

The Status of Household Food Insecurity: The Case of West Belesa, North Gondar, Amhara Region, Ethiopia.

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Abstracts:

The vast majority of extraordinarily poor households live in rural areas that are heavily reliant on rain fed agriculture. In Ethiopia, the Amhara region in particular, has been prone to much suffering in the past, and was one of the hardest hit areas. Different projects and programs were designed and implemented to reduce household food insecurity. However, the effect of the program whether household food insecurity is reduced or not was not yet assessed in these areas. This is therefore, to investigate the current food insecurity status of different households and the determinant factors that affect household food insecurity in the study area. A multi stage sampling method was employed to select 120 respondents from West Belesa Woreda and structured survey questionnaire was designed to collect quantitative data. Data was analyzed using descriptive statistics and econometric model. From the study it was found out that about 35.8% of the respondent households were food insecure and the remaining 64.2% of them were food secure that indicated the reduction of food insecurity status of the people in the study area. Among the different variables hypothesized to affect household food insecurity; family size, total income, distance from market, total livestock holding and losses of crops were found to be significant variables to affect household food insecurity. It can be concluded that because of the intervention of many projects and programs the food insecurity status of the woreda was reduced to 35.8 %. This indicates that the efforts done by the government and non-governmental organizations before the study year were somehow successful. Therefore, Governmental and Non-governmental organizations still have to work more to minimize the food insecurity status of West Belesa in particular and drought prone woredas of the region in general.

Key words: food insecurity status, West Belesa, Determinant factors

Introduction

Ethiopia is predominantly an agricultural country and agriculture plays a major role in the country's economy. However, as stated by Yilma 2005, rapidly growing population, environmental degradation and low agricultural production and productivity are major problems facing the country. Since the tragic 1983-84 famine in Ethiopia, the policy response to this threat has been a series of ad hoc emergency appeals for food aid and other forms of emergency assistance. Further, the ad hoc nature of these responses meant that the provision of emergency assistance often in the form of food-for-work programs was not integrated into ongoing economic development activities (Subbarao and Smith

2003). More than 8 million individuals in rural areas of Ethiopia are estimated to suffer from chronic food insecurity and many more to suffer from transitory food insecurity (Daniel et al., 2008). The household income consumption survey showed that in 1995/96 the incidence of poverty was on average 45 percent (GoE, 2004). Consequently, Ethiopia became the largest recipient of food aid in Africa. Food aid delivered to Ethiopia between 1985 and 2000 amounted to around 10 million tonnes, equivalent to 10 percent of the annual national food grain supplies (Middlebrook, et al, 2001).

The Government of Ethiopia has put in place policies and strategies that address both chronic and transitory food insecurity. Chief amongst

these are the Rural Development Policy and Strategy (RDPS); the Food Security Strategy (FSS); the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and the Pastoral Development Policy (MOARD, 2009). Food security program with four major components is therefore, one of the strategies designed to alleviate food security problems. Thus, among the components the Productive Safety Net Programme (PSNP), aims to provide transfers to the food insecure population in chronically food insecure woredas in a way that prevents asset depletion at the household level and creates assets at the community level (Government of Ethiopian, 2004).

Based on this background, in North Gondar Zone nine food insecure (locally driven) wordas, the PSNP together with the other food security programs (OFSP) is being implemented since the last five years to reduce household food insecurity; raised consumption levels; encourage households to engage in production and investment through enhanced access to credit, increased use of modern farming techniques and entry into nonfarm own business activities; and further to be led to sustained asset accumulation. However, rural people in the study area are still facing continuous food shortage that may be caused by the ever-decreasing land holding size, increasing population and others that have made the food situation worsened. There was no official count to estimate the numbers of food insecure and hungry people so far and so there are no data available to estimate the level of food insecurity in the area. This is therefore, to investigate the current food insecurity status of different households in the study area.

Materials and Methods

Data collection methods: Data was collected mainly from rural households located in three Peasant associations (PAs) of West Belesa which is one of the food insecure districts as identified by locally driven criteria. Structured survey questionnaire was designed to collect quantitative data for the study. Enumerators who have completed (10+3) or two years college training program, native to the area and working in the rural area as development agent was recruited. Pre-test was conducted under the supervision of the researcher and some adjustments were made to the questionnaire.

Sample and Sampling Method: A multi stage sampling method was employed. In the first stage West Belesa was selected purposively out of 9 food insecure districts of North Gondar Zone based on the assumption to represent all the food insecure Woredas. In the second stage three PSNP and OFSP benefiting peasant associations from the Woreda was also be selected randomly. In the third stage, random sampling on the basis of proportional to size was employed to select 120 PSNP benefiting farm households from the respective PAs. The numbers of sample households that were selected are limited to 120, considering the time, budget and logistics to undertake the research activities.

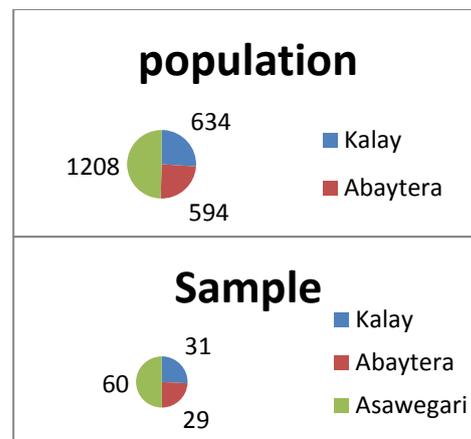


Fig. 1: Sample farm households from 3 peasant associations in West Belesa Woreda
Source: Field survey, 2015

Data Analysis: The farm household data was analyzed using simple descriptive statistics that are frequency distributions, percentage, mean standard deviation, t-test and chi-square tests. In addition binary logit regression model was also employed.

Result and Discussion

Food Security Status of the Households

There are different methods that will be used to measure the households' food insecurity status; these are direct survey of income, expenditure and consumption. In this study, the households' food security status was measured by direct survey of consumption. It is by the households' food or calorie acquisition/consumption per adult per day was used to identify the food secure and food insecure households. The minimum recommended calorie by an adult per day is 2100 kcal and this is compared with the calorie consumed by the household. If the consumption/acquisition of the

household with other requirements (clothing, health care, etc...) is less than the recommended amount then, the household is categorized as food insecure and if greater than, as food secure.

The reason for use of this measure was that it produces a crude estimate of the amount of calorie available for consumption in the household. Moreover, it is not obvious to respondents how they could manipulate their answers. Because the questions are retrospective, rather than prospective, the possibility that individuals or households will change their behavior as a consequence of being observed is lessened. Of course, it cannot be denied that measuring food security in terms of income is consistent with objectives of many rural development interventions aimed at raising the level of income of rural households. However, the correlation between income and food security status of household is not always strong (Hoddinott, 2001).

Data on the available food for consumption, from home production, purchase and /or gift/loan/wage in kind and other expenses for clothing, health care, taxes, school expenses for their children was collected and the annual food and non food consumption of the household was identified during data collection and calculated in monetary terms. Following this, The minimum level of expenditure required per AE was computed based on the amount of food required by an adult person (a calorie requirement of 2100 kcal per day or 225 kg of cereal per AE per year), minimum expenses needed for cloths, minimum health care, the amount of money required to pay land use tax were also calculated. The estimation of the minimum staple food needed per AE was, therefore, based on the minimum calorie an adult person requires. The calorie intake result is calculated by using the standard food composition table prepared by Ethiopian Nutrition Institute (ENI, 1968).

With the presumption that a kg of cereals provides 3400 kcal, as established by Ethiopian Nutrition Institute, 225 kg of cereals is needed per AE per year. The value of this amount of cereals at an average price of grain in the local market Belesa, Arbaya (i.e., 11.15 Birr/kg.) would be about 2508.75 Birr during the study year.

Moreover, information from different available sources was used to estimate the minimum amount of money needed for other food items per adult equivalent and to purchase cloths, to meet health care expenses. With regard to health care expense, in a low-income economy, the (World Bank, 1993, pp 9-11) as cited in (Bazabih, 2000) estimates the minimum expenses per person for a minimum package of essential clinical services to be \$US 8 per year. This estimate is assumed to be applicable to the study area by using the official exchange rate of the dollar.

However, because of lack of information and its difficulties to estimate and incorporate the expenditures of households for provision of education, to pay short-term loan and expenses needed to meet social obligation such as contribution during death of relative or neighbors, wedding and cultural holidays were not included, even though these can have impact on the food security status of the households.

The overall situation analysis in West Belesa district during 2014/15 production year clearly shows that the minimum subsistence requirement for less than half of the household was not met. The distribution of net household expenses per AE compared to the minimum subsistence amount required per AE per annum shows the severity of the food insecurity problem in the study area.

From the household survey, it was identified that the minimum and maximum expenditure of the households was birr 2707.50 and birr 43,500.00 respectively. It was also identified from the computed annual requirement of each sample household to be birr 2250.00 and birr 25760.00 of the minimum and maximum annual requirement respectively. In addition, the mean annual household expenditure and the mean minimum requirement were found to be birr 15854.00 and birr 13116.00 respectively.

In general, by calculating the annual requirement of the households based on their family size was compared with the actual household annual expenditures made in the study year. The household that expend less than its minimum requirement was said to be food insecure and those that uses what they require and more than that was categorized as food secure households. Therefore, food security status was calculated at

household level though it was computed as an individual level as per AE.

As a result, from all respondent households, 43 households were found to be food insecure and 77 of them food secure. It means that (35.8%) of the respondent households were food insecure and (64.2%) of them were food secure.

4.2. Factors affecting food insecurity status of households

4.2.1 Descriptive Statistics

The results of the independent t-test and chi square test analysis are presented separately as continuous and discrete variables respectively. The variables are helpful to see the relationship or the mean or percentage differences between food insecure and secure households. There were seven

continuous and nine discrete variables hypothesized to influence the food insecurity status of farm households. The results of continuous variables show that there is significant mean difference between food insecure and secure households with respect to family size, total income, livestock holding and total farm oxen holding all at less than 1% probability level (table 2). Similarly, a chi-square test for the discrete choice variables indicate that sex, educational status, participation in productive safety net program and credit use which are less than half of the total variables are found to influence food secure and insecure households significantly at less than 1%, 5% and 10% probability level (table 3).

Table 2. Descriptive statistics for continuous variables

Variables	Total (N=120)		Food insecure (n=43)	Food secure (n=77)	t-value
	Min(Max)	Mean	Mean(SD)	Mean(SD)	
AGE	22(75)	42	42.5(10.57)	41.7(12.36)	0.342
FAMILYSIZE	1(10)	5.5	6.34(1.94)	5.03(1.73)	-3.722***
CULTLANDSIZE	0(4)	1.5	1.43(0.68)	1.58(0.59)	1.391
DISTAMARKET	0.25(3)	1.49	1.35(0.63)	1.58(0.88)	1.558
TOTALINCOME	400(29800)	6293	4666((3334)	7477(6669)	2.696***
LIVESTOCK(TLU)	0(7)	3.00	2.43(1.52)	3.30(1.70)	2.878***
TOTALOXEN	0(3)	1.26	1.00(0.61)	1.40 (0.71)	3.240***

*** $p < 0.01$

Source: own Household Survey data (2015)

A) Family size

As shown in Table 2, the minimum and maximum family size of the households was 1 and 10 respectively. From the total farm households 55.8% of the food insecure and 19.5% of the food secure posses greater than 7 family members at household level. This indicated that large family size is a cause for food insecurity since the majority of the family members are dependent and non-productive but demands the produces for consumption.

The mean family size of food insecure and food secure households was 6.34 and 5.03, respectively. The standard deviation of household size for food insecure was 1.94 and that of food secure was 1.73, while that of the total respondent households mean family size was 5.5. Family size, which means number of individual members

including the household head of a household, is a variable used by many empirical studies on food security to see how it affects food security status of households. With regard to this study, the mean family size of the households between food secure and insecure households was found to be significantly different at less than 1% probability level. A study made in Rwanda about the determinants of household food insecurity in developing countries by Jean (2015) also supported this finding as the household size increase the probability of being food insecure also increased.

B) Total income

The results of the descriptive statistics showed that as there is mean income difference between the two groups at less than 1% significant level. Income determines the household's access to food. It is an important variable distinguishing the

food secure and food insecure households in that those who have earned relatively larger income per adult equivalent could be more food secure. It was expected that the total annual income per adult equivalent and food insecurity are negatively related and the result has proved this hypothesis.

C) Livestock holding in TLU

Livestock are the farmers' important sources of wealth as farmers accumulate wealth in terms of livestock. Households who possess large livestock size are expected to be less vulnerable to food insecurity. Based on this hypothesis, from the respondent household farmers the minimum and maximum livestock holding was zero and seven respectively and the mean was three. When it is compared between the two groups, the food secure farm households the mean ownership was 3.3 which is more than the total mean, while the food insecure averagely own 2.43. This livestock

holding was analysed using t-test and the result showed a significant difference among the two groups at 1% probability level.

D) Total oxen owned

With regard to oxen ownership which was believed by farmers as significantly important in securing food security for farm households. The results of the study indicated that the oxen ownership per household had ranged from zero to three. While, the average oxen holding per household was 1.26. The descriptive statistics also showed about (28%) of food secure households possessed two oxen, while only (1.2%) of food insecure households possessed 2 oxen. The mean oxen holding for food insecure households was 1.00, whereas that of food secure was 1.40 which has statistically significant difference between the two groups at less than 1% probability level

Table 3. Descriptive statistics for discrete variables

Variables	Categories	Food security status		Chi square
		Insecure (%)	Secure(%)	
SEX	Male	79.0	90.8	3.241*
	Female	21.0	9.2	
MARITALSTATUS	Married	81.4	90.9	2.283
	Unmarried	18.6	9.1	
EDUCATIONALLEVEL	Literate	55.8	39.5	2.958*
	Illiterate	44.2	60.5	
FERILIZERUSE	Users	74.4	63.2	1.581
	Non-users	25.6	36.8	
CROPLOST	Yes	58.1	44.7	1.973
	No	41.9	55.3	
EXTENSIONSERVICE	Yes	81.4	86.7	0.587
	No	18.6	13.3	
PARTIEXTENPACKAGE	Yes	41.9	48	0.415
	No	59.1	52	
PARTIPSNP	Yes	61.9	36.4	7.153***
	No	38.1	63.6	
CREDITUSE	Users	69.8	48.7	4.962**
	Non-users	30.2	51.3	
PARTIOFFFARMINCOME	Yes	2.5	6.5	0.863
	No	97.5	93.5	

** p< 0.05; *** p< 0.01

Source: Household Survey (2008)

b) Sex of the household heads

The sex of respondent household heads had shown a variation despite the fact that there were few

numbers of female headed households in the kebel. From the total female headed households 43.8% were food secure, and the remaining 56.2%

were food insecure. Whereas from the male headed households the majority (67.3%) of them were food secure. However, 79% and 90.8% of the respondents were food insecure and secure respectively. The Chi-square test had shown that the sex of the respondent head was 3.241 that indicated there is a significant difference at 10% level between food secure and insecure households because of the percentage in their sex difference. This may be due to the lack of labour in female headed households, which forced to rent their land as a share crop. Moreover, this may be also a difference in farming experience and access to technology that males are better than female farmers.

F) Educational status

The majority of (55%) the head of the household's educational status was found to be illiterate (can't read and write) as compared to those who can read and write. About 44.2% of food insecure and 60.5% of the food secure respondents were illiterates. The difference between food secure and insecure farm households in terms of education was significant at 10% probability level. It was hypothesized that education may have a positive impact on food security. However, the result was different.

G) Participation in productive safety net program

It was hypothesized that Productive safety net program is mainly engaged in supporting food insecure farm households so as to reduce or minimize problems associated with food insecurity. From the study it was revealed that majority of the food insecure farm households were participating in PSNP as compared to food secured farmers. The difference between the two was statically significant at 1% probability level. Therefore, the program is achieving its target in supporting the most vulnerable households in the study though there are some farmers who are

graduated from food insecurity but still supported by the program.

H) Credit use

Credit is an important source of earning future income. Households who received farm credit have possibility to invest in farming activities, which is important to secure their food shortages, because farm households who have access to credit can increase their production. Hence, it was expected that credit in general have a positive impact on food security status. However, the study result showed that credit and food security are negatively correlated. That means food insecure farm households demands credit as compared to food secured farmers because they lack means of production for their farming activities though it cannot solve food security problem at one production season. The difference between were statistically significant at 10% level.

4.2.2. Results from the Econometric Model Analysis

An econometric model, binary logit regression, was employed to identify the determinants of household food insecurity status. Sixteen independent variables that were hypothesized to have influence on household food insecurity status in the study area were included in the model. The model output revealed that total income (TOTALINCOME) was significant ($p < 0.1$). Crops lost in the study year (CROPLOST) and distance to market (DISTANCETOMA) were also found to be significant ($p < 0.05$). The other two variables, namely, family size (FAMILYSIZE), livestock holding in TLU (LISTOCKHOLDTLU) were statistically significant ($p > 0.01$). The remaining eleven variables were not statistically significant to affect the food insecurity status of farmers. In light of the above summarized model results, possible explanations for each significant independent variable are given consecutively as follows: ,

Table 4. The logistic regression results for the determinants of food insecurity status

Variable	Coefficient	Wald Statistics	Sig.	Odds ratio
SEX	22.814	0.000	1.000	0.808
AGE	0.014	0.136	.712	1.015
MARITALSTATUS	20.972	0.000	1.000	1.282
EDUCATIONS	-1.266	2.077	.150	0.282
FAMILYSIZE	1.053***	12.117	.000	2.867
CULTIVATEDL	-0.223	0.917	.338	0.800
CHEFERTIUSE	-0.108	0.009	.922	0.897
CROPLOST	-1.962**	5.114	.024	0.141
LISTOCKHOLDTLU	-0.812***	7.634	.006	0.444
NUMBEROFXEN	1.195	0.990	.320	3.304
TOTALINCOME	0.000*	3.352	.067	1.000
VISITINGOFDA	-0.419	0.189	.664	0.658
PARTIEXTENPACK	1.131	2.120	.145	3.099
CREDITRECIEVE	-1.049	1.630	.202	0.350
DISTANCETOMAR	-1.521**	6.310	.012	0.218
ANYOFFFARMJOB	2.692	1.703	.192	14.757
Constant	20.231	.000	1.000	6.114
-2log likelihood				61.423
Chi-squared				49.368***

* p<0.1; ** p< 0.05; *** p< 0.01

Source: Household Survey

Logistic regression model was used to identify determinants of food insecurity. Accordingly, variables assumed to have influence on household food insecurity in different contexts were tested in the model and out of 16 variables five of them were found to be significant.

The model reveals that family size has positive and significant (at $p < 1\%$) relationship with household food insecurity (table 4). The logit increases by a factor of 2.867 as the family size of a household increases by one member keeping the other variables constant. The possible explanation for such positive association is that the family with relatively large number of family members (high dependency ratio) negatively affects household food security. This result coincides with Ejigayhu S. and, Abdi-Khalil E. (2012) that states Household size has a positive relationship with food insecurity and statistically significant at 5%. This positive relationship shows that the probability of being food insecure increase with increase in household size. This is also consistent with the results of Fekadau Beyene and Mequanint Muche, (2010) that indicated, the negative sign in the model output implies that family planning policies that will have an impact in reducing household size will increase the probability of a household to be food secure.

It was assumed that farmers with problem of pest infestation are more likely to be food insecure because of crop losses than those who do not have this problem. Thus, crop losses because of pests and insects' infestation is negatively correlated with food security status. The model also reveals negative relationship with household food security that shows the important role of loss of crops because of the infestation of pests, insects and other causes in contributing to household food insecurity as expected (at $p < 5\%$). In this circumstance, smallholders who faced part or all of their crops lost because of different reasons will be subjected to food insecurity.

Livestock holding (LISTOCKHOLDTLU) is another variable which was found to have a positive and significant impact on household food security (at $p < 1\%$). The livestock holding of the household was measured in terms of livestock units. Most households in the rural communities in Ethiopia accumulate their wealth in terms of livestock. Results from this study support such a practice where households with relatively large livestock size (larger TLU) were found to be less vulnerable to food insecurity. In this case, the odds ratio in favor of food insecurity reduces by factor of 0.444 for a unit increment in TLU.

Household income (HHINC): The survey result shows a negative relation between monthly income per adult equivalent and food insecurity and the coefficient is significant ($p < 0.1$). The food insecurity, holding other variables constant, decreases by a factor of 1% as monthly income increases by one level. The result corresponds with the hypothesis and also the findings of Fekadau Beyene and Mequanint Muche, (2010) found similar result that indicated income determines purchasing power of the household with the prevailing price so that those households having higher daily income per adult equivalent are less likely to become food insecure than low income households.

Distance from the nearest market (DISTANCETOMAR). It was expected access to market and other public infrastructure may create opportunities of more income by providing non-farm employment and access to transportation facilities. The sign for distance to market in the model is also consistent with the hypothesis in which access to market has a negative relationship with food insecurity and it affects households food insecurity at 5% significant level that implies households who have good accessibility to market center have better chance to improve farm household food security status than who do not have a proximity to market centers. Hence, distance from market center is negatively related to food insecurity.

Conclusion and Recommendations

Though there was no baseline data about the status of the woreda in terms of food insecurity at household level, it was clear that more than half of the woreda Kebele administrations (19 from 30 which are 63.3%) were categorized as food insecure woreda to be supported by the government and non-governmental organizations to overcome their food security problem at the study time. This data indicated that the majority of the woreda were food insecure. Hence, from the result of the study it was identified that because of the intervention of many projects and programs in the Woreda through Ethiopian government the food insecurity status of the woreda was reduced to 35.8 %. This indicates that the efforts done before the study year have contributed to the change. Therefore, Governmental and Non-governmental organizations have to work more to minimize the food insecurity status of West

Belesa in particular and drought prone Woredas of the region in general.

Among the factors expected to affect household food insecurity; family size, total income, loss of crops, livestock holding and distance from market were the variables that influences the independent variable significantly when tested at the econometric model.

- Family size in the household was found to be directly related with household food insecurity. Larger family size worsens the problem of meeting food requirement. Hence, extension must work on awareness creation on the impacts of population growth at all levels.
- Total household income was also found the other factor which was strongly and negatively related with household food insecurity on the model result. Thus, promoting intensive agriculture and searching and providing productive technical skills that make farmers technically competitive to generate more income should be required and promoted.
- Livestock holding calculated in TLU was found as an important factor affecting food insecurity negatively because livestock is an important source of wealth that could contribute to food security in the study area. Therefore, the livestock sector should be strengthened through the provision or supply of better management and veterinary services..
- The infestation of pests and insects and other risks observed in the study area were causing crop losses that directly contribute to food insecurity significantly. Hence, early warning and readiness should be done by extensionists to protect pests and insects and also the application of post harvest management
- Households that are relatively far from the market were found to be food insecure. Access to market allows nonfarm job opportunity the increases total income of the household. Therefore, the community and other development actors should participate in infrastructural development to facilitate market access to farmers in the study area.

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