security for a household means access by all members at all times to enough food for an active, healthy life. Food security includes at a minimum (1) the ready availability of nutritionally adequate and safe foods; and (2) an assured ability to acquire acceptable foods in socially acceptable ways” (from the USDA website quoting Andersen, 1990, p. 1560).

On the contrary, *food insecurity* is identified by situations where the conditions of food availability, food access and food utilization are not satisfied “at all times”: food insecurity is the risk that any of these three elements may be disrupted. People are food-insecure because they are exposed to various risks and they are unable to cope with the negative impacts that “hazard events” or “shocks” have on the availability of food, on the access to food or on the utilization of food (Webb and Rogers, 2003, pp. 5-8). Ranging from the condition of food security up to full-scale famines, a wide variety of situations may be covered by the concept of food insecurity: it has a time dimension, which brings for example to distinguish chronic from transitory food insecurity (Devereux, 2005) and, of course, space dimensions which are the object of spatial analyses (WFP, 2004).

Wars, political instability, natural disasters, ecological changes due to climatic variations and environmental degradation are direct causes of food insecurity for millions of people. There is also a very strong correlation between the level of food consumption and poverty. More than 900 million people are undernourished worldwide owing to their extreme poverty (FAO, 2009, pp8-28), and the number of those who may, more or less frequently, fall in situations of food insecurity because of poverty is much higher. The households who have enough financial resources to escape extreme poverty rarely suffer from chronic hunger, while the poorest households represent the population

segment who bears the highest risk during food shortages and famines. In rural areas, poor households have inadequate access to means of production, such as land, water, mechanisation, improved crop varieties, appropriate technologies and farm credit. This does not necessarily imply that poor people are vulnerable to food insecurity: one person may be poor in terms of financial income, e.g. less than 1 USD per day, but he may be secure in terms of food availability, access and utilisation, as in the case of many small farm holders mainly producing for self-consumption.

To assess the people's risk of being adversely affected by food insecurity, it is necessary to distinguish between the concepts of vulnerability, coping capacities, and resilience. The concept of *vulnerability* derives from disaster management;¹ within the context of food insecurity, it refers to the exposure of people to contingencies and stress: "...vulnerability is a function of how a particular population group's options for obtaining access to food are affected by different shocks to which they are likely to be exposed and the characteristics of those shocks with respect to magnitude, duration and timing" (Dilley and Boudreau, 2001, p. 241). More generally, vulnerability incorporates the elements of risk and coping capacity in a dynamic perspective, as "...a process of cumulative conditions which vary over time and space" (Gentilini, 2005, p. 135).

Vulnerability Analysis (VA) focuses on the trajectory of household livelihoods, food access, consumption and utilization over different seasons or subsequent cycles of relative good and bad conditions, by examining the underlying causal factors and processes. Understanding vulnerability means to use the available information to analyse the levels of food security, the type and magnitude of shocks faced by households in specific contexts, and the factors that constrain their ability to cope with those shocks. The risk factors explaining *why* people are vulnerable to food insecurity are classified as *exogenous*, when they refer to natural, social, economic shocks or other potentially harmful events, and *endogenous*, regarding the characteristics of the unit of analysis and defining the *intrinsic vulnerability* of people (WFP, 2004a).

Coping capacities are related to the means and capacity by which people counteract or absorb the adverse consequences of external shocks. The determinants of the households' coping capacities include the endowments of human and physical assets, the levels of production, income, and consumption, and the ability to diversify the sources of income and consumption for an effective mitigation of shocks. Coping capacities are closely related to *resilience* which is an attribute of persistence and sustainability allowing "... the system itself to contract and expand in response to variations in resource availability and external shocks" (Maxwell and Frankenberger, 1992).

On this basis, vulnerability is associated with exposure to shocks and depends on the inherent characteristics of a particular community or household, which cannot significantly change in the short-medium term. Resilience and coping capacities, on the other hand, refer to the ability of a community or household to recover from the negative impacts of external shocks. The risk of being adversely affected by an exogenous shock is then a function of: (1) vulnerability, associated to the inherent conditions of the community or household that is exposed to the shock; and (2) resilience, which is associated with the conditions developed to cope with external shocks (Briguglio, 2004).

Risk is the probability of harmful consequences resulting from interactions between natural or human-induced hazards and vulnerable conditions. Exposure to risk is determined by the frequency and the severity of natural and man-made hazards, as well as their socioeconomic and geographical scope. But, when resilience is high, people are more able to adapt to variations in available resources and to use different environmental and economic possibilities to stabilise their conditions (Villagran de Leon, 2006). In the context of food security, resilience is a function of livelihood and it is necessary to investigate how people provides for it and the socioeconomic and geographical aspects of this activity. The scheme of Figure 1, based on a general model proposed by Briguglio (2004), summarises the different concepts introduced to define the risk of food insecurity. The minus signs in front of

¹ In general, vulnerability involves exposure to events/shocks, sensitivity to such exposures and resilience related to adaptive measures anticipating and reducing future harm (Folk *et al.*, 2002, p. 5).

“resilience” and “coping capacity” indicate that the development of these elements reduces the risk of food insecurity.

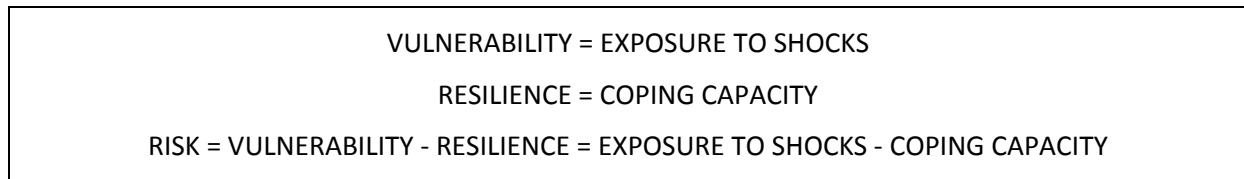


Figure 1. Understanding of the concepts introduced to define the risk of food insecurity.

Recurrent food insecurity for rural population in Ethiopia.

The annual growth rate of Ethiopia’s Gross Domestic Product (GDP) over the past years was constantly above 10%. Agriculture is the main industry of the country: it contributes to 46% of the GDP, followed by services (40%), and manufactures (13%), employs more than 80% of the population, and accounts for 94% of the export (World Bank, 2005). Nevertheless, Ethiopian agriculture suffers for high variability of production: there is a large dominance of small-scale subsistence farming affected by low use of modern inputs and technology. The high and increasing density of rural population and the consequent pressure on land cause disintegration of the land tenure systems, with fragmentation of farm holdings, environmental degradation and decline of land fertility. In rural areas there is lack of infrastructures and social services, including primary education, and possibility of employment in off-farm activities is scarce.

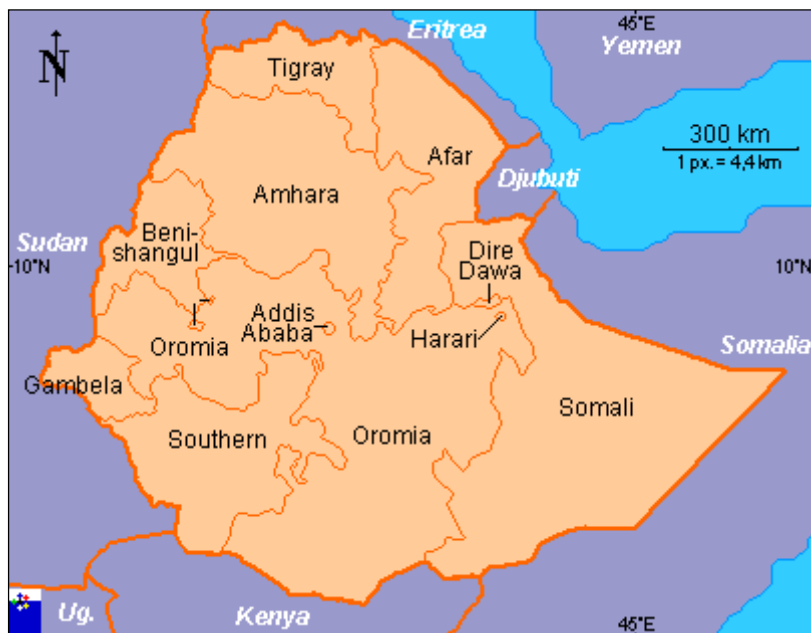


Figure 2. Administrative map of Ethiopia.

Between the 1990s and the 2000s labour productivity did not increase and scarcity of land was indicated as a major constraint for agricultural development (Benin and Pender, 2001). Despite an expansion in the grain crop area, the availability of productive land per household decreased because of farm fragmentation and losses of fertility. Consequently, food insecurity is a structural problem, which has been defined in terms of variations in the amount of food that rural households can obtain directly from subsistence farming and also from other income (Gittinger *et al.*, 1990). A large numbers of households face famine with sizeable food deficits every year and are vulnerable to minor shocks.

The history of Ethiopia knows a very long series of famines and food shortages which, for the most, took place in two wide areas of the country: the first covers the central and northern highlands, laying from northern Shewa through Wello and Tigray, the second is the area of agro-pastoral low lands from Wello in the north, through Hararghe and Bale to Sidamo and Gamo Gofa in the south (Webb and Von Braun, 1994), including the provinces analysed for this study. In the last decades, many subsequent shocks, mainly related to drought and price crises, and their cumulative effects have severely affected the patterns of options available to rural populations for obtaining food.

The link between poverty and vulnerability depends on the dimension of the risk and the assets available to cope with it. Dercon and Hoddinot (2003) show that shocks have had a persistent negative effect on economic growth in Ethiopia. In 2004, 44% of Ethiopians were living below the poverty line, GDP per capita was 141 USD in 2005, about 20% of the Sub-Saharan Africa's average (World Bank 2006). Earlier studies (Sisay Asefa, 1995) have estimated Ethiopia's food insecure people to be around 40-50 percent of the total population.

The farming systems of a food insecure area of Eastern Ethiopia.

The Woredas of Fedis and Goro Gutu are located in the East Hararghe Zone, Oromia Regional State (see Figure 2 and Figure 3). The Fedis Woreda has a population of 170,562 inhabitants with a density of 83 inhabitants per square kilometre; The Goro Gutu Woreda has 136,119 inhabitants and a population density of 256 inhabitants per square kilometre. Both the Woredas have been classified as vulnerable to food insecurity and are currently target areas of the Productive Safety Net Program (PSNP) which began in the year 2005.² The two Woredas have different agro-ecological conditions and local communities have adopted a variety of livelihood strategies over time to cope with natural and economic risks of food shortages.

The Fedis Woreda has latitude between 8°22' and 9°14' north and longitude between 42°02' and 42°19' east, in middle and low land areas: altitude range is from 500 to 2,118 metres, with a prevalence of low lands. The population's livelihood mainly consists of agriculture, husbandry and small-scale trade. The farm units are small family holdings with an average agricultural land area of less than one hectare.³

The main objective of farming activities is to satisfy households' consumption needs, although an increasing number of farmers are exerting efforts to produce more cash crops, in particular groundnuts and castor oil seeds to be sold locally. Agriculture is mainly rain-fed. The cropping system (classified as *intensive rain-fed system*) is mainly composed of cereals (sorghum, is the dominant crop and the main staple food, and maize), pulses (beans and chickpeas), oil crops (groundnuts, castor oil seeds), vegetables (onions, tomatoes, sweet potatoes, etc.), fruits (papaya, mango, etc.) and permanent crops (khat, coffee). The use of irrigation is still very limited: only few farmers irrigate their plots from small ponds and reservoirs covered with plastic sheets or concrete.

² The Productive Safety Nets Program (PSNP) aims at closing the household food gap and eliminating distress asset sales. The PSNP is part of the Ethiopian Government strategy for meeting the Poverty and Hunger Millennium Development Goals (MDG) in Ethiopia, which tries to overcome the usual emergency appeals by tackling chronic hunger with a multi-year planning of actions and resource management. The PSNP started in 2005 and currently the Government is setting the benchmarking for graduation of the programme's beneficiaries. The PSNP approach distinguishes between the "unpredictable food insecure" (those who face transitory food deficits because of erratic weather or other shocks) and "predictable food insecure" (those who face chronic food deficits, because of poverty rather than food shocks) who have been transferred from the annual emergency appeal to the PSNP. These PSNP beneficiaries receive cash or food transfers on a regular basis for a period of five years, with financial and technical support provided by a consortium of donors and other implementing agencies. These transfers are expected to be used mainly to meet immediate consumption needs and to protect household assets, though they might also be partly invested in farming and small enterprises (about the PSNP see also Gilligan *et al.*, 2008).

³ The unit measure for land areas is the *Timad*, corresponding to 0.125 hectares

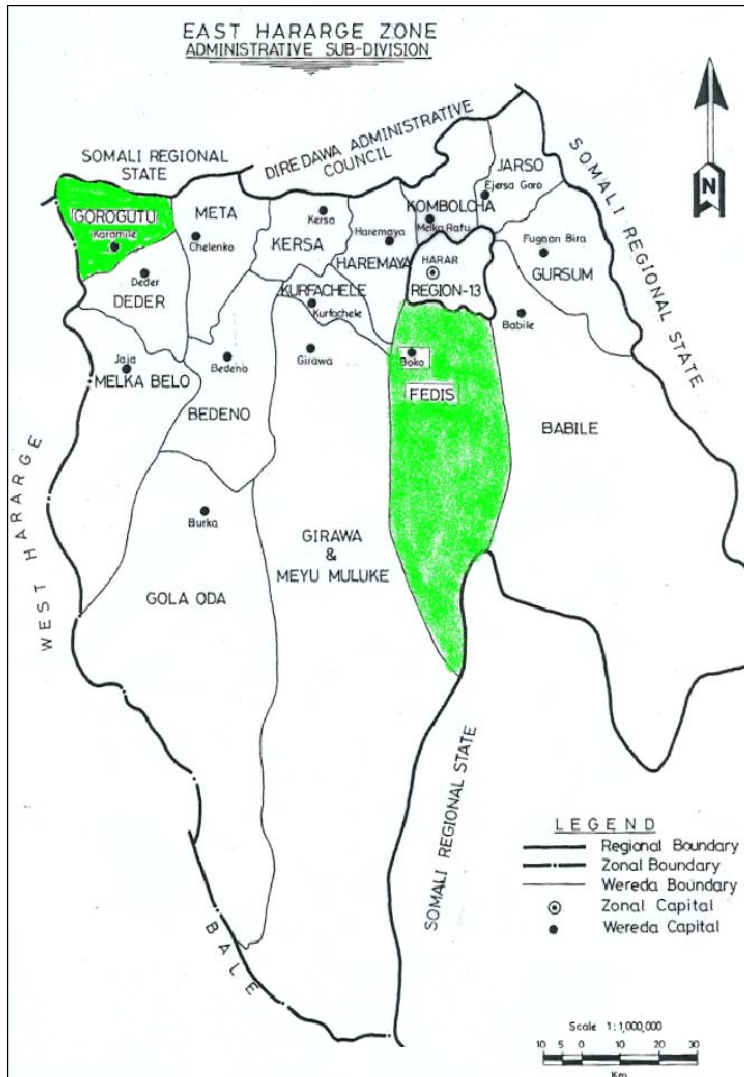


Figure 3. Administrative Map of the East Hararge Zone with the two examined regions.

As in the most of the Horn of Africa, two rainy seasons characterise the Fedis Woreda’s climate: the first, named *Belg*, is the shortest one and takes place between March and May, while the second and most important, named *Meher*, is between July and October. The rainfall distribution during the year is then bi-modal, with a dry-spell period during the months of June and July which, depending on its duration, may affect crop growth, as shown by the graph of Figure 4.

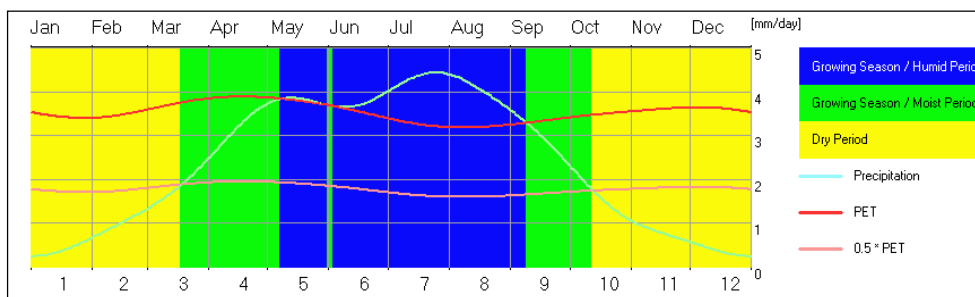


Figure 4. Rainfall distribution and potential evapotranspiration (PET) in Fedis Woreda (FAO’s Local Climate Estimator software).

The crops growing in the *belg* season are harvested between August and September. The main crop of this season is maize, in some cases, also a short-term variety of sorghum is cultivated. Onions and groundnuts may represent an important source of income for farmers, during the lean period, which

lasts from May to August-September. The *Meher* season is the most important for the intensity of farm practices and production. This season ends with the main harvest of sorghum. The production cycle of the local sorghum varieties takes about 8 months: this crop is the principal contributor to food security for farmers' households. During the lean period the risk of food insecurity becomes much higher and a majority of the rural population is under stressful conditions. The rate of undernourishment among children and women increases for the limited availability and reduced access to food and to other sources of income.

The target groups of the food security projects are the farm households mostly vulnerable to food insecurity. Through different interventions, these projects aim to reduce the chronic causes of low agricultural production and environmental degradation. In the region, there are also foreign direct investments on the production of castor oil seeds for bio-fuel processing. Many farmers are progressing in this sector and, if the current trend continues, the castor oil plant will be probably cultivated by a larger and larger number of holdings, with a remarkable change in the cropping patterns from production for self-consumption towards more market oriented farming systems.

Goro Gutu Woreda is located between latitude 9°18' and 9°53' north and between longitude 41°12' and 41°30' east. It is formed by high and mid lands, with altitude ranging between 1,200 and 2,657 metres, with prevalence of mid lands. The economic activities are similar to the ones described for Fedis Woreda, however the different agro-ecological conditions, with cultivated lands mainly located on high and mid lands, make the cropping pattern different. More cereals are cultivated, e.g. wheat, barley and oats, and there is a higher production of beans, which are considered a valuable cash crop. The rain pattern is bi-modal, with the average amount of rainfall higher than the one in Fedis Woreda, as shown in Figure 5.

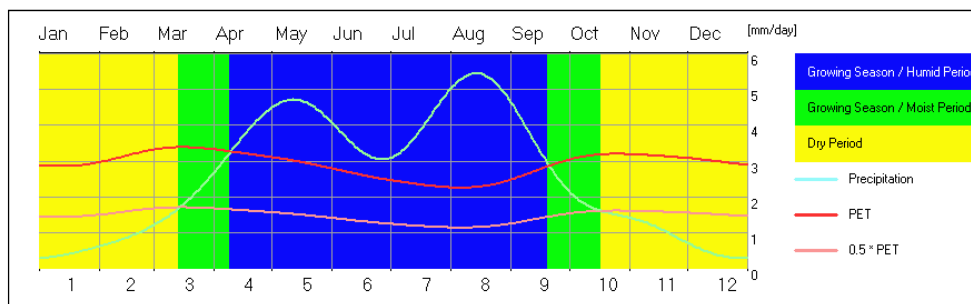


Figure 5. Rainfall distribution and potential evapotranspiration (PET) in Goro Gutu Woreda (FAO's Local Climate Estimator Software).

Also in Goro Gutu Woreda the land tenure system is characterised by high fragmentation of agricultural holdings, reflecting the intensive use of land and the big pressure of rural population. However, the cultivated area under irrigation is wider than in Fedis Woreda: many farmers have small facilities (channels from rivers, pipes from roofs, small reservoirs, etc.) to catch and store water for irrigation. These systems are very important in horticulture to offset the effects of the dry-spell period. In both Fedis and Goro Gutu Woredas, cattle is an important farm asset either for land labour and as an additional source of income: veal fattening for the local markets is a common practice in the rural areas of East Hararghe.

Farm typology (assets, land, capital, market, environment)

The Agrarian System Diagnosis (Groppo *et al.*, 1999) refers to the concept of agrarian systems defined as "a mode of exploiting the environment that is historically established and durable, a system of production forces adapted to the bio-climatic conditions of a given space and responding to the existing social needs" (Mazoyer, 1981). The household farming system is an element of the agrarian system and it can be studied as a production unit combining the different factors: labour, technology and environment.

The ASD provides the conceptual elements to classify the holdings of an analysed region on the basis of their respective farming systems, which become the reference for establishing a regional farm typology. The income generated by the different farming systems includes both the production for self-consumption and the marketed production. This income is compared to a bench-mark income acting as a reproduction threshold for the holdings of the region. (see Groppo *et al.*, 1999, pp. 27-38, and Canali, 1994, pp. 21-35). The objective is to calculate the level of income that each type of farm can obtain and verify its economic sustainability through the comparison with the threshold (bench-mark) income.

For this, it is necessary to know the structure and the production techniques used in the different types of farms, as well as all the technical and economic parameters like input consumption, yields, and prices of inputs and outputs. When all these elements are defined, it is possible to calculate the net income per working unit of the farming systems practised in the region in function of the cultivated area per working unit (see Figure 6).

$$NI / WU = (GI / WU - VC / WU) \times \text{cultivated area} - FC / WU$$

NI = Net Income
WU = Working Unit
GI = Gross Income
VC = Variable costs (e.g. seeds, fertilizers, pesticides, etc.)
FC = Fixed costs (given by annual depreciation of equipment, farm buildings, tree-crops, etc.)

Figure 6. Calculation of the net income generated by the analysed farming system.

The net income per working unit is compared with the reproduction threshold, which is assumed as the minimum annual income that could assure to the farmers of the region acceptable living conditions according to the local standards. If farmers do not attain this minimum income they may probably seek another job (as daily labour in local farming or in an urban area). The net income of the household can be combined by means of cluster methods which create typologies (or classes) of the sampled households based on the degree of similarity of conditions. The use of cluster analysis provides relevant insights into the causes of vulnerability. For instance, the analysis of coping capacities, the vulnerability index, indicators of asset holdings and productivity can be correlated to the different net income profiles per working unit of the households.

Research methodology

During 2008, a survey was conducted in seven different Peasant Associations (PAs) of Fedis Woreda and Goro Gutu Woreda. The PAs, which after the 1975 Land Reform represent the lowest level of government administration in Ethiopia, had been chosen among the areas vulnerable to food insecurity through focus group discussions with the Woredas' technical staff and other relevant stakeholders. Within the seven PAs, 28 villages were then chosen on the basis of the agro-ecological conditions (altitude, rainfall patterns, NDVI⁴, etc.), livelihood profiles, access to permanent irrigation schemes and distance from the main roads and from the main centres, in order to provide a reliable representation of the selected PAs.

The selection of the villages was conducted according to a *purposive sampling*, which took into consideration the aforementioned criteria. Within the selected villages, the sampling unit for the

⁴ The Normalized Difference Vegetation Index (NDVI) is a indicator used in remote sensing measurements to assess the presence of live green vegetation within an observed area.

nutritional survey and individual interviews was the “household”. The sampling was based on a stratification of the examined population into two groups: the first group consisted of the households which benefited either from the PSNP or from other rural development/food security programs (World Bank, Oromia Bank etc.), while the second group consisted of households which did not benefit from any programme. The sample was drawn randomly from 28 villages. It was formed by 210 households and its main characteristics can be summarised as follows:

- the sample included 5 PAs of Fedis Woreda and 2 PAs of Goro Gutu Woreda;
- 4 villages were selected in each PA, forming a total of 28 villages included in the sample;
- the number of households representing each village ranged from 4 to 10, and was not constant, because of the fact that the samples were drawn to represent the PAs rather than the villages;
- each of the 7 PAs chosen had a household sample size of 30 units, consisting of 15 beneficiary households and 15 non-beneficiary households;
- around 71 per cent of the households were from the Fedis Woreda and 29 per cent from the Goro Gutu Woreda;
- the households were mainly agro-pastoralists, including: (1) households which practise farming only; (2) households which combine farming and livestock; and (3) households which mainly rely on livestock production for their livelihoods.

The households were investigated regarding nutritional and socio-economic matters, through interviews and collection of anthropometric data of mothers and infants aged between 6 and 59 months.⁵ The socio-economic analysis focused on the following elements:

- household composition and occupation;
- assets and capitals;
- land, crop, livestock, work and market;
- farm production and costs;
- food security and aid, shocks and coping ability.

Food availability was estimated through the analysis of data on crop production, storage and exchange. Food access took into account food purchases, self-consumption of farm products, the food aid and the food for work received annually by each household. External shocks to food availability and food access were investigated together with the coping strategies adopted by households. The objective of the socio-economic survey was to obtain information on farm income (including its composition), consumption and diet composition, food security and aid levels, shock typology, coping strategies and access to basic services.

In order to obtain further relevant information and to capture contrasting points of view, in each village *focus group interviews* were conducted with a small group of people (from 6 to 10), who were familiar with the problem. Focus-group interviews were useful for eliciting a sub-village group that may not have been accessible to collect information, such as women or specific ethnic groups. Focus group interviews were also useful in those villages with substantial differences among household practices as regards, for example, natural resource management, farming techniques and production outputs, coping strategies and health practices. The challenge of focus group interviews was to facilitate conversation so that the whole group fully understood the interview objectives and all participants contributed to discussion. Household interviews were conducted in situ.

The research study also included secondary data analysis, i.e. analysis of food production trends, cultivated area, food aid, socio-economic data, rainfall trends, NDVI values). In particular NDVI and rainfall data were developed to build class profiles and set up criteria for agro-ecological zoning.

⁵ The nutritional survey was aimed to extrapolate proxies of household food consumption by following experienced methodologies (Swindale and Ohri-Vachaspati, 2005).

Main determinants of vulnerability to food insecurity and risk management of smallholder farmers

The results of the analysis reveal that recurrent drought has been depleting the already scarce resources of Fedis and Goro Gutu Woredas' people. This has made the population less and less resilient and more vulnerable also with respect to minor shocks. On the other side, the frequency and severity of drought has increased in the last decades. Between 1974 and 1994, drought took place every ten years. Then it occurred after 5 years in 1999. Since 1999, it has been happening almost yearly (East Hararghe Zone, 2009).

The main consequences of recurrent drought were severe crop failures and loss of livestock that affected people livelihoods. This made a quite large part of the population relying on external food aid for survival. The population needing food aid increased dramatically since 1996, and the number of food insecure people has become very high in both the Woredas. In 2008, the percentage of chronic food insecure population assisted by the Security Safety Net Programme in Fedis and Goro Gutu Woredas was higher than the national average (see Figure 7), while the number of seasonal (acute) food needy population had a remarkable increase in Goro Gutu because of drought (East Hararghe Zone, 2009).

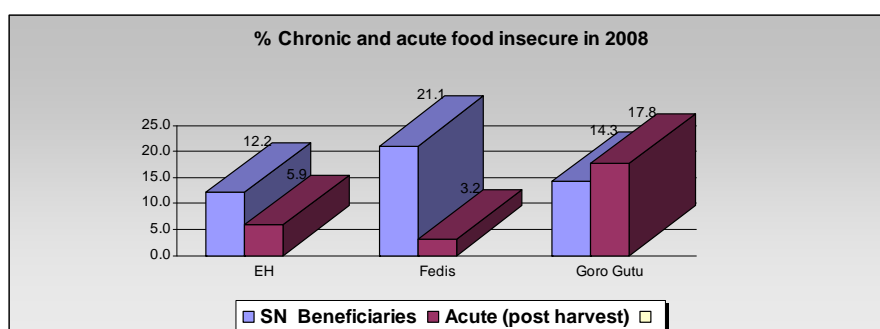


Figure 7. Percentage of chronic food-insecure population assisted by the Security Safety Net Program (SN), and percentage of the seasonal acute food needy population in Ethiopia (EH), Fedis Woreda, and Goro Gutu Woreda in year 2008 (Source, East Hararghe Zone, 2009).

People's livelihood is predominantly based on food crops and livestock production. In the analysis, food availability was examined through the variables mainly explaining the differences among the households in the number of months along the year for which sufficient food is available for all the household members. In particular, food availability resulted positively correlated with presence of male and literate household leaders, with reduced number of members, and with endowments of agricultural land, livestock, and especially cattle, and farm tools (see Table 1). Moreover it was found that the holdings best endowed of land, livestock and tools, also received more financial and technical assistance to improve crop and livestock productivity and prevent soil erosion.

Table 1. Main correlations between the characteristics of households and holdings and the availability of sufficient food along the year in the Fedis and Goro Gutu Woredas.

Variables		Correlation with food availability
Characteristics of the households	Presence of a male leader	Positive
	Presence of a literate leader	Positive
	Number of members	Negative
Endowments of the holdings	Agricultural land size	Positive
	Livestock and especially cattle	Positive
	Farm tools	Positive

Source: own elaboration

As mentioned, food insecurity is the result not only of low agricultural productivity. If people have other sources of income or have accumulated wealth, they can purchase food from the market.

However, the recurrent drought of the last decades has reduced savings and family assets and the majority of the households remains with little or no assets. In the two Woredas, the possibilities for households to obtain cash may only come from sales of crop and livestock products and from earnings of various off-farm activities. But, from the data available, it results that also these possibilities are very limited in the two areas. Thus, the population is highly food insecure because of the very low yields of agricultural production and the lack of family assets and income generating activities.

The main type of shocks which have an impact on household food security are:

1. Natural shocks that reduce production (mainly drought and pests or diseases affecting crops and livestock);
2. Market shocks that affect profits (mainly related to the increase of agricultural inputs' prices);
3. Health shocks that affect productivity (mainly illness, inability or death of male adult members of the households).

The strategies most frequently used to cope up with the negative impact of these shocks are, in order of magnitude: to reduce number of meals eaten per day; to sale livestock and reproductive small ruminants (like goats and sheep); migration of some family members; to obtain food or help from relatives; to harvest immature crops (e.g. green maize); to cut and sale abnormal amounts of firewood and charcoal. This research has shown that the farming systems of small holders in these two areas of Eastern Ethiopia are vulnerable and food insecurity is more and more recurrent, causing severe malnutrition, an increase in the prevalence and incidence of endemic diseases, and high mortality rates particularly among infants and children.

Findings and further research hypothesis

The results presented in this article, based on the data collected through a field survey carried out in 2008 in two Woredas of Eastern Ethiopia, are a first step towards an enhanced understanding on food insecurity, vulnerability, risks and different coping strategies adopted by local small farmers. The bottom line of these two food insecure situations is that there is a severe stress on the environment, e.g. trees are cut down for fuel and construction purposes, fallow periods are shortened, croplands are over ploughed, and grasslands are overgrazed.

The environmental stress is not only caused by population growth and production activities but also by drought, which is the main natural factor of vulnerability to food insecurity. In both surveyed areas, the degree of both chronic and transitory food insecurity has been increasingly due to a low agricultural productivity. The latter is related to inadequate rainfall, backward agricultural technology, decreasing soil fertility and limited access to productive inputs and to market. Further the results show that the cumulative effects of natural shocks with market and health shocks constitute a major challenge to people livelihoods. In the context of sustainable agriculture and rural development, non-farm and off-farm activities need to be stimulated.

Capacity building and improving access to micro-credit can be a tool to encourage rural non-farm development to benefit the poor. Besides, investment in diversification of livelihood activities would enable the farmers to spread the shocks and reduce vulnerability to risks. In this matter, to obtain a better understanding of risks it is necessary to develop further the analysis of the degree of vulnerability of rural livelihoods over time and space. Moreover, the relationships between risk management, coping strategies and poverty reduction should be investigated in-depth in order to assess the potential impact of risk reduction on various dimensions of rural poverty: i.e. income, food consumption, health, nutrition, etc.. This would enable to design an adequate policy to strengthen the abilities of rural communities, household and individuals to reduce vulnerability to food insecurity and, at the same time, to increase their resilience.

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