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Determinants of Rural Female-headed Households' Food Security in Ambo District, West Shewa Zone, Oromia Regional State, Ethiopia

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Abstract

Food security strategy is the major component of the Agricultural Development Led Industry (ADLI) strategy of Ethiopia. So far, no systematic study has been undertaken on food security status of female-headed household in Ambo district. Thus, identifying the determining factors of female-headed households` food security is crucial for pertinent interventions. Accordingly, this study was carried out to identify factors influencing food security of female-headed households. To achieve the objective of the study, cross sectional survey was employed using 104 female-headed households. Structured household survey questionnaire, focus group discussions and key informant interviews were used for data collection, and analyzed using descriptive statistics and binary logistic regression model. The result of binary logistic regression model revealed that age of household head, productive labor force, access to credit, number of oxen owned, use of chemical fertilizer, location of the household, share cropping, livestock holding, participation in social organization and non-farm income were found to be positively and significantly influencing the status of female-headed household food security. The study further indicated that the mean value of the energy available for food insecure and secure households was 1,843 Kcal/AE/day and 2,943 Kcal/AE/day respectively with the mean energy intake of all sample households 2,560 kcal. As female-headed household spent much of what they have for food than male-headed households, female-headed households are engaged in insecure livelihood system. Thus, it necessitates to improve female-headed household`s decision making power, resource allocation and control, access to markets, and asset ownership issues, which is likely to be a more powerful tool for poverty alleviation policies.

Keywords: Agricultural development, female headed household, food security

Introduction

Female-headed households have been largely considered a vulnerable and at risk of poverty group both among academic and policy making sphere (Mossa, 2013). In Ethiopia, the dimensions, determinants, and consequences of food security problems differ widely within the country. The Oromia region of Ethiopia is one of the most affected by recurrent drought and food security problems especially pastoral and rural women (USAID, 2011). To reverse the dire food insecurity situation of small holder rural farmers, the Ethiopian government formulated a long-term strategy "the Agricultural Development-Led Industrialization strategy (ADLI)" which takes agriculture as its point of departure

and as the engine of growth (Alemu *et al.*, 2002). The food security strategy is one of the major components of the Agricultural Development-Led Industry (ADLI) policy of Ethiopia government. The first version of the food security strategy was issued in 1996 and was revised in 2002 and 2005, highlighting the government's plan to address causal and the effects of the food security problem in the country. The strategy envisaged developing an agricultural-based economy by raising the production and income of farmers.

Given the enormous role played by women, their quick and easy access to information is important for the achievement of household food security. It is noteworthy that many programs with good intentions; especially in developing countries like Ethiopia often overlook women's needs to access food security information. This is mainly due to researchers, policy-makers and planners lack of adequate data, information awareness and methodologies to address them (USAID, 2011). There are many challenges on women in general and to female-headed households in particular in playing a more active role in food security than when compared to male-headed households.

The term household-head is contextual and has different meanings to different people. Despite its wide usage and acceptance as a well-being proxy, the "self-reported" head definition has started to increasingly generate debate regarding what this variable is actually measuring (Ramaprasad, 2009). Demographic, cultural and economic changes have transformed the traditional household head notion, and in particular the female headship concept. Commonly, female headship has been linked to unfavorable circumstances, such as family dissolutions, single parenthood facing socio-cultural constraints (Whitehead, 2003; Addis, 2001).

Utmost different poverty reduction policy and rural development strategy program had targeted these consensually considered "dis-advantaged" households. In Ethiopia however, recent investigations evidence large variability within this group (Devereux *et al.*, 2008 and Tizita, 2013). It is also noticed that, important demographic and cultural changes are affecting the typical household structure and its intra-household allocation dynamics (Chant, 2003; Little, *et. al.*, 2006). A substantial body of literature now exists to show that men and women experience food security differently (Ramaprasad, 2009; Henri-Ukoha, *et al.*, 2013; Tizita, 2013). But what is less clear, is disparity within female-headed households using different parameters.

In Ethiopia in spite of the growth in the numbers and the enormous responsibilities placed on female-headed households, they lack access to sufficient resources to effectively nurture their families and manage

households (IFAD, 2010). It is also well-documented that female-headed households almost everywhere are disadvantaged relative to male-headed households in their access to assets, credit, employment, and education (Little, *et. al*., 2006; Henri-Ukoha, *et al*., 2013). This leaves female-headed households in a perpetual cycle of poverty, barely satisfying basic needs of their members (Chant, 2007; IFAD, 2010). Consequently, it is often suspected that female-headed households are poorer and food insecure than male-headed households. The factors responsible for the 'feminization of poverty' have been linked variously with gender disparities in rights, entitlements and capabilities, feminization of labor, and the erosion of kin-based support networks and so on (Farnworth and Tamene 2010; MoFED 2010; IFAD 2010). The consequences of household food insecurity are as many as its causes which require different responses. In the light of these facts, this study therefore was conducted to identify factors influencing the food security of female-headed households

Materials and Methods

Descriptions of the Study Area

Ambo District is located in central part of Ethiopia and lies within altitude 1380 to 3300 masl and characterized by a rugged and undulating topography. Agro-climatically, the district is divided in to, highland, mid-highland and low land which account 35%, 50 % and 5% respectively. The rain fail in the area is bi-modal and erratic distribution with short rainy season from March to April followed by long rainy season from June to August and the mean annual rainfall of the areas is ranges from 1300-1700mm (CSA, 2010). The mean annual range of temperature ranges from 23-28 0c having average temperature of 22oc. The total household population of the district is 20518, which comprises of 16322 male-headed and 4196 female-headed households. The major economic activities are agriculture in which 90% of labor forces are engaged in it. Mixed agriculture which are characterized by crop production and livestock husbandry, is predominant economic activity and the major source of livelihood in the study area. Crop production is mostly dependent on rain-fed and major crops produced in the area wheat, barley, beans, maize, teff, sorghum, Enset, pea cheese and some vegetables and fruits were also grown mainly in highland area of the district (CSA, 2013). Livestock husbandry is one of the important livelihood resources particularly in the lowland areas of the district. Cattle, goats, sheep, donkey, and poultry are among the major type of livestock reared in the study area.

Sample population and Sampling techniques

Ambo district was purposively selected. The district was stratified in

to three agro ecological zones (highland, 12 kebeles , midland, 17 kebeles and low land 5 kebeles) with a total of 34 kebeles. Probability Proportional to Size (PPS) across the strata was used to include proportionate number of kebeles in the study. Then, using simple random sampling technique 6 kebeles were identified for the study (3 kebeles from midland, 2 kebele from highland and 1 kebele from low land). The kebeles are Ilamu Goromit and ya'i chabo from highland, Amaro, Bayo Korbi and Ilamu Jalina from mid highland and Galan wadessa from low land. The sample size of each kebele was determined using probability proportional to size procedure. According to Storck et al. (1991), the size of the sample depends on the available fund, time and other reasons and not necessarily on the total population. Accordingly, 104 respondents were selected through simple random sampling techniques.

Sources and types of data

The study used both primary and secondary data sources. Primary data were collected from female-headed households. Secondary data were also sourced from research reports, annual reports, journal and proceedings. Both qualitative and quantitative data types were used to address the objectives of the study.

Method of data collection

The study adapts a comprehensive research approach combining quantitative and qualitative methods. The study employed a multi-methodological set up and primary data collected from respondents. Structured household survey questionnaire were designed and pre-tested for quantitative data collection. For qualitative data collection, the study used focus group discussions and key informant interviews and then transcribed, interpreted, and analyzed and presented accordingly.

Data analysis

The binary logistic regression model and descriptive statistics such as t-test, percentage, frequency and chi-square were employed for quantitative data.

During logistic regression, the dependent variables were stratified into food secure and insecure using the recall method. Thus, the enumerator interviewed each household member regarding the food they consumed in the previous 24-hour period. This covered the type of food consumed, the amount consumed, food eaten as snacks and meals outside the household. Calorie availability showed the amount of calories consumed by a person a day. This indicator is useful when price information is unavailable by plotting expenditure per capita or per adult-equivalent against food consumption (in calories per person per day) to determine expenditure level at which a household acquires enough food (Haughton and Khandker 2009). In this study, per adult-equivalent scale is used to consider the composition of each family such as gender and age (Lewbel 1989, 2006; Claro *et al*., 2010; Jorgenson and Slesnick, 2012). Hence, the collected data on quantities of

food were expressed in terms of their caloric content, using factors that convert quantities of edible portions into calories. A seven day food consumption recall method was used and the estimated quantities of every food item consumed by the household in the 7-day period were calculated. Following Shimalis *et al.,* (2011), food security was measured in three steps. First, the food supply at a household level was determined using a food balance sheet for each sampled household. Secondly, the food supply at the household level was used to calculate the calories available per kilogram per adult equivalent (AE) per day for each household, taking into account the age and sex of household members. Thirdly, following Federal Democratic Republic of Ethiopia [FDRE] (2001) classification, households that attain 2,100 kilo calorie per AE per day were considered as food secure, and those with a lower amount were categorized as food insecure.

As the dependent variable has a dichotomous nature (food secure or insecure households), a binary logistic regression model was used where the estimated probabilities lie between logical limit 0 and 1 (Gujarati, 1995). Food security as a dependent variable, thus, assumes the value of Y= 1 if a household is food secure and 0 when it is the reverse. After checking for multicollinearity among the continuous variables (Variance Inflation Factors (VIF)) and the associations (computing contingency coefficient) among discrete variables, the regression model was estimated. Based on Gujarati (1995), the functional form of logistic regression model is specified as follows:

Pi = $\epsilon(\gamma = 1)$ | Xi= 1 1+e $-(\beta$ 0+β 1X $i)$ (1) taking $\beta 1 + \beta 2Xi$ to be zi and the equation becomes $Prob\ foodsecure$ = 1 1+e $-zi$ = e zi 1+e zi (2) Where zi = $\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \cdots \beta n\ Xn$,(3) Which implies a linear combination of correlates, Xi with i ranging from 1 to n and the βi (i= 0 to n) represents the coefficients for the correlates. The value of zi ranges from$-\infty to+\infty$ and therefore, Pi ranges between 0 and 1. Given that Pi is the probability of being food secure then 1-Pi becomes the probability of being food insecure.

The variables of the study were hypothesized as follows;

Age of household head, continuous variable (+)
Family size, continuous variable (-)
Dependency ratio, continuous variable (-)
Productive labor force, continuous variable (+)
Irrigation availability, dummy variable (+)
Social participation, dummy variable (+)
Location of household, (discrete variable (-/+)
Farm Size, continuous variable (+)
Livestock ownership, continuous variable (+)
Number of oxen owned, continuous variable (+)
Educational status of household head, dummy variable (+)
Use of agro chemical, dummy variable (+)
Use of chemical fertilizer, dummy variable (+)
Use of improved seed, dummy variable (+)
Access to credit, dummy variable (+)
Share cropping, dummy variable (-)
Access to extension services, (dummy variable (+)
Non-farm income, continuous variable (+)

Results and Discussion

Food security status of the study area

The amount of energy available for the household was compared with the minimum subsistence requirement per Adult Equivalent, AE per day (i.e. 2,100 kcal). Accordingly, the percentages of food insecure and secure female-headed households were found to be 13.5 and 86.5 % respectively. The study indicated that the mean value of the energy available for food insecure and secure households was 1,843 Kcal/AE/day and 2,943 Kcal/AE/day respectively. The mean energy intake of all sample households was 2,560 kcal. The t-value confirmed that there is a significant mean difference between food insecure and secure households at $P<0.01$ (Table 1).

The result showed that there was significant mean difference between food secure and insecure female-headed households with respect to age, dependency ratio, landholding, productive labor force and total family size (Table 2). Similarly, a chi-square test for the discrete choice variables indicated that greater proportion of food secure female-headed households were literate, used fertilizer, chemical, irrigation, improved seeds, and had access to formal credit source extension services. (Table 3)

Table 1. Mean energy intake in Kcal/AE/day

Particulars	Food secure		Food insecure		T-value	Average energy in take (Kcal/AE/day)
	Minimum	Maximum	minimum	maximum		
Energy in take	2234	3684	1456	2184	20.68***	2560
Average Energy in take categorical	2943		1843			
Proportion (%)	86.5		13.5			

*** Significant at 1% probability level

Table 2. Mean distribution of respondents by demographic and socio economics variables

Variables	**Food secured**	**Food insecure**	**t-value**	**P-value**
Age	42.50	37.22	4.188	0.01***
Dependency ratio	1.13	2.33	3.187	0.05**
Productive labor force	2.63	3.52	4.698	0.01***
Total family size	3.39	4.78	2.564	0.05**
Land holding size	2.79	1.93	7.504	0.01***
Livestock ownership	3.57	1.38	0.014	0.40
Number of oxen	1.61	1.67	0.101	0.42

*** and ** significant at 1 and 5 % probability level respectively

Table 3. Descriptive Statistics Result for Discrete Variables by food security status

Variables	Category	Food secured (Frequency)	Food insecure (Frequency)	χ^2
Irrigation use	User	17 (18.9)	1 (7.1)	4.698**
	Non user	73 (81.1)	13 (92.9)	
Fertilizer use	User	72 (80.2)	5 (35.7)	17.755***
	Non user	18 (19.8)	9 (64.3)	
Improved seed	User	37 (41.1)	5 (35.7)	5.426**
	Non user	53 (58.9)	9 (64.3)	
use chemicals	User	65 (72.2)	6 (42.9)	48.231***
	Non user	25 (27.8)	8 (57.1)	
Extension service use	Yes	8 (57.1)	53 (58.9)	7.906***
	No	6 (42.9)	37 (41.1)	
Formal credit use	Yes	11 (78.6)	54 (60)	5.892**
	No	3 (21.4)	36 (40)	
Share cropping	Yes	50 (55.6)	8 (57.1)	8.327***
	No	40 (44.4)	6 (42.9)	
Educational status	Illiterate	40 (44.4))	4 (28.6)	7.906**
	Literate	50 (55.6)	10 (71.4)	
Participation in local organization	Yes	37 (41.1)	7 (50)	5.238***
	No	53 (58.9)	7 (50)	

Figures in parenthesis indicates percent; * and ** significant at p<1% and 5% probability level respectively**

Econometric analysis

Logistic regression model was used to identify determinants of food security. Accordingly, variables assumed to have influence on female-headed household food security in different contexts were tested in the model and out of 17 variables ten of them were found to be significant (Table 4).

Table 4. Logistic regression result for the determinants of female-headed household food security

Variables	Coefficients	Wald	Sig.	Odds ratio
Constant	5.247	13.587	.000	.764
Age of household head	0.105**	4.561	.030	1.111
Productive labor force	0.694**	6.179	.013	0.500
Access to Credit	1.671*	2.777	.096	5.316
Access to extension services	-0.250	.132	.716	0.778
Number of oxen owned	2.171**	4.235	.040	8.764
Use of chemical	-0.468	.368	.544	0.626
Use of improved seed	-0.371	.192	.661	0.690
Use of Fertilizer	1.303*	3.04	.081	0.272
Educational status of household head	0.318	.197	.657	1.375
Location of the household	2.171**	4.235	.040	8.764
Share cropping	-1.655*	2.726	.099	5.231
Number Livestock owned	0.063*	3.500	.061	1.065
Participation in social organization	2.171**	4.235	.040	8.764
Farm Size	0.047	.158	.691	.954
Dependency ratio	.074	3.325	.168	1.077
Irrigation availability	1.939	1.026	.311	6.952
Non-farm income	6.071***	1.374	0.000	1.41
-2Log likelihood		102.2		
Chi-squared		155.0***		

***, ** and * significant at p<1%, P< 5% and P<10 % probability level respectively

Age of household head

The model revealed that age of the household head has positive and significant at (p<5 %) (Table 4). It indicates that as the age of a household head increases by one year, the odds ratio of logit increases by a factor of 1.111, keeping the other variables constant. It implies that an older female-headed household devotes their time on farming activities compared to young farmers. Young people spend much time in towns and prefer urban life than the rural for a number of reasons (Shiferaw *et al.,* 2003). Moreover, as age increases, one can acquire more knowledge and experience and then becoming effective in exploiting these experiences.

Productive labor force

The model revealed that productive labor force has positive and significant at (P<5 %). The odds ratio increases by factor of 0.5 as productive labor supply increases by one adult equivalency keeping other variable constant. The possible explanation in the context of limited income-generating opportunities, having more able-bodied household members facilitates diversification into multiple activities, thereby dissipating risk to ensure food security level of female headed households. Similar to this, Chambers (2003) and Degefa (2005) state that the elderly, the female-headed households, the sick and relatively the better-off farmers face labour shortages. In the same token lacking an adult male 'breadwinner' lone mother units not only have to do without men's earnings, but they may also be disadvantaged by higher dependency ratio than households which comprise two working parents which determine food security level of female-headed households (ILO, 1996; Fuwa, 2000; IFAD 2010).

Access to credit

Credit serves as a means to boost production and expand income generating activities (Diagne, 1998; Devereux, 2001). Access to formal credit is positively related and statistically significant at P<10. The odd ratio in favor of food secure is increased by 5.316. Thus, a female-headed household who has access to credit does initiate investment in farm and non-farm activities and achieve food security (Beyene and Muche, 2010).

Number of oxen owned

Households who own more oxen have better chance to escape food shortages since it allows effective utilization of the land and labor resources of the farm households (Tesfaye, 2005; Guled, 2006; Getinet, 2011). Oxen are key assets in the study areas like in other parts of the region in which farming system is characterized by drought power. For female-headed household in the study areas like farmers in other parts of Ethiopia, ox/oxen are prominent resource in farming as livelihood strategy. Female-headed household food security and number of oxen owned are positively associated and statistically significant at (p<5 %). The odd ratio in favor of being food secure

is increased by 8.764 when the number of oxen is increased by one.

Use of Chemical Fertilizer

Use of fertilizer is another variable which was found to have a positive and significant impact on household food security (at p<10 %). The odds ratio for this variable supports attaining food security with a factor of 0.272. Any farm inputs like fertilizer that augments agricultural productivity is expected to boost the overall production; this contributes towards attaining household food security (Shiferaw *et al*., 2003).

Location of the household

Location is a critical determinant of household food security status and it is worth looking at variations in reported incidents of hunger based on available spatial information. Numerous studies have demonstrated that location affects the food security status of female-headed households (Oldewage-Theron *et al* 2006; Bogale and Shimelis, 2009). Location has positive association with food security of female-headed households and statistically significant at 5 %. Locations with fewer economic opportunities, weak social protection and networks ('social capital') have higher degrees of food insecurity. The odds ratio for this variable supports attaining food security with a factor of 8.764 as female-headed households are living in relatively potential agro-ecology.

Share cropping

Female-headed household food security and share cropping is negatively associated and statistically significant at 10 %. The odd ratio in favor of being food secure is increased by 5.231 when female-headed households share out decrease by one factor keeping other variable constant. The possible explanation is share-cropping arrangement locally known as '*Hirta*' is one by which a farmer without oxen gives his/her land to someone who does own oxen. In support to this, Devereux (2000); Degafa (2005); and Belaineh (2006) argue that poorer households (mainly female-headed households) cannot cultivate their plot on time, or even at all, due to lack of labor, oxen and /or seeds. Moreover, because of gender division of labor, female-headed households are forced to do so. Thus, they make an arrangement with other farmers in the form of share cropping.

Number of livestock owned

Households with relatively large livestock size were found to be less vulnerable to food insecurity. In this case, the odds ratio in favor of food security increases by factor of 1.065 for a unit increment livestock. Most households in the rural communities in Ethiopia accumulate their wealth in terms of livestock. In mixed farming system, the contribution of livestock and livestock products to the households' income is the highest for the rich as well as poor owning to the size of livestock they hold (Nejafi, 2003 and Muluken, 2005). As in other parts of the mixed farming systems in

the country, livestock production plays the central role to the households' economy and is important in farming system. Livestock provide manure, drought power, milk and egg, meat, transport, skin and hide.

Participation in social organization

The logit regression model result has positive and statistically significant at P<10 %. In this case, the odds ratio in favor of food security increases by factor of 8.764 for a unit increment in participation of female-headed households in social organization. Among these, the study focused on local social group that provides different services to people during wedding, funeral and different crises, rotating saving and credit associations, the reciprocal type of labor pooling. It is also noticed that , most female-headed households in the study area face problems for the simple reason of lacking partners or spouses because the community does not give due respect to households that are headed by women. Mayee (2003) explained this situation by stating that women face stigma and isolation when they become household heads because of their new roles as bread winners.

Non-farm income

It was found to have significant (p<1 %) and positive relation with the food security status of the household indicating female-headed households engaged in non-farm activities have better chance to be food secured. This might be due to the fact that households engaged in non-farm activities are better endowed with additional income and more likely to escape food insecurity. This finding is consistent with (Abebaw, 2003; Tesfaye, 2005).

Conclusion and Recommendation

Agriculture is the dominant economic activity and the primary source of livelihoods for rural female-headed households in the study area. Low resources endowments were main feature that characterize female-headed households of the poor and this meager resource could not enable them to generate sufficient livelihood outcome-food security. Thus, it necessitates to improve female-headed household`s decision making power, resource allocation and control, access to markets, and asset ownership issues, which is likely to be a more powerful tool for poverty alleviation policies.

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