Journal of Sustainable Development in Africa (Volume 17, No.7, 2015)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

HOUSEHOLD FOOD SECURITY STATUS AND ITS DETERMINANTS IN GIRAR JARSO *WOREDA*, NORTH SHEWA ZONE OF OROMIA REGION, ETHIOPIA

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ABSTRACT

This paper deals with household food security status and its determinants in the Girar Jarso Woreda. Household survey, field observations, key informant interviews and focus group discussions were the main techniques for generating primary data. Data's were analyzed using Household Food Balance Model. Besides, mean and cross-tabulations of frequency distribution were used for analysis. Households in the study area were prone to food insecurity. The available dietary energy of study households met only 45.3% of the minimum daily allowance, 2100kcal during the study year, indicating a deficiency of 54.7%. The main factors determining household food security status were identified as household demographic factors (sex, age, educational status and family size) and access to productive resources (farmland, farm oxen, labor and farm inputs). Access to those productive asset help to understand the sustainability of household food security status. Eating less preferred foods, reducing the number of meals, purchasing foods through selling small animals/ruminants, grass, cow-dung and firewood were responded as the main coping mechanisms in the area. The study suggested the need of short-term and long-term activities from government bodies, donors and the households themselves to improve household food security status on sustainable bases.

Keywords: Household, Food security/insecurity, Coping mechanism, dietary energy, Sustainability, Girar Jarso.

INTRODUCTION

The concern of food security traced back to the world food crises of 1972-1974. The Universal Declaration of Human Right 1948 recognized individual right to get adequate food (Maxwell and Frankenberger, 1992:45). Food security as a concept emerged at the United Nations Food and Agriculture Organization, World Food Conference in 1974 considering food availability as the central argument. This indicates that, the nation could make available food either through domestic production or export to attain food security; therefore availability and price stability of basic food-stuffs could ensure food supply at the international and national level. Following this, the 1996 World Food Summit targeted to halve the number of hungry people in the world by 2015 and the Millennium Development Goals targeted to reduce the proportion of hungry people by half (FAO and WFP, 2010). The recent FAO estimates (FAO, IFAD and WFP, 2015) indicated that developing countries as a whole have almost reached the MDG, reducing the proportion of hungry people by half. However, the target set by World Food Summit, halving the number of hungry people in the world by 2015, has been missed by many countries.

The total number of food insecure and hungry people in the world was estimated as 925 million in 2010 (FAO and WFP, 2010). This figure has declined to 795 million in 2014-16 (FAO et al., 2015). Though the number of food insecure and hungry people in the world is declining, the hunger remains high and likely to persist and even increase in developing countries due to rapid population growth. Based on FAO and its associate report (2015), the majority of people suffering from hunger live in developing countries, which is put at 780 million. Among others, the number of food insecure and hungry people living in sub-Saharan Africa was estimated as 220 million in 2014-16, showing a declining trend as compared to in 2010 (239 million).

The cause of failure of sub-Saharan Africa to feed its alarmingly increasing population, by and large, is attributed to rapid population growth, unsustainable farmland management practices, recurrent drought, rising food prices, political instability, widespread epidemics, technology stagnation, continuous civil strife and conflicts (Taddesse and Belay, 2004; Degefa, 2005; FAO et al., 2015, Habyarimana, 2015). Although sub-Saharan and Eastern Africa have shown a slow progress in reducing the proportion of hunger, Ethiopia is reported to be one of the countries that have achieved the hunger reduction target in the year 2015 (FAO et al., 2015).

Nonetheless, Ethiopia faces challenging problems induced by recurrent drought, rapid population growth, land degradation and socio-economic constraints, which have adversely affected people's production system. Subsistence rain-fed agricultural production is the main source of living for more than 84% of the population in the country (MoFED, 2006; CSA, 2008). However, the agricultural sector is limited to feed its own population sufficiently (Degefa, 2002; 2005; Hussein, 2006; CSA, 2008); and hence the country faces a great trouble in its struggle sustaining agriculture and achieve household food security (Tadesse, 2001; Gebremedhin and Swinton, 2003; Bekele and Drake, 2003). Profoundly, erratic rainfall distribution has adversely affected Ethiopian agricultural production, in general and the sustainability of household food security in particular (Devereux, 2000; Mesay, 2011).

Girar Jarso *Woreda*, where this study was conducted, has low agricultural production and productivity due to various interrelated problems including erratic rainfall distribution, land degradation, poor farmland management practices and existence of poor social services. As a result, seasonal food shortage and vulnerability of the households to food insecurity, particularly in *kolla* area (ANPPCAN, 2009) is the salient feature of the *Woreda*. The livelihood means of *kolla* area are

often prone to crises as compared to *dega* and *woina-dega* areas due to its multiple ecological, economic and infrastructural problems.

Crop production and productivity in the *Woreda* have been showing a declining trend because of various production constraints including poor soil fertility, limited use of improved inputs, and high crop losses due to insect pest (such as aphids, cutworm, African boll-worm, stalk borer, army worm, sorghum chaffer) and diseases (such as rust). Similarly the potential benefits obtained from livestock production have been limited due to shortage of animal feeds, prevalence of livestock diseases and poor veterinary services (WAO, 2010).

A number of studies undertaken in different parts of Ethiopia identify numerous determinants of household food security. For instance, household education status, sex of household head, family size, family labor, health condition, farmland size, farm oxen, livestock ownership, off-farm income, farm implements, access to market, farm inputs, crop diseases and rainfall distribution are mentioned in many of the studies (Arega, 2012; Girma, 2012; Hussein and Janekarnkij, 2013; Mequanent, Birara and Tesfalem, 2013; Misgina, 2014; Shishay and Mesay, 2014). However, to the knowledge of writers of this article, factors determining the household food security status in the Girar Jarso *Woreda* have never been investigated. Therefore, this paper aims to investigating the level of household food security, its determinants and coping strategies that the food insecure households rely on in Girar Jarso *Woreda.* It attempts to answer the following research questions: 1) What is the food security status at household level; 2) What are the major factors that induce households to food insecurity? and 3) What are the coping strategies used by the households during food shortage crises?

LITERATURE REVIEW

Conceptual frameworks

Food security as a concept emerged in 1974 by considering food availability and price stability of basic food stuff as the central issue. However, the concept is broad, diversified, and dynamic due to varied geographical, social and economic set-up of the world communities, and consequently tends to understand the concept differently (Hussein, 2006).

The history of food security definitions shows that, the focus has moved from global and national perspective to household and individual level (Maxwell, 1996). In the mid-1970s, food security was conceived as adequate food supply at global and national level, though significant proportion of the population has suffered from hunger and malnutrition (Debebe, 1995). However, mere availability of food at the global level does not guarantee acquisition of food at the household and individual level (Getachew, 1995) and hunger could persist with the presence of adequate food supply at the national and international level (Maxwell, 1996).

In the early 1980s, the concept of food security attained wider attention and the unit of analysis shifted from national and global level to household and individual level. World Bank (1986:1) defined food security as: "access by all people at all times to enough food for an active and healthy life". It encompasses food availability (adequate supply of food) and food access through home production, purchase in the market, or transfer (Degefa, 2002); and also stresses an individual access at all times to enough food not just for survival, but for active participation in a society (Maxwell, 1996).

The most widely used definition of food security is the one forwarded by World Food Summit in 1996, and it goes as: "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). This definition integrates access, availability, utilization and stability of food. Furthermore, this definition implies the time dimension, i.e. long-term sustainability of food security. Sustainability of food security has been introduced as an issue of international concern through the notion of sustainable development. Sustainability in the context of rural household food security is mainly determined by long-term availability of household food production, sustainable food access, and stability of household food consumption (Berry, Dernini, Burlingame, Meybeck and Conforti, 2015). Getachew (1995:29) defines food security in the context of Ethiopian subsistence farmers as "ability to establish access to production resources such as land, livestock, agricultural inputs and family labor combined to produce food or cash". This shows that, food security at the household level is mainly determined by a household's own sustainable food production and members' ability to purchase food of the right quality (Degefa, 2005).

Food insecurity is the situation of not having enough food for all people at all times (Degefa, 2002) and occurs in a situation where the available food is not accessible due to erosion of peoples entitlement to food (Frankenberger, 1992). Food insecurity can be classified as chronic or transitory depending on the intensity of the problem, duration and strategies used to withstand the problem. Chronic food insecurity is persistent lack of household's ability either to buy or produce enough food due to lack of access to resources (Maxwell and Frankenberger, 1992). It manifests itself in the form of market failure due to recurrent drought and other calamities (Debebe, 1995). Transitory food insecurity is temporarily decline in a household's access to enough food resulting from instability in food production due to crop failure, seasonal scarcities, increased food prices, temporary illness or combination of all these factors (Maxwell and Frankenberger, 1992; Degefa, 2002).

Households adopt various behavioral and material responses to cope with during food shortage crises, notably transitory food insecurity. Maxwell (1996) classified household responses to food insecurity into two: coping strategies and adaptive strategies. Coping strategies are responses made by households to improve the declining situation of households' food security, which is unsustainable, while adaptive strategies involve a permanent change in the mix of ways in which food is required, irrespective of the year in question and it refers to long-term adjustment (Degefa, 2008). Household responses involve trade-off between and within various coping options. In other words, different households within a community stand at different points along the continuum and their response to threat varies depending on their resource endowment, access to community support and access to public intervention (Webb and Von Braun, 1994).

Theoretical frameworks

A clear understanding of the theory of food security is an essential element to better understand sustainability of household food security status and its determinants. The major theories considered in the study includes: general explanations of food insecurity, models of food insecurity and sustainable livelihood approach. The general explanation theory mainly emphasizes on the impacts of drought, flood, land degradation, inaccessibility to productive resources and population pressure on the performance of household food security status. It results in disruption of agricultural production and attributes the household to decline in food availability (Devereux, 1993; Getachew, 1995; Degefa, 2002).

Household food security situation in rural areas is whether the household can produce sufficient food from own production or sell livestock and purchase food grain of the right quality in the market place. This implies availability of enough food and the capacity of the household to acquire it determines household food security. Therefore, household food security

means the complementarities of food availability and entitlement. As a result, model of food in/security including Food Availability Decline (FAD) and Food Entitlement Decline (FED) were considered for this study. Food Availability Decline model is directed towards understanding of the main hindrances for an increased agricultural production which, in turn, would leads to decline in food availability. The central argument of the model is that, anything which disturbs food production, such as drought and flood by reducing the availability of food for extended period of time causes famine (Getachew, 1995; Vadala, 2008). Food Entitlement Decline model was developed by Sen (1981). As Sen argues the mere presence of food in the economy or in the market does not entitle a person to consume and famine could persist without aggregate availability decline. Sen profoundly believes that it is access to food that plays a crucial role in securing command over food.

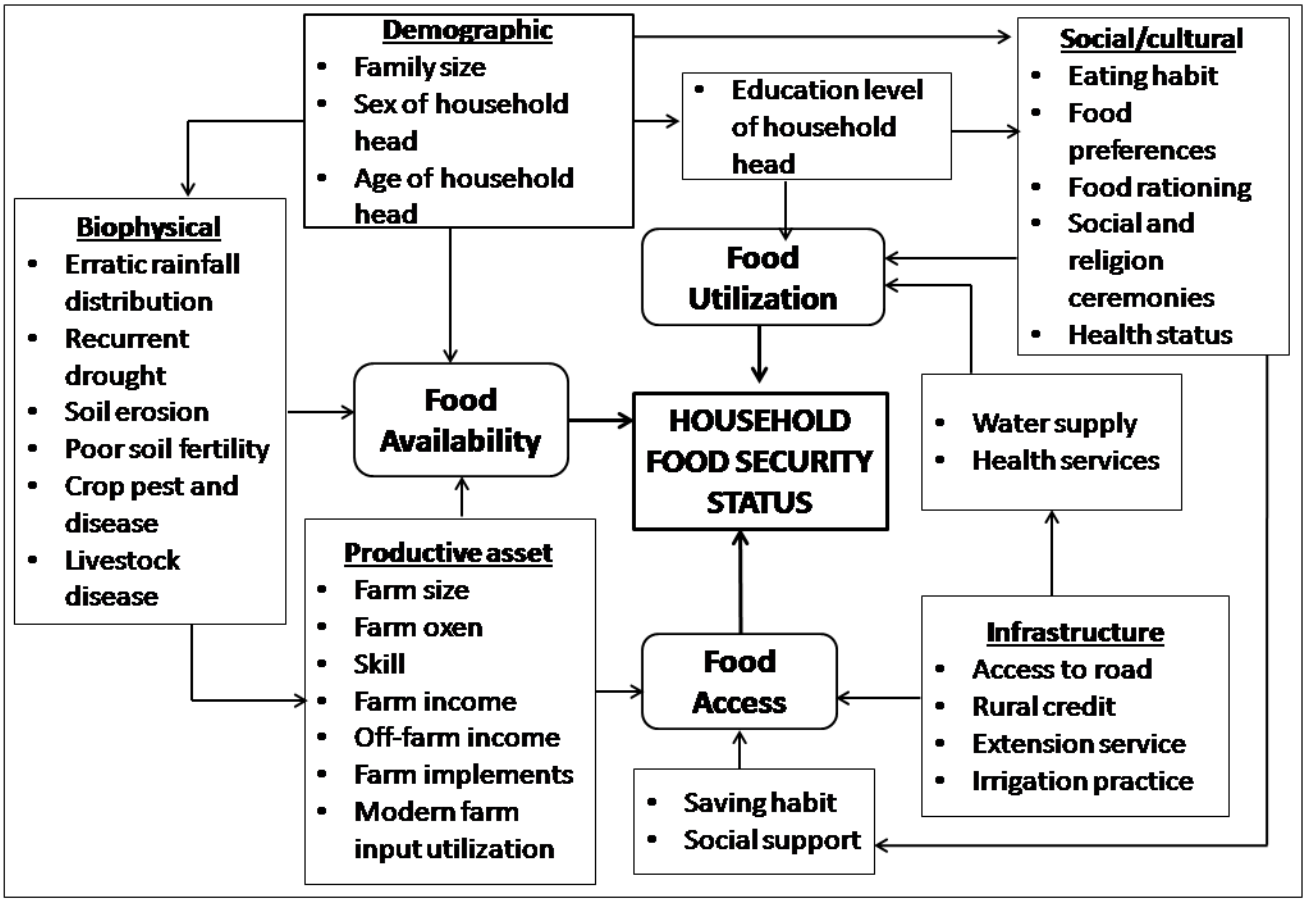
Sustainable livelihood approach enables to identify and understand a multiple of natural, cultural, social, economic, and political factors that enhance or constrain peoples living situation in general and household food security in particular; and it offers more attention and priority on human environment. It is used to understand the sustainability of the quality of life and food security of the poor and recognizes the complexity, diversity and continuous change of people's activities and their strategies over time. In addition, the approach helps to holistically addresses how context interact with various forms of assets in affecting the livelihoods and strategies that households depend on (Degefa, 2005; 2008).

An analytical framework

Sustainable livelihood framework was utilized to analyze household food security status of the study area. The framework was developed in line with the general definition of food security mentioned above: availability, food access and utilization. Within the framework, five factors determining household food security status were incorporated. These include the demographic, bio-physical, productive asset/resources, infrastructural and socio-cultural factors (Figure 1). The outcome of the study provided an understanding of whether the household in the study area are food secure or not. The linkages and interactions between household food security status and determining factors are briefly explained as follows:

i. Food availability addresses the households' adequate supply of food and is determined by the level of home production, purchase in the market or food transfer (Degefa, 2002; Aidoo, Mensah and Tuffour, 2013). Food availability can be affected by disruptions of food production due to bio-physical problems (erratic rainfall distribution, recurrent drought, soil erosion, poor soil fertility, crop pest and disease, and livestock disease), poor access to productive resources (farm size, oxen, skill, farm and off-farm income, farm implements, modern farm input utilization) and demographic factors (family size, sex and age of household) (Figure 1).
ii. Food access is the way in which households acquire available food in different forms that include home production, purchase in the market, borrowing, gifts from relatives/friends, and provisions through relief systems or food aid (Sen, 1981; Devereux, 1993; Degefa, 2002; 2008; Aidoo et al., 2013). This can be determined by household productive asset (farm size, oxen, skill, farm and off-farm income, farm implements, modern farm input utilization), socio-cultural factors (saving habit and social support) and infrastructural factors (access to road, rural credit, storage facility, extension services, irrigation practice and location of market) (Figure 1).
iii. Food utilization is the way in which people consume their food (Degefa, 2002; 2005; Aidoo et al., 2013). This can be determined by demographic factors (educational level of household), socio-cultural factors (eating habit, food preferences, food rationing, social and religious ceremonies, nutritional knowledge and health status) and infrastructural factors (water supply and health services) (Figure 1).

Figure 1: Analytical framework



Source: Authors own construction

METHODOLOGY

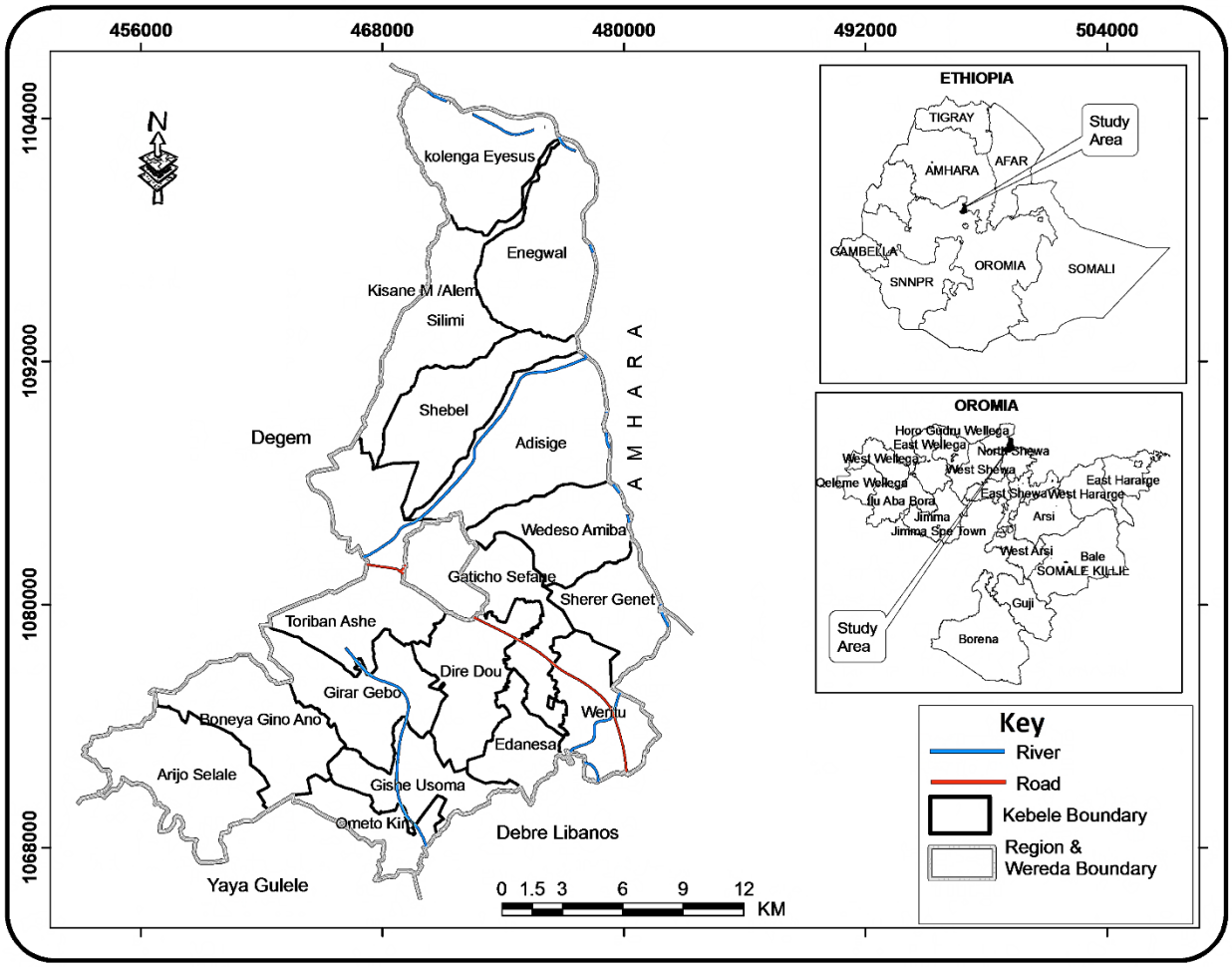
Study area

This study was undertaken in the Girar Jarso *Woreda* of North Shewa zone, Oromia region. The *Woreda* is found along the highway to Debre Markos in the North-western direction at a distance of 112 km from Addis Ababa, capital city of Ethiopia. The astronomical location of Girar Jarso *Woreda* is between 09º38'52.8"N to 10º00'10.8"N latitude and 38º34'22.8"E to 38º50'20.4"E longitude. Administratively, the *Woreda* encompasses 17 rural *kebeles* (Figure 2). The total area of the *Woreda* is about 494 km^2. More than 65% of the area is characterized by steep-slopes and a mountainous topography. Elevation ranges between 1300 and 3419 meters above sea level. Heterogeneity in altitudinal zone causes the area to follow different livelihood strategies and make use of various coping mechanism at the time of food shortage. Agro-ecologically, the *Woreda* is categorized into three: *Dega*, *Woina-Dega* and *Kolla* constituting 52%, 41% and 7% of the total area of the *Woreda*, respectively. The difference in agro-ecology causes variation in natural resource endowments, weather pattern, the type of crop grown and purpose or importance attached to the crop grown and productivity of production to vary. The total population of the *Woreda* is 67,312 with a population density of 156 persons per km^2. The number of males and females is 34,467 and 32,845, respectively (CSA, 2007). According to CSA projection, the populations of Girar Jarso *Woreda* have reached 80,080 in 2014. The number of males and females become 40,900 and 39,180, respectively (CSA, 2013). The mean minimum and maximum temperature of the *Woreda* are 11.5^{0}c and 35^{0}c

(*WFEDO, 2014*). The annual rainfall ranges between 801mm to 1200mm according to Fiche Station meteorological data (Hailemariam, 2014).

A subsistence rain-fed mixed farming (crop production and livestock raising) is the main means of living for more than 90% of the population in the *Woreda*. In addition, small-scale irrigation is practiced in some of the *kebeles* in the *Woreda*. The main soil types found in the *Woreda* are Vertisols, Nitosols and Cambisols, where Vertisols are the dominant soil types. Cereals and pulses are the major food crops grown in the area. Fruit and vegetables are widely produced in the *kolla kebeles* of the *Woreda*.

Figure 2: Map of the study area



Source: GIS data CSA 2007 and Ethio-GIS, 2004

Methods

This research study was conducted in the three rural *kebeles* of Girar Jarso *Woreda* namely Torban Ashe, Girar Geber and Woddesso Amba (Figure 2). The study areas was purposefully and carefully selected so as to represent the *Woreda* in terms of economic, socio-cultural, and physical factors like agro-ecology, accessibility to infrastructural facilities and natural resource endowment.

In order to have representative sample household, a multi-stage sampling technique was used. First, rural *kebeles* were stratified by agro-ecology (*dega*, *woina-dega*, and *kolla*) and then three rural *kebeles* (Girar Geber, Torban Ashe and Woddesso Amba, respectively) were selected i.e. one from each agro-ecological zone. Secondly, one *gott* from each *kebeles*

(Annaso-Sago from Girar Geber, Shebel- Botori from Torban Ashe, and Feres-Amba from Woddesso Amba) was selected by using purposive sampling technique in consultation with *kebele* Development Agent and *Kebele* Administrators. Third, respondent households were selected by using proportionate stratified random sampling techniques. Lastly, 100 sample households (60 male headed and 40 female headed households) were randomly selected from *kebele* administrations registration book, and were interviewed through structured survey questionnaire in 2011. Key informant interviews and focus group discussion were held to gather qualitative information. Some secondary data were obtained by reviewing documents related to household food security.

Both qualitative and quantitative techniques were used to analyze the data. Information obtained from key informant interviews, focus group discussions and field observations were analyzed qualitatively. Descriptive statistics were used to analyze quantitative survey data; and SPSS and Ms-excel were used to manage collected data.

Moreover, Household Food Balance Model (HFBM) was utilized to quantify the available food for the households and determine per capita kcal consumed per annum in the household. Conversion factor was utilized in order to convert grains available into kilocalorie. The HFBM is a modified form of the Regional Food Balance Model (Degefa, 1996; 2002). Data used for the computation were generated through field survey undertaken in the year 2011 except for the estimates given for the total seed reserve and post-harvest loss due to poor storage facilities. Mesay (2001:73) revealed that, farmers reserve 5 % of their total food produced for seed while post-harvest losses are estimated as 10 % Degefa (2002) of the total yield of a household produced. The assessment covers a period between November 2009 and November 2010. The model was given by the following mathematical expression.

$$Nij = (Cij+Pij+Bij+Fij+Rij)-(Hij+Sij+ Mij)$$

Where,

Nij - is the net food available for household i in year j

Cij - is the total crop produced by household i in year j

Pij - is total grain purchased from market by household i in year j

Bij - is the total food household i borrowed in the year j

Fij - is the total grain obtain through FFW by household i in year j

Rij - is the total relief food received by household i in year j

Hij- is post-harvest losses out of total output produced by household i in year j

Sij - is amount of grains utilized for seed by household i in year j

Mij - is total grain marketed (sold out) by household i in year j

Though the amount of calories a person needs depends on the person's sex, age, body builds, degree of physical activity, agro-ecology and the type of soil on which the crop has sown, the average values were taken into consideration to ease the analysis of the available daily dietary energy supply of households.

RESULTS AND DISCUSSIONS

Food security status of households in the Girar Jarso Woreda

Survey result showed that cereal and pulse grains are the major sources of food widely produced and used for home consumption, whereas food items such as oil seeds, fruit and vegetables and livestock products are produced, but rarely used for home consumption. As a result, cereal and pulse grains, which are commonly used for home consumption are considered as the main sources of dietary energy supply in the household, hence used to calculate dietary energy supply of the study households.

The finding of the study showed that food grains that were obtained from the households' own production covered 79.5 % of the total amount of grains available. A considerable amount of total available food grains were obtained through purchase from market (14.6 %), and receiving through relief (5.3 %). This indicates that, farmers own production was important and highly determine dietary source of energy and food availability in the year under study.

The result of the Household Food Balance Model showed that the total amount of food energy available for the households was 34,745,491 kcal, giving the average daily per capita volume of 951.9 kcal (Table 1). When compared to the Minimum Recommended Allowance for an adult, 2100 kcal, the available dietary energy was only 45.3 % of the recommended daily allowance.

Table 1: Net food source grains available for the sampled households in 2010

Food source	Net available grain for consumption (kgs)	Dietary energy of 100gm edible part (kcal)	Total dietary energy equivalent (kcal)	Contribution value to total dietary energy supply (%)
Teff	39158.75	182.38	7,141,772.83	20.6
Wheat	33486.25	196.38	6,576,029.78	18.9
Barley	23962.5	243.8	5,842,057.50	16.8
Sorghum	37142.5	177.85	6,605,793.63	19.0
Oat	12022.5	200.35	2,408,707.88	6.9
Pulses	31227.25	197.62	6,171,129.15	17.8
Total	177000		34,745,491	100

Source: Survey data by authors

Similarly, distribution of available dietary energy of the household was considered and the study found out as households incur wider gaps in the dietary energy available to them. The gap between minimum and maximum value of the available energy was wide. There were households that obtained 194 kcal of available dietary energy whereas others, indeed few in number, obtained up to 2557kcal (Table 2). Attempt was made to compare the maximum dietary energy available to a household with two neighboring *Woreda* of the same zone, Kuyu and Wuchale-Jidda *Woreda*. The study conducted by Mesay (2001:79) in Kuyu *Woreda* revealed that, the maximum dietary energy available to a household is over 3000 kcal while study conducted by Hussein (2006:109) in Wuchale-Jidda *Woreda* revealed 2560 kcal. This shows the poor available dietary energy of the household and high prevalence of food insecurity in the Girar Jarso *Woreda*.

Table 2: Distribution of dietary energy available in kilo calories (kcal) for the sampled households

Range of dietary energy (kcal)	N	Mean Dietary energy available (kcal)	Minimum Dietary energy available (kcal)	Maximum Dietary energy available (kcal)	% of MRA
<700	33	521.9	194	695	24.9
700-1399	51	971.9	700	1397	46.3
1400-2099	11	1561.91	1413	1783	74.4
exactly 2100	1	2100	2100	2100	100
>2100	4	2282.25	2151	2557	108.7
Total	100	931.9	194	2557	

Source: Survey data by authors

Based on the survey results obtained, only 5 % of the households meet the minimum recommended dietary energy, 2100 Kcal, whereas 11 % of the households obtained up to 67 % of the minimum recommended dietary energy. The remaining 84 % of the households obtained only about 33 % of the minimum recommended daily allowance. Although this may need further investigation, it is possible to infer that 84 % of the study households were food insecure. It was also attempted to look at the variation of the per capita dietary energy available for the household in agro-climatic zones. The result showed that the mean value of dietary energy of the households who live in *dega* areas were better than those in the woina-dega and *kolla* areas. Regardless of households living in *kolla* areas were expected to be the most food insecure areas, the mean value of dietary energy supply of the household who live in *kolla* areas were found in a better position than the *woina-dega* areas (Table 3). This is due the fact that households who live in *kolla* areas received relief food in the year under study. As a result, the total food available to the household has increased and hence the available per capita dietary energy.

Table 3: Distribution of mean dietary energy available by agro-ecologies

Agro-ecology	N	Total Kg	Total Kcal	Minimum	Maximum	St.dev.	Mean	% of MRA
Dega	35	66141	36437	426	2557	441.7	1041.1	49.6
Woina-dega	40	64118	34982	194	2151	479.9	874.5	41.6
Kolla	25	46741	23775	424	2161	462	951	45.3
Total	100	177000	95193	194	2557	463.4	951.9	45.3

Source: Survey data by authors

Determinants of household food security in the Girar Jarso Woreda

Food is a basic need for a mankind. Therefore, adequate quantity and quality of food for all people at household level is important, and needs to be available sustainably. This important food item shall either be produced at the household level through own production or accessed through means of purchase, gifts or transfer. Nevertheless, food access through production, purchase or transfer needs sizeable amount of assets or resources from the household (Degefa, 2005). Sustainable availability of food production and long-term acquisition of available dietary energy helps to determine sustainability of household food security. According to the survey results obtained, large proportion of food grains were obtained from own production as compared to other means of food acquisition. As a result, any factor that disrupts agricultural production has adverse impact on household food availability and dietary energy of households in the area.

Demographic factors, economic factors and productive resources have been identified as factors determining food availability and dietary supply of study households.

Demographic characteristics of the households

The main demographic characteristics determining household food availability and dietary energy of the studied households include sex, age, educational status and family size. Regarding sex of household head, an attempt was made to analyze the difference of available per capita dietary energy that existed between female-headed and male-headed households. The result shows that the mean dietary energy of households headed by male and female was 1041.4 kcal and 817.7 kcal, respectively (Table 4). Based on the results obtained, it is possible to infer that the difference in sex of household head influences household food availability.

Table 4: Sex of household head and mean dietary energy available

Sex	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddeso Amba	
Female	790.62	800.22	883.59	817.70
Male	1208	924.09	995.93	1041.42
Total	1041.05	874.54	951.00	951.93

Source: Survey data by authors

Education was thought to influence household food availability and utilization. The basic premise here was that educated households have possible advantages of increasing agricultural production and productivity by means of adopting improved technologies and farm practices which, in turn, would enhance households' food availability (Degefa, 2002; 2005; Haile, Alemu, & Kudhlande, 2005; Mequanent et al., 2013). Similarly, education influences household food utilization through production management. For instance, education affects households eating habit, food preferences, food rationing and saving habits, hence, determine food utilization and access. The mean dietary energy of household head who could read and write was relatively higher (1063.7 kcal) as compared to illiterate heads (975.2 kcal) (Table 5).

Table 5: Education level and mean dietary energy available

Education level	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
Illiterate	1081.90	422.58	944.82	975.23
Read and write	1131.13	1044.82	1091.67	1063.80
Literate	810.78	712.35	763.15	746.87
Total	1041.05	874.54	951	951.93

Source: Survey data by authors

The mean per capita dietary energy with the age of household heads was also computed. The survey showed that household headed by people with the age brackets of 30-39 and 40-49 years got available dietary energy of 794.5 kcal and 917.3 kcal, respectively. Similarly, households headed by 50-59 and 60-69 years acquired highest available dietary energy, 997.9 kcal and 1095.4 kcal respectively (Table 6). This could be due to the fact that household heads in this age group had relatively better access to livelihood asset and able to support food grains obtained from own production. However, household head >70 years acquired lower available dietary energy. This may be due to other factors such as shortage of labor and ill health.

Table 6: Age and mean dietary energy available

Age	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
<30	838.90	531.65	-	634.07
30-39	934.53	825.89	708.3	822.91
40-49	938.68	792.11	1114.22	949.03
50-59	1230.34	921.08	829.63	1038.51
60-69	1001.23	1289.22	1256.37	1167.45
70-79	1366.90	348.55	-	688
Total	1041.05	874.54	951	951.93

Source: Survey data by authors

Household size has also its own influence on food security status of households. Family size affects household food consumption with regard to the number of consumers. This is, because, large family size exerts more pressure on household food consumption and causes the available dietary energy of household to decrease. Study conducted by Degefa (2002), Hussein (2006) and Arega (2014) revealed that, household food availability declines with increase in household size. However, some household perceived that household who has large family size (children) is considered to be rich in a society and able to deploy more labor power in agricultural and non-agricultural activities. Inherently, large active household size is perceived as a source of income which, in turn, would increase household food availability. The survey result also conformed to this reality. Households with size of 10-12 got the relatively larger amount of per-capita dietary energy, 1242.4 Kcal whereas households both with 2-5 and 6-9 household size got lower per capita dietary energy, 831.2 and 1050.8, respectively (Table 7). This showed that, as the number of household size increases the availability of dietary energy increases so positively related with household available dietary energy. Hence, active family size affects the available dietary energy of a given household.

Table 7: Household size and mean dietary energy available

Household size	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
2-5	857.93	796.76	854.94	831.19
6-9	1186.75	906.70	1049.31	1050.81
10-12	1144.98	1284.13	1507	1242.42
Total	1041.05	874.54	951	951.93

Source: Survey data by authors

Economic factors

The economic status of a household has a significant role in enabling or hindering household to access or not food either through production or purchase from market. The extent to which a household earns cash income matters a lot in improving agricultural activities and improve food production. It was observed that income obtained from agricultural products such as sale of livestock and livestock products, and grain products make nearly all the bases of household income. The result showed that livestock and livestock products contribute about 34 percent of household income while sale of grain products contributes about 30 percent. However, income obtained from off-farm activities such as petty trade, credits, sale of grass, *kubet*, etc. were limited to satisfy the cash demand of household in the study area.

Various source of income alone does not give households' net income and directly contributes to household access to food. Household expenditure pattern is equally important and determines household food security status on sustainable basis. Purchase of food items takes the highest share in the expenditure pattern of households as the survey result showed. This indicates that, households in the study area spend more on food items as compared to other expenses. As a result, 31.3 percent of the total household expenditure is allocated to purchase food items for home consumption. This shows that food products obtained from farmers own production is not sufficient to cover annual food consumption for the majority of the households.

Productive resources

People require a range of productive resources/assets to achieve a positive livelihood outcomes, particularly sustainable livelihood and food security. However, no single category of productive assets on its own is sufficient to bring sustainable livelihood and household food security. The status of asset possession are considerably important in sustaining living condition and household food security (Devereux et al, 2003; Degefa, 2006; 2008). As far the living condition in the study area is dominated by subsistence small holder agriculture; access to productive resources are important to sustainably transform agricultural development and achieve sustainable household food security (Habyarimana, 2015). Similarly, Ayalneh (2012) in his study stated that achieving sustainable food security is a challenging problems for households owning limited productive resources. Therefore productive resources such as farmland, farm oxen, available labor and farm inputs, and capabilities to make resources are decisive factors determining sustainable agricultural development and household food security.

As regards to farmland, holding size and fertility status are important factors and play a significant role in influencing availability of dietary energy. The study showed that about 74% of household have owned more than 1.25 hectare of

farmland given that the majority of study households have accessed farmland through a combination of means. Several studies revealed that, landholdings in many rural parts of the country are too small for adequate food production to meet the minimum household consumption requirements. For instance, Dessalegn (1997); Mesay (2001); Degefa (2002) indicate that, more than 60 percent of the rural households cultivate less than one hectare. Likewise, a farmer holding less than 0.5 hectares is unable to meet his/her subsistence food requirements even in good rainfall years (Devereux, 2000). The mean dietary energy available computed in terms of the total size of farm land holdings showed those households who have owned large farm size have gained higher dietary energy than who owned small farmland. For instance, the mean dietary energy supply of household holding farm land between 4.25 and 5 hectare is 2150.9 Kcal, whereas household who owned farm land between 0.25 and 1 hectare obtained 730.08 Kcal (Table 8).

Table 8: Farm land holding and mean dietary energy available

Farm land holding	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
0.25-1	889.8	512.97	878.98	730.08
1.25-2	968.76	818.72	719.86	861.44
2.25-3	1206.46	994.63	1131.52	1107.57
3.25-4	2260.4	1918.25	1687.9	1946.2
4.25-5	-	2150.9	-	2150.9
Total	1051.09	874.54	971.50	959.54

Source: Survey data by authors

With regard to farmland productivity, only 3% of study households have owned fertile farmland during the year under study. Besides, 72%, and 25% of the study household reported that they owned farmland with medium and poor productivity, respectively. Poor soil fertility reduces food production while fertile land results in greater food production and provides adequate food availability. The survey result showed that, household with poor soil fertility gained available dietary energy of 731.6 kcal while with moderate soil fertility obtained 1463.5 kcal. Besides, the mean dietary energy of farmers who have owned fertile farmland was 2322 kcal (Table 9). This indicates fertile farm land enable households to produce higher agricultural production and increased their available dietary energy.

Table 9: Soil fertility status and mean dietary energy available

Age	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
Poor	837.88	637.74	741.04	731.58
Moderate	1351.31	1433.62	1662.87	1463.50
Good/fertile	2408.80	2150.90	-	2322.83
Total	1051.09	874.54	971.50	959.54

Source: Survey data by authors

Having sufficient draught power obtained from farm oxen highly determines the production capacity of households in traditional agriculture of Ethiopia. The study indicated that, 68 % of household have access to farm oxen while 32% have not. Among farmers who have farm oxen, 42% owned a pair of oxen and hence able to cultivate their farmland without requiring external support of draught power. 11% of respondents owned one ox so that, ploughing for these household was

possible by pairing with other households on the basis of borrowing and/or *qixira*, a system of oxen use arrangement in which households who lacked farm oxen rent an ox or more to use its draught power. The rest 15% of the household owned more than two farm oxen in the year under study. The survey result has shown a wider gap between available dietary energy of households' that possess one ox and four farm oxen. Households that owned one ox gained the mean dietary energy of 827.71 kcal while households who owned four oxen have gained up to 1623.61 kcal (Table 10).

Table 10: Number of farm oxen and mean dietary energy available

Farm oxen	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
No	832.46	578.60	652.80	686.73
One	774.87	658.25	1036.80	827.71
Two	1069.50	955.39	931.41	991.58
Three	1311.53	1342.90	1569.15	1387.70
Four	1659.33	1612.20	1581.45	1623.61
Total	1041.05	874.54	951	951.93

Source: Survey data by authors

Any farm input that augments agricultural productivity is expected to boost the overall production and hence contributes towards attaining household food security (Brown, 2004; Workneh, 2004). Literatures on the role of fertilizers in agricultural productivity found that, fertilization of farmland can boost agricultural production and influences household food security status (Haile et al., 2005). Devereux (2000) stated that rural household food security can only be achieved by increasing food production per farm plots. Therefore, access and use of agricultural inputs such as fertilizer and improved seeds are indispensable. The result indicated that 93 % of households were used improved farm inputs in the year under study. Accordingly, 31 % of households used fertilizers, improved seeds and herbicides together, while 26 % utilized fertilizers and herbicide only. Similarly, 16 % of respondents applied fertilizers alone on their farmlands. The types of input utilized is directly related to household food availability and determine dietary energy of the households. The result showed that, available dietary energy of household who use only improved seeds and fertilizer are 901.8 kcal. This may not be due to limited role of these inputs to enhance farm production and increase available dietary energy but, due to inappropriate utilization of inputs among households. Besides, the use of fertilizer, improved seeds and herbicides in combination, according to the results obtained, helps to increase crop production hence resulted in higher dietary energy, 1064.08 kcal (Table 11).

Table 11: Types of farm inputs utilized and mean dietary energy available

Types of farm inputs	*Kebeles*			Total
	Girar Geber	Torban Ashe	Woddesso Amba	
Fertilizer only	1161.98	723.87	1092.02	936.70
Fertilizer and improved seeds only	1100.40	911.45	744.95	901.85
Fertilizer and herbicides only	860.62	1216.93	1057.82	990.08
Fertilizer, improved seeds and herbicides	1216.86	893.94	1066.69	1064.08
Fertilizer, improved seed, herbicides and pesticides	1030.43	-	424.30	878.90
Total	1051.09	905.71	1009.38	982.27

Source: Survey data by authors

Access to farm labor plays a crucial role in Ethiopian agriculture. Households with better access to family labor have better available food than with limited family labor (Tesfaye, 2003). Poor health status, nutrition and inadequate sanitations facilities are important factors determining availability and utilization of family labor and adversely affect household food security status (Degefa, 2005). The reason is noticeable; health status affects individual household participation in any agricultural and non-agricultural activities. Demographic characteristics of the respondents indicated that 97% were economically active with regard to the labor availability and able to work on their farm activities and improve household food security status and dietary energy supply.

Household coping strategies to food shortage

Food insecure household in the study area develops their own coping mechanism to seasonal food shortage. Study conducted by Arega (2014) shows that, households respond to seasonal food shortage based on resources they owned. Coping strategies adopted by the households in the study area were intended to increase household food availability through production, purchasing and reducing household consumption. For instance, changing cropping pattern, which implies growing drought tolerant crops, were adopted to increase crop production, hence improve food availability. Similarly, income generating ventures such as selling grass and firewood, sell-off small animals, borrowing cash from private money lenders, migrating to nearby town for casual laborers, engaging in petty trade, sell off farm oxen and leasing out farm land were used to earn cash income helps to purchase food from markets. Furthermore, reducing consumption during each meal, reducing the number of meals per day, eating less preferred food such as maize, sorghum particularly a variety called "Mariam Zer ", vetch, cabbage, etc., and skipping meals for adults to feed children were used to reduce household consumption.

Among these coping mechanisms, changing cropping pattern and selling small animals were practiced by the largest proportion of study households, which was 98 % and 84 %, respectively. Nevertheless, migrating to nearby town, sell off farm oxen and leasing out farmland was practiced by small proportion, 6 %, 16 % and 18 %, respectively.

CONCLUDING REMARKS

The central theme of this study was to investigate household food security status and its determinants in Girar Jarso *Woreda*. The study revealed that the status of household food security is determined mainly by access to productive resources/asset

that is required to produce and generate income. Availability of productive resources such as adequate fertile land, grazing land, farm oxen, the number and type of livestock owned, access to off-farm sources of income significantly determine the household food security. This implies that, households that have no adequate amount of these resources might not have the means and ability to produce enough food/or to generate adequate income on sustainable basis. Food security requires sustainability of available food production and consumption by individual members in the household. It has been pointed out in the discussions that, a great proportion of the households in the study area are food insecure due to poor access to resources to produce and purchase adequate amount of food grains. It is concluded that, households who do not have the capacity to command adequate amount of productive resources and/or who have no options to generate income are severely food insecure. It is needless to mention that, shortage of farmland associated with large family size exerted more pressure on the available resources. Contrary to this argument, the study found out that household with large family size obtained higher available dietary energy than those with small family size. It was observed that availability of a relatively large labor force, regardless of family size, has an advantage to those households that struggled to achieve household food security. This is the fact that excess labor force is able to engage in other income generating ventures such as casual wage labor and petty trades. For instance, children have obtained income through the so called *kira*, which is a system of casual wage labor arrangement in which individuals work for the better income sources. As a result, large family size is able to diversify source of income and considered as a source of power of households to access available food either through production or purchase.

It was also observed in the discussion that households attempt to cope with seasonal food shortage. The main coping mechanisms were to increase household food availability through production, purchase of food items and the reduction of household food consumption. Households increased household food availability by changing cropping pattern while income generating was used to purchase food in the market. Likewise, reducing consumption during each meal, reducing number of meal and eating less preferred foods were used to reduce household food consumption thereby increased household food availability.

In general, the root causes of food shortage in the area were related to entitlement failure resulting from poor endowment of livelihood asset of the household. Thus, we have suggested the following as ways to improve household food security in the light of sustainable agriculture and rural development. First, it is important to sustain agricultural production and productivity through introducing high yielding improved crop varieties, improving method of cultivation, and using continued soil and water conservation measures. Second, there is a need to promote small-scale communal irrigation scheme and improving the livestock production. Third, ways should be sought to increase employment in off-farm and non-farm activities, which would help to diversify sources of income..

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