The role of rural micro credit in reducing household vulnerability to food insecurity: Case study in Bati Woreda, Oromo Administrative Zone, Amhara Region, Ethiopia

Aliy Seid[1] and Mengistu Hulluka[2]

ABSTRACT

Households residing in the two sample Kebeles of Bati were stratified based on their participation in Amhara Credit and Saving Institution (ACSI) as ex-clients, clients, eligible non-clients, and ineligible households. A total of 170 sample households, comprising 108 clients of ACSI and 62 non-clients, were finally selected from the two sample Kebeles using simple random sampling with probability proportional to size. The proxy indicators utilized to measure households' vulnerability to food insecurity were, households own food production, income, asset, crop and income diversification.

The survey results had indicated that the annual mean income obtained by ASCI clients was higher than the annual mean income of the non-clients by 52%. Moreover, as compared to non-clients, larger proportions of ASCI clients have participated in more remunerative income sources i.e. high value crop production, sheep and goat production/ fattening, beekeeping and petty trade. Among the variables examined, family size, number of economically active members of the household, farm size, livestock holding, and participation in ACSI credit program are positively correlated with households' income source diversification. With regard to asset ownership, clients owned larger number of livestock, and a sizable of non-productive assets with relatively higher estimated value, as well as, more cash savings. Furthermore, the level of rural households vulnerability to food insecurity is negatively associated with their participation in ACSI program..

Key words: Food insecurity, vulnerability, microfinance, ASCI clients

[1] Expert, Organization for Rehabilitation and Development in Amhara (ORDA), and former graduate student in Rural Development, Indira Gandhi National Open University, e-mail: ali_sof2007@yahoo.com

[2] Associate Professor, St. Mary's University College, e-mail:ethiopiquei@live.com

Introduction

In Ethiopia, agriculture has remained the major constituent of the economy accounting for 43.2 percent of the total GDP (NBE, 2008/09) and the major source of employment involving 84.14 percent of the active population (Bananuaka et al., 2006).

In the face of agriculture's contribution to the national economy, annual production and productivity has remained very low, farming practices has been traditional and at subsistence level, and crop failure has been frequent due to recurrent drought. As a result, people became vulnerable to food insecurity.

According to studies, improving the delivery of financial services to the poor would help them to increase their disposable income, asset ownership, and cushion consumption during food deficit periods (Wolday, 2003).

Microfinance institutions (MFIs) are becoming increasingly essential instruments in the government's strategy for reducing poverty. The microfinance industry has been able to serve more than 2.3 million clients through their 433 branches and 598 sub-branch offices. Various studies had shown that these institutions cover only 10-15% of the total microfinance demand in the country (NBE, 2010).

Similarly, in Amhara National Regional State, like other regions of the country, a formal credit institution was established, known as Amhara Credit and Saving Institution (ACSI), to render credit and saving services to the rural community. ACSI is the largest institution in the region that has been providing financial services to urban and rural households since 1997.

The institution is operating at all Woredas of the region with 15 micro-banks, 39 branches and 218 sub-branches, and with a total of 1.9 million active borrowers, with 80 percent of the clients were from rural areas (ACSI, September 2004 E.C, No.16).

This study, therefore, was initiated to investigate the role of the existing ACSI rural credit services in reducing vulnerability to food insecurity.

Research Methodology

Background of the Study Area

Bati Woreda is one of the woredas (geographical enclaves) of Amhara National Regional State. The Woreda is located on the geographical coordinates of 11° 11' and 11.1' 83° N Latitude and 39°13' and 40° 1' E Longitude with elevation of 1,502 meters above sea level, about 420 km from Addis Ababa (the capital city of Ethiopia) and 92 Km from Kemissie to the North east on the main road to Djibouti. It has a total area of 1,132.16 Km^2 comprising of 23 rural Kebeles (the smallest administrative unit in the region) (WoARD,2010).

Survey design and sampling

The approach was quasi-experimental where clients of ACSI are to be compared with comparison group,i.e. eligible but non clients of ACSI. The study was based on data of 170 rural households (108 ASCI clients and 62 non-clients) within the district. The survey was carried out in 2009/10. The nature of the study requires a four stage stratified random sampling technique. At stage one, the district was selected for being located on vulnerable zone, having high population density, low average land holding, low production, frequent drought victim, high dependence of food aid and

availability of ASCI branch with long credit service and large number of clients.

At stage two, selection of vulnerable Kebeles from among 23 Kebeles, on the basis of length of time under food shortage. Kebeles suffering from food shortage for more than 6 months (April to September) were considered as highly vulnerable. The selection of the two Kebeles from highly vulnerable Kebeles was by using simple random sampling technique.

At stage three, categorization of households was performed into ASCI clients and non-clients.

At stage four, a total of 170 households (108 as clients and 62 as non-clients) were selected randomly.

Data collection

The study was largely based on primary data collected from sample rural households. It encompasses cross-sectional information related to economic and natural phenomena, as well as, attributes of social factors leading to vulnerability of households to food insecurity.

Questionnaires were compiled to reflect all aspects of the society which were related to food security and micro- financing and were pretested prior to actual data collection.

Supportive data were also collected to be used as secondary sources, such as educational and research institutions, ASCI branches, publications, reports and other documents. Primary data was collected from 170 sample households using structured questionnaire through interview methods so as

to get an in- depth information, including changes of household perceptions. In addition to the household interview, six focus group discussions were conducted to obtain additional information and more clarifications on selected issues that can substantiate the household interview questions. The focus group members constituted members from the kebele task force, village level watershed committees, the youth, female headed households, elders and development agents. Moreover, key informants of knowledgeable individuals both from the community and at woreda level, concerned offices were also approached to triangulate the household level information.

The prepared questionnaires were pretested, and on the basis of the results obtained the necessary modifications were made to the questionnaires.

Data Analysis

The data collected were organized, classified, summarized and presented using various methods, including tabular, graphs, percentage, mean, standard deviation, frequency distribution, ratio system, etc. Statistical Package for Social Science (SPSS, Version 11.5) techniques was used in order to analyze the data. In this study both descriptive and econometric model were applied.

For the targeting variables, descriptive statistics and mean comparison techniques were mainly employed. In addition to this, multiple regression analysis and multinomial logits model was used as illustrated below:

Multiple regression analysis:

Multiple regression analysis is a statistical technique that can be used to analyze the relationship between a single dependent variable and several independent variables with the object of using the independent variable whose value are known to predict the single dependent value (Chandan & Jagit, 1996). Standard and hierarchical multiple regression analysis procedures will be employed for testing relationship hypothesized in the study and make comparison between the effects of independent and intervening variables on the dependent variable.

According to Chandan & Jagit (1996), the regression equation takes the form:

$$Y = A + B_1 X_1 + B_2 X_2 + \ldots + B_k X_{ky}$$

Where, Y is predicted value on the dependent variable, A is the Y intercept, the Xs represent the various independent variables (of there are k), and the Bs are the coefficient of each independent variables.

3.2.4. Econometric Model Specification

Multinomial logit model:

The multinomial logit model has been chosen for this study. This model makes it possible to study the determination of factors influencing household income source diversification in the context of individually specific data on multiple choices. The unit of observation and analysis for

this study household's individual income sources. In the multinomial logit analysis income sources are to be classified according to their status at the time of the survey, and the distribution of income sources among groups is explained in terms of the characteristics of the income sources and the income of the household.

The logit model can be used to estimate a utility maximization problem where the household is assumed to have preferences defined over a set of income source diversification alternatives:

$$U_j = \beta_j \chi_i + \ell_j \quad \text{--------- (2)}$$

Where U_j is the utility of income source diversification j, x_i a vector of attributes of the income source and the income, β_j a parameter to be estimated and ℓ_j the disturbance term?

The disturbance terms are assumed to be independently and identically distributed. If the household's choice is alternative j on a particular income source we assume that the utility from alternative j is greater than the utility from other alternatives, i.e.

$$u_{ij} > u_{ik}, \forall k \neq j \quad \text{---------- (3)}$$

Where u_{ij} is the utility to the i^{th} household income source j, and u_{ik} the utility to the i^{th} household income source k. When each income sources thought of as a possible choice decision by a household, the household will be expected to choose the income sources that have higher expected utility among the alternatives considered (Dorfman, 1996).

The i^{th} individual's decision may, therefore, be modeled as maximizing the expected utility from a given income source by choosing the j^{th} income source among J discrete income sources, i.e.,

$$\max_{j} E(u_{ij}) = f_j(x_i) + \varepsilon_{ij},\ j = 0,\ldots,\ J \quad \text{---------- (4)}$$

Where $E(u_{ij})$ is the expected utility of alternative j to the i^{th} household income, and f_i is a function of $X_i = (X_i1 \ldots X_in), a(1xn)$ vector of attributes of the income source and the income that potentially affect the desirability of diversification of income sources.

The probability of choosing alternative j from among J alternative choices is equal to the probability that the expected utility from alternative j is greater than the expected utility from any other alternative, i.e.,

$$\Pr(choice = j) = P\left[E(u_j) - E(u_k) > 0\ \right], \forall_k \neq j \quad \text{--------- (5)}$$

Following Greene (2000), the multinomial logit form for a multiple-choice problem is:

$$\Pr(y = j) = \frac{\ell^{\beta_j x_i}}{\ell^{\beta_o x_i} + \ell^{\hat{\rho}_j xi} + \ldots + \ell^{\beta_j xi}} \quad \text{Or}$$

$$\Pr ob\ (y = j) = \frac{\ell^{\sum_{k=1}^{k} \beta_{jk} x_k}}{1 + \sum_{j=1}^{J-1} \ell^{\sum_{k=1}^{k} \beta_{jk} x_k}} \quad \text{---------- (6)}$$

Gives $\Pr ob(y = 1)$ where j=1, 2, J-1.

Parameter β has two subscripts in the model, k for distinguishing x variables, and j for distinguishing response categories.

The subscript j indicates that now there are J-1 sets of β estimates. In other words, the total numbers of parameter estimates are (J-1) k. This implies that the sample size should be larger than (J-1) k.

3. RESULTS AND DISCUSSION

3.1. Demographic characteristics of sample households

The influence of demographic characteristics of the sample households variables, such as, age, sex and level of education of the household head, and family size on participation in micro-credit scheme were evaluated.

Age of sample household heads (AGHHH)

The mean age for the sample population was 47 years, ranging from 21 to 80 years. When it is disaggregated, the mean age for clients and non clients was 50 years and 44 years, respectively. This indicates that on average clients are relatively older than non-clients. In addition, ages of the household heads were positively correlated with households' participating in the credit program ($p<0.05$) (Table 1). This implies that households' participation in the credit program increases with an increasing age of the household head below the maximum age observed in sample household heads (i.e., 80). This result has to be seen in connection with the eligibility criteria to participate in ACSI credit program. The criteria had not set an age limit for applicants. If the applicant is able and considered to be productive the opportunity to participate in the program is open to all. Although there are household heads older than the maximum age considered as productive (i.e., 65 years),

if they are judged as able and productive by the Kebele committee they were allowed to borrow from ACSI (Table 1).

Sex composition of sample household heads

In general, the proportion of male headed and female headed households for the sample population was 67% and 33%, respectively. On the other hand, the composition of male headed households for sample clients and non-clients was 74% and 55%, respectively (Table 10).

This implies that being male headed household was positively associated with households' participation in the credit program. Thus, in all income sources, the proportion of male headed households had exceeded that of female headed ones (Table 1).

Education level of sample household heads (EDUCHHH)

Results on analysis of achievement of household heads in education in terms of years of schooling completed for the sample population had shown that large proportion (54%) of the sample household heads were illiterate. The remaining have achieved varying level of education. However, the mean year of schooling for clients and non-clients were significantly different ($p<0.01$), 2.47 and 1.68, respectively (Table 13). This implies that clients have attained relatively better education as compared to non-clients, and the level of education is positively correlated with households' participation in the ASCI. In addition, household heads participating in income sources that consist of petty trade activities and livestock production achieved relatively better level of education as compared to the remaining income sources (Table 1).

Family size of sample households (FAMSIZE)

The mean family size for the sample population was 5.16 persons per household ranging from 1 to 12 persons. However, the mean family size for sample clients and non-clients was 5.64 and 4.34 persons per household, respectively (Table 1). Family size is positively correlated with households' participation in the credit program. The income sources of households with

Table 1. Characteristics of sample households

Variable	Total Sample (N=170)	Income source diversification categories					F/x^2 value	r value
		ND* (n=27)	HVC* (n=15)	LS* (n=40)	HVCLS* (n=75)	HVCLSPT (n=13)		
AGEHHH							1.280	0.069
Mean	47.38	36.12	49.13	44.7	49.85	44.23		
SD	13.332	13.757	13.809	14.472	14.193	10.879		
AGESQ							1.144	0.046
Mean	2454.14	1587.30	2592.07	2202.3	2684.12	2065.62		
SD	1435.7	1079.89	1325.27	1410.36	1467.11	952.223		
SEX							3.211	0.523a
Male (%)	67.1	55.56	66.67	65.00	73.33	61.54		
Female (%)	32.9	44.44	33.33	35.00	26.67	38.46		
EDUCHHH							0.731	0.48
Mean	2.10	1.71	1.60	2.7	2.02	2.77		
SD	2.882	1.894	2.414	3.252	2.847	2.803		
FAMSIZE							2.656**	0.187
Mean	5.16	3.68	5.60	4.63	5.52	5.92		
SD	2.178	1.572	2.995	2.096	2.171	1.498		
ECOACTM							4.242***	0.259
Mean	2.71	1.74	2.73	2.3	3.14	3.0		
SD	1.568	0.953	1.981	1.159	1.682	1.472		

Note: ***, **,* Significant at 1%, 5%, and 10% probability level, respectively.

Source: own survey

✸ Key: ND = No diversification; HVC = High value crop; LS = Livestock; HVCLS = High value crop and livestock; HVCLSPT = High value crop + Livestock + Petty trade

the large family size were high value crops, livestock and petty trade, while households with non-diversified income sources had the lowest family size (Table 1). Thus, the result had shown that there is a significant difference in mean family size

among households across income sources ($p<0.05$). The implication is that as clients have larger family size compared to non-clients, they have more financial demand to sustain the life of their family and by utilizing the available labor force in the household they seem to participate in more diversified income sources. This result is in agreement with the findings reported by Canagarajah et al. (2001); Rees (2002); and Minot et al. (2006).

As an extension of family size, marital status of sample household heads was analyzed. It indicates that larger proportions of clients were married as compared to non clients, indicating that being married is positively associated with households' participation in the credit program (Table 2).

Table 2. Marital status of sample household heads in percent

Category	Category				
	Clients (n=108)	Non-clients (n=62)	Total (N=170)	χ^2 value	Cramer's V
Married	73.15	54.84	66.47		
Divorced	14.81	33.87	21.76		
Widowed	12.04	8.07	10.59		
Single or never married	0.00	1.61	0.59		
Separated	0.00	1.61	0.59		
Total	100.00	100.00	100.00	12.629**	0.273

Note: ** Significant at 5% probability level
Source: own survey, 2011

Number of economically active household members (ECOACTM)

The mean number of economically active members of clients and non-clients were 3.03 and 2.15 persons, respectively (Table 1). The number of economically active members of the household is positively correlated with

households' participation in the ASCI, implying that households with more number of economically active members have participated in the credit program as compared to households with less number of economically active members.

And there is a positive association between number of economically active members of the household and households' income source diversification. It can be said that due to availability of labor force in client households they could have more diversified income sources. The result is in agreement with findings of Canagarajah et al. (2001); Abdulai and Rees (2001); Schwarze (2004); and Minot et al. (2006).

Economic factors

In order to compare clients and non-clients, economic variables taken into consideration were farm size and livestock holding of the sample households.

Farm size of sample households

With regard to farm size, the highest proportion of sample households (41%) cultivated 0.251-0.5 Ha and the lowest proportion (1%) cultivated a farm size greater than one hectare (Table1).

Large proportion of clients (42%) cultivated a farm size ranging between 0.251-0.5 Ha, whereas, the highest proportion of sample non-clients (45%) cultivated farm size of 0.1-0.25 Ha. Farm size is positively correlated with household participation in ASCI. The implication is that due to availability of family labor and financial capabilities clients are able to cultivate larger farm size and diversify their income sources.

Livestock holding of sample households

The mean number of total livestock holdings in Tropical Livestock Unit (TLU)[1] for the sample population was 2.86, ranging from none to 12.75. When disaggregated, the clients and non-clients had 3.25 and 2.19 TLU, respectively (Table 3). This implies that total livestock holding is positively correlated with households' participation in the credit program.

The implication is that as sample clients own relatively more livestock they would have more diversified income sources. Furthermore, ACSI was the major source of credit for households who had participated in the livestock package. In addition to the special package loan available from ACSI, 32% of the clients had also used the regular loan they had obtained for livestock purchases.

Table 3. Farm size and livestock holding of sample households

Variable	Total	Income source diversification categories					F value	r value
	Sample (N=170)	ND (n=27)	HVC (n=15)	LS (n=40)	HVCLS (n=75)	HVCLSPT (n=13)		
FARMSIZE							6.411***	0.302
Mean	0.431	0.231	0.463	0.353	0.517	0.481		
SD	0.263	0.355	0.206	0.258	0.259	0.206		
TLSHOLD							6.325***	0.357
Mean	2.86	1.55	1.82	2.7	3.36	3.86		
SD	1.876	1.274	.335	11.778	1.713	2.902		

Note: *** Significant at 1% probability level
Source: own survey, 2011

[3]TLU = a convenient method for quantifying a wide range of different livestock types and sizes in a standardized manner.

Income sources and annual mean income of households

Income sources of households were broadly classified into six categories: agriculture, self employment, formal employment, informal employment, relief, and remittance. In each income source category, a number of specific income sources have been considered. Agricultural activities consist of crop production, livestock production, tree farming and production of forage grasses and collecting of crop residues for sale.

Self employment consists of owning small kiosk for selling household items, petty trading (grain, livestock, coffee, spices, salt, etc.) food processing, fuel wood and/or charcoal selling, handicraft (blacksmithing, embroidery, pottery, etc.), cactus and/or other **wild fruits** collection and selling, and others (hairdressing, traditional **healing, etc.**).

Formal employment pertains to employment in government or non-governmental organizations and locally elected positions. On the other hand, under informal employment, working as housemaid, manual labor, etc. were considered. Protective Safety Net Programs (PSNP) entails engagement in public works (PW).

The other income source worth mentioning is remittance, i.e. money transferred from relatives living abroad.

The different income sources had a varying contribution to the annual overall mean income of sample households. Accordingly, farming stands first in contributing to the income of large number of households for both groups, where clients and non-clients accounting 99% and 94%, respectively. PSNP in the form of PW and/or DS (direct support) follows agriculture in contribution and accounts for 88% and 92% of clients and

non-clients, respectively. Low proportion of clients and non-clients, 29% and 18%, respectively, have participated in self employment opportunities.. Only 23% and 15% of the clients and non-clients, respectively, had participated in informal employment. Very few of them, in both groups, had earned income from remittances and formal employment. The total mean annual income earned per household for clients and non-clients from all income sources was 4199.89 EB (Ethiopian Birr) and 2769.60 EB,, respectively. Thus, the annual mean income for clients was higher than the annual mean income of non-clients by 52% (Table 4).

When it comes to contribution of each income source to the total annual mean income of sample households, obviously, the major contribution comes from agriculture, accounting for almost 62% of the total annual mean income for both clients and non-clients. Next to agriculture the important income source was PSNP , which contributes to 14% and 16% of the total annual mean income of clients and non-clients, respectively. While self employment and informal employment fell in the middle, remittance and other sources contributed the lowest proportion to the annual mean income of both clients and non-clients.

In summary, except for remittance, clients had earned larger annual mean income from all income sources, resulting in higher overall annual mean income. Furthermore, the overall annual mean income had strong positive correlation with households' participation in ACSI credit program ($p<0.01$, $r=0.648$).

Table 4. Distribution of households by income sources and total annual mean income per household

Income source category	Category: Clients (N = 108)		Non-clients (N = 62)		Total (n = 170)		t value	P value
	HH%	Annual Mean Income (EB)	HH%	Annual Mean Income (EB)	HH%	Annual Mean Income (EB)		
Agriculture	99.07	2580.77	93.55	1710.11	97.06	2263.24	12.877***	0.000
PSNP	87.96	594.48	91.94	435.97	89.41	536.55	6.988***	0.000
Self employment	28.7	529.24	17.74	284.75	24.71	440.07	2.957***	0.004
Informal employment	23.15	396.56	14.52	153.61	20.00	307.96	4.061***	0.000
Remittance	5.56	63.89	6.45	167.74	5.88	101.76	1.795***	0.000
Others	1.85	34.95	3.22	17.42	2.35	28.56	0.408	0.684
Total	100	4199.89	100.00	2769.60	100.00	3678.24	14.589***	0.000

Note: *** Significant at 1% probability level, r=0.648
Source: own survey, 2011

Clients' annual income before and after participation in ACSI credit program

Variation in total annual mean income of ASCI clients between the year 2009/10 and 2008/09, the immediate year just before participating in ACSI program, was assessed. Considering a two year maturity period of loans (one loan cycle), analysis of the overall annual mean income variation before and after participation in the credit program was performed.

In terms of the amount of income derived from agriculture before and after participation in the program, client households' annual mean income has risen from 1803.61 EB to 2580.03 EB (increased by 43%) ($p<0.01$) and it has strong association with the household agricultural package introduced by the WoARD and implemented by the clients through credit obtained from ACSI (Table 5). Next to agriculture, income obtained from PSNP had contributed a sizable proportion to the overall annual mean income of clients. The household annual mean income obtained from PSNP before

participation in the program was 284.11 EB and was raised to 594.30 EB (increased by 109%) after participation in the ASCI program ($p<0.01$).

The marked difference observed in income generated from PSNP was mainly attributed to the wide opportunity created by the Safety Net Program in the Woreda. Large proportion of residents of the Woreda as a whole and the sample Kebele in particular have participated in Safety Net Program. Based on focus group discussion made it was learnt that borrowing from ACSI is one of the push factors for clients to participate actively in the program in order to repay their loan, though the Safety Net Program was open to both clients and non-clients.

Self employment and informal employment had also made considerable contributions to the overall income of the households. However, there was little increase in client participation in the program (2% increment for self employment and 1% increment for informal employment). On the other hand, after participating in ACSI program , households annual mean income obtained from self employment has shown large increment (i.e., 176.96 EB or 50% increment) ($p<0.05$).

After participating in the ASCI program households annual mean income from informal employment has increased only by 24.07 EB (i.e.,7% increment) while income obtained from remittance and others was low and insignificant (Table 5).

Table 5. Distribution of clients and their annual mean income from each income source before and after participation in ACSI program credit, (N=108)

Income source category	Income Before Participation			Income After Participation			
	HH No.	%	Annual Mean Income (EB)	HH No.	%	Annual Mean Income (EB)	t value
Agriculture	104	96.3	1803.61	107	99.07	2580.77	6.508***
PSNP	44	40.74	284.11	95	87.96	594.48	7.973***
Self employment	29	26.85	352.27	31	28.7	529.24	2.445***
Informal employment	24	22.22	372.49	25	23.15	396.56	1.000
Remittance	4	3.70	31.48	6	5.56	63.89	1.304
Others	0	0.000	0.000	2	1.85	34.95	1.112
Total for all clients	108	100.00	2879.07	108	100.000	4199.89	8.554***
Total for clients who borrowed before the year 2008	67	62.03	2997.00	67	62.03	4322.15	6.071***

Note: ***, ** Significant at 1% and 5% probability level
Source: own survey, 2011

Overall, clients had earned much more income after participating in ACSI program in the year 2009/10, as compared to the income they had obtained during the previous (2008/09)year. The annual mean income clients obtained in the year 2009/10 was 4198.99 EB which was 46% higher than their annual mean income prior to participating in the program.

Household annual income variations

The results had indicated that for clients and non-clients there was variation in annual mean income obtained in the year 2009/10 as compared with income obtained in the year 2008 /09 . Accordingly, 61% and 39% of the sample clients and non-clients, respectively, responded that there was an income variation between the two indicated years (Table 4). While the remaining households had reported that their income stayed the same. Among the clients that had reported that there is variation in annual income

obtained, 91% had achieved annual mean income increment of 416.08 EB (11%) on the latter year. On the contrary, 9% of the sample clients reported that their annual mean income has decreased by 18.06 EB (0.4%) on the later year. Similarly, of the non-clients, 71% had reported annual mean income increment by 200.65 EB (8%) (Table 6).

In general, clients had achieved better income increment on the following year(2009/10), that is, 52% higher than increment obtained by non-clients ($p<0.05$).

According to respondents, the reasons for income variation were additional income obtained from agriculture (crop and livestock) and PSNP. Clients were able to buy improved seeds and commercial fertilizers that enabled them to achieve better crop production. Furthermore, they had obtained additional income from sheep and goat sales through participating in household agricultural package supported by the credit program. .

Income source diversification

Different empirical methods were used to assess income diversification at household level. The number of income sources, the share of non-agriculture income in total household income, income diversity index as well as the nature of diversification (i.e., whether it entails a shift from less remunerative to more remunerative activities) have been used in the current analysis.

Table 6 . Households' income variation between the year 2009/10 and 2008/09 Category

Category	Income variation		Income increased			Income decreased		
	Yes		No		Annual mean decreased (EB)	HH		Annual mean decreased (EB)
	No.	%	No.	%		No.	%	
Clients (n=108)	65	60.19	59	90.77	416.08 (11%)	6	9.23	18.06 (0.4%)
Non-clients (n=62)	24	38.71	17	70.83	200.65 (8%)	7	29.17	35.48 (1.3%)
Total (N=170)	89	52.35	76	85.39	337.51 (10%)	13	14.61	24.41(0.67%)
	$x^2 = 2.629$***				t = 2.834**			t = 1.013

Note: ***, ** Significant at 1% and 5% probability level
Source: own survey, 2011

Households' income diversification

In general, the mean number of income sources for the local population was 2.82 whereas, it was 2.94 for clients and 2.61 for non-clients, implying that clients did have more types of income sources as compared to non-clients (Table 7).

Table 7. Households' mean number of income sources

	Category					
			Total (N=170)	t value	p value	r value
Mean	Clients n=108)	Non-clients (n=62)				
SD	2.94	2.61	2.82	2.55**	0.011	0.193
	0.8	0.776	0.804			

Note: ** Significant at 5% probability level; Source: own survey, 2011

The households' income composition analysis for both client and non-client households had been carried out and there was no significant difference

between the two groups with respect to the mean share of non-agriculture income.

Income diversity indices

The diversity index is a measure of how fragmented household's income portfolio is. This assesses how many different pieces the total income is broken into, and therefore how many different diverse sources a livelihood depends up on (Start et al., 2005). Herfindahl index of concentration measures the degree of concentration (how scattered) of household income into various sources; and it thus measures the level of income diversification. Accordingly, households with most diversified income will have the largest diversity index and the less diversified incomes are associated with smallest diversity index. For least diversified households (i.e., those depending on a single income source), diversity index takes on its minimum value of one. The upper limit for diversity index depends on the number of income sources available and their relative shares. The higher the number of income sources and/or the more evenly distributed the income shares, the higher the value of diversity index (Ersado, 2006).

Similarly, the diversity index that is proposed by Chang (1997) and used by Ellis (2001) describes best in terms of both the number of activities and the distribution of total income between the different wealth groups. This can be adapted to the two groups-sample clients and non-clients. The logic of the formula suits the application being addressed since the index is the inverse of the market concentration index known as the Herfindahl-Hirschman index.

The maximum index value possible is equal to the number of income sources, and this would be attained if total income is equally distributed between each source; otherwise it falls away rapidly if any one income source begins to take a larger than equal proportion of income. In this study, a diversification index was used to calculate income source diversity for each household based on the identified income sources and the statistics was summarized for the two groups using the mean and the standard deviation. The mathematical specification for the market concentration index is expressed as follows:

$$IMCI = \frac{1}{\sum_{i=1}^{n} X_i^2}$$ Where, IMCI is the inverse of Herfindal-Hirschman index, and X_i^2 is the square proportional to total income of each activity.

The results had revealed that the overall mean income diversity index for sample households was 2.566. Whereas, the mean income diversity indices for clients and non clients was 3.345 and 1.117, respectively (Table 8). This indicates that clients do have relatively better diversified income both in number of sources and distribution of the amount of income generated from the sources than non-clients.

Table 8 . Annual mean income diversity index for sample households

	Category		
	Clients (n=108)	Non-clients (n=62)	Total (N = 170)
Mean income diversity index	3.345	1.117	2.566
SD	4.961	3.909	2.412

Source: computation from own survey, 2011

Households' income diversification in terms of participation in more remunerative activities

Based upon the focus group discussion and key informant interview it was learnt that rural households were advised, encouraged, and in most cases trained to participate in more remunerative activities identified in the Woreda. The major factors considered for the selection of these activities were: households' resources (labor, land, etc.), agro-ecology, available infrastructure (road, irrigation, etc.), and access to market.

Accordingly, production of high value crops (ground nut, sesame, and vegetables), livestock production (sheep and goat production/fattening, dairy production using improved or selected local camel fattening, and beekeeping using modern beehives) and petty trade (livestock, grain, and commodity trading) activities were identified as more remunerative activities in the Woreda. Household diversification into more remunerative activities was considered if a household has participated at least in one of these activities and generates some proportion of income from that particular activity.

The results indicate that there is a significant difference in proportion of households that have participated in high value crop production ($p<0.01$) and sheep and goat production/fattening ($p<0.01$)between clients and non-clients at ($p<0.01$). and dairy processing ($p<0.05$) (Table 9).

Overall, households' participation in remunerative activities vary, and had shown that larger proportion of clients (91%) had participated in remunerative activities as compared to non-clients (73%)($p<0.01$).

Table 9 . Distribution of households participating in remunerative activities

Activities	Number of households Participated (%)				
	Clients (n = 108)	Non-clients (n=62)	Total (n=170)	x^2 value	P value
High value crop production	71.3	43.5	61.18	12.769***	0.000
Sheep & Goat production/ fattening	72.2	50	64.1	8.454***	0.004
Dairy production	28.7	14.5	23.5	4.406**	0.036
Beekeeping	17.6	9.7	14.7	1.967	0.161
Petty trade	10.2	6.5	8.8	0.682	0.409
Total	90.74	72.58	84.12	9.723***	0.002

Note: ***, ** Significant at 1% and 5% probability level
Source: own survey, 2011

When it comes to actual utilization of the loan obtained from ACSI, the distribution of clients participating in different remunerative activities was, 57% in sheep and goat production/fattening, 33% in dairy production,13% in beekeeping and 7% in petty trading. In related analysis, by using the loan, 23% of the sample clients had purchased farm oxen, 13% had obtained farm inputs (fertilizer, improved seed, herbicides, farm tools, etc.), and 4% have participated in poultry production (Table 10).

Table 10. Distribution of sample clients by purpose of loan utilized, (%) (N=108)

Purpose of loan utilized	Number of Households (%)
Sheep and Got production/fattening	57.41*
Dairy production	33.33
Beekeeping	12.96
Petty trade (cereals, coffee, livestock, salt, spices, etc.)	6.48
Purchase of farm oxen	23.15
Purchase of farm inputs (fertilizer, improved seed, herbicides, farm tools, etc.)	12.96
Poultry production	3.7

* Households gave multiple responses; Source: own survey

Households' perceptions to changes in their living conditions

General assessment of perceptions of households on changes in their living condition over the past five years was carried out based on selected 13 indicators. Accordingly, 12 indicators were used to measure the perceptions of households on specific attributes on their living condition while one indicator was used to assess their perception in their overall living condition.

All indicators considered are directly or indirectly related to food security status of the households. The respondents have rated their perception on each indicator using a range of scale of "decreased greatly" to "increase greatly" (Table 11). For brevity, scales for each indicator depicted in Table 11 are reduced from five levels (decreased greatly to increased greatly) into three levels (decreased to increased).

Accordingly, the aggregate results are presented in terms of proportional distributions (percentage) of households by their response to each indicator across the three scales. The result had shown that 73% and 39% of the clients and non-clients, respectively, had reported that their total income has increased.

In summary, 75% and 34% of the clients and non-clients, respectively, have reported that their overall living condition has increased. Only 4% and 19% of the clients and non-clients, respectively, reported that their living condition has decreased. The remaining households, i.e., 21% of clients and 47% of non-clients) had responded that their living condition has stayed the same.

Table 11 . Distribution of households by their perceptions of changes on the basis of selected welfare indicators (%)

Scale	Category	Indicators					
		Total Income	Productive Assets	Durable Assets	Quality of Food	Quantity of Food	Non Fo Items
Decreased greatly	Client (n=108)	0.93	0.00	0.93	0.00	0.00	0.00
	Non-clients (n=62)	1.61	0.00	3.23	0.00	0.00	0.00
	Total (N=170)	1.18	0.00	1.76	0.00	0.00	0.00
Decreased	Clients (n=108)	1.85	1.85	1.85	1.85	2.78	0.93
	Non-clients (n=62)	16.13	19.35	12.90	16.13	16.13	11.2
	Total (N=170)	7.06	8.24	5.88	7.06	7.65	4.71
Stayed the same	Client (n=108)	24.07	43.52	45.37	15.74	21.30	21.3
	Non-clients (n=62)	43.53	61.29	64.52	27.42	41.94	32.2
	Total (N=170)	31.18	50.00	52.35	20.00	28.82	25.2
Increased	Client (n=108)	72.22	52.78	50.00	81.48	75.00	76.8
	Non-clients (n=62)	38.71	19.35	17.74	56.45	41.94	56.4
	Total (N=170)	60.00	40.59	38.24	72.35	62.94	69.4
Increased greatly	Client (n=108)	0.93	1.85	1.85	0.93	0.93	0.93
	Non-clients (n=62)	0.00	0.00	1.61	0.00	0.00	0.00
	Total (N=170)	0.59	1.18	1.76	0.59	0.59	0.59

Source: Own Survey 2010

The result on households perceptions of changes in their overall living condition were checked whether it is consistent with the participatory wealth ranking made for the sample households. In the participatory wealth raking the indicators used are the number of oxen, cows, and sheep and goats that the household has, ability of the household to sharecrop in, the number of months in the year that the households is food self-sufficient, and the type of material from which the roof of the household's house is made (Table 12).

Table 12. Indicators used in participatory wealth ranking of sample households in the study area

Wealth category	Indicators: Number of Oxen	Number of Cows	Number Sheep and/or Goats	Able to Sharecrop in	Food self sufficiency (Months)	Material from which roof of the house is made
Extremely poor	0	0	0	No	Up to 3	Thatch/Earth
Poor	0	0	5 – 10	No	Up to 6	Earth
Medium	1	1	11 – 15	Yes/No	Up to 9	Earth
Better-off	At least 2	At least 2	At least 15	Yes/No	At least 12	Corrugated Iron sheet

Source: own survey, 2011

The result indicates that the difference in perception of changes in living condition between the two groups is reflected consistently with the participatory wealth ranking of the sample households. As the proportion of clients who perceived that their living condition is positively changed was almost twice than of non-clients, the proportion of clients (18%) who are categorized as better-off in the wealth category are much greater than the proportion of sample non-clients, 7% categorized as the same. The proportion of sample clients and non-clients categorized as poor are 32% and 58%, respectively. In addition, the proportions of clients and non-clients categorized as extremely poor are 2% and 18%, respectively. The remaining households fall under medium category. In general, from the above discussion we can conclude that clients do have better living condition than non-clients.

To identify the role of rural credit in changing in living condition, further examination of the reasons for positive and negative changes in living condition was conducted. According to the response obtained from sample households, the result had indicated that the first reason for positive

changes in living condition for large proportion of sample clients (58%) is because they have participated in ACSI credit program. The second reason, which comprises 28% of sample clients, was their increased participation in livestock production. . The third reason for 17% of the sample clients was the use of improved agricultural practices (Table 13).

Similarly, reasons for positive changes in living condition for sample non-clients were engagement in new income generating activities for 13%, use of improved agricultural practices, and additional investment on agriculture (specially purchase of oxen) each consisting of same 8%. The contribution of ACSI credit for positive changes in their living condition is directly recognized by more than half of the sample clients. Client households' participation in livestock production was also related to the provision of credit by ACSI for livestock package. The use of improved agricultural practices is also related with agricultural packages supported by training and close follow -up of development agents and Woreda agricultural experts.

Table 13 . Reasons for positive changes in living condition for sample households

Reason	Category					
	Clients (n=108)		Non-clients (n=62)		Total (N=170)	
	No.	%	No.	%	No.	%
Credit from ACSI	43	39.81	0	0.00	43	25.29
Credit other than ACSI (ORDA, Government, Relatives)	25	23.15	3	4.84	29	17.06
Engaged in new income generating activities (self-employment	17	15.71	8	12.90	25	14.71
More involvement in livestock activities	30	27.78	4	6.45	34	20.00
More involvement in vegetable and fruit production	13	12.04	4	6.45	27	15.88
Additional investment in agriculture (oxen, farm implement, etc.)	4	3.70	5	8.06	5	2.94
Use of improved agricultural practices	18	16.67	5	8.06	23	13.53
PSNP – PW	6	5.56	2	3.23	8	4.71
Remittances	20	18.52	45	72.58	65	38.24
Sold in new markets	4	3.70	0	0.00	4	2.35

Source: own survey, 2011

Furthermore, the analysis of the contribution of ACSI credit was under taken through respondents estimate of the proportion of contribution of ACSI credit to the overall changes in their living condition. The majority of clients (40%) responded that the contribution of ACSI credit for positive changes in living condition accounts for up to 20%, whereas, to 18% of respondents, the estimate of contribution was between 41% to 60% (Table 14).

The extent of contribution of ACSI credit in improving their living condition was related to frequency and amount of money borrowed and their effective utilization of the loan by the households.

Table 14. . Contribution of ACSI credit to positive changes in living condition for clients (%)

	Clients (n = 180)	
Contribution of ACSI credit (%)	No.	%
0 – 20	66	61.11
21 – 40	19	17.59
41 – 60	10	9.26
61 – 80	12	11.11
Total	107	99.07

Source: own survey, 2011

On the other hand, a certain proportion of the households had responded negatively in their living condition. The reasons for these negative changes, as outlined by respondents were, poor agricultural season, poor health and less agricultural practices (Table 15).

Households' experience to food shortage

Respondents were asked whether they have experienced food shortage in amount and/or frequency of meals over the past 12 months. Of the sample

clients 39%. and 58% of the clients and non-clients, respectively, responded that they have experienced food shortage over the specified period of time, the remaining households reported otherwise.

Moreover, further queries were made on the duration of food shortage over the past 12 months. In general, the duration for food shortage for clients and non clients was 1.42 and 2.31 months, respectively.

Table 15. Households reasons for decrease/negative changes in living condition

Reasons	Category					
	Clients (n=108)		Non-clients (n=62)		Total (N=170)	
	No.	%	No.	%	No.	%
I have been sick	10	0.93	6	9.68	7	4.12
Poor agricultural season	39	2.78	25	8.06	64	4.71
Could not get credit	0	0.00	15	1.61	15	0.59
Less land	12	0.93	5	8.06	6	3.53
I do not have land	0	0.00	1	1.61	1	0.59
Household member has been sick	0	0.00	4	6.45	4	2.35
Get older	0	0.00	3	4.84	3	1.76
Lack of oxen	0	0.00	1	1.61	1	0.59
Fire hazard	1	0.93	0	0.00	1	0.59
Borrowing from ACSI	1	0.93	0	0.00	1	0.93

Source: own survey, 2011

The result had indicated that clients have faced food shortage at an average for lesser period as compared to non-clients (Table 16).

With respect to the critical period for food shortage, March to August are known to be deficit months of food every year.

Table 16. Mean number of months sample households experienced food shortage in the year 2009/10

Number of months	Category		Total	t	p	r
	Clients (n=108)	Non-clients (n=62)	(N=170)	value	value	value
Mean	1.42	2.31	1.74	-2.538**	0.012	-0.192
SD	1.996	2.519	2.236			

Note: ** Significant at 5% level

Source: own survey, 2011

Households' coping mechanism to food shortage

At times of food shortage, households have different choices or strategies to ease the impact of the food shortage they faced from time to time. In this study, 15 types of strategies were identified. Among these, the three major choices for the two groups were identified.

The first choice or strategy to ease the impact of food shortage was to cut down the number of meals for 21% and 36% of the clients and non-clients, respectively. The second strategy was to cut down amount food in each meal for 19% and 26% of the sample clients and non-clients, respectively. The third strategy was selling of livestock for 18% and 24% of clients and non-clients, respectively (Table 17).

Table 17. Households' choices (strategies) to ease the impact of food shortage

Strategy	Category					
	Clients (n=108)		Non-clients (n=62)		Total (N=170)	
	No.	%	No.	%	No.	%
Cut down number of meals	23	21.30	22	35.48	45	26.47
Cut down amount food for each meal	21	19.44	16	25.81	37	21.76
Borrowed food or cash from relatives	6	5.56	6	9.68	12	7.06
Exchanged food with other relatives	4	3.70	5	8.06	5	2.94
Looked for paid work	13	12.04	8	12.90	21	12.35
Gathering wild plants	17	15.74	13	20.97	30	17.64
Food for work	10	9.26	7	11.29	17	10.00
Migration	12	0.93	21	1.61	33	1.18
Load from money lenders	6	5.56	8	12.90	14	8.24
Using ACSI loan for consumption	1	0.93	0	0.00	1	0.59
Selling of livestock	19	17.59	15	24.19	34	20.00
Sale of household durables	1	0.93	1	1.61	1	0.59
Eating inferior foods	7	6.48	12	19.35	19	11.18
Selling of wood, charcoal, and animal dung	1	0.93	1	1.61	2	1.18
Looking for other self employment	2	1.85	2	3.23	4	2.35
Looking for gift from other relatives	4	3.70	11	17.74	15	8.82
Credit from grain merchants	1	0.93	3	4.84	4	2.35
Look for food aid	1	0.93	5	8.06	1	0.59
Eat less during hungry season	2	1.85	8	12.90	10	5.88

Source: own survey, 2011

Households' level of vulnerability to food insecurity

With respect to households' vulnerability to food insecurity, a number of authors had devised different methods. However, there were a number of attempts to measure households' vulnerability to food insecurity with no success due to various limitations. However, by taking the necessary precautions, the method used by IFAD (2007) was adopted to assess households' vulnerability to food insecurity.

According to IFAD (2007), in order to construct the indicators to identify households that are vulnerable to food insecurity, the household must be

characterized based on the following features: food production or food market dependency, income, asset ownership, income diversification, and crop diversification. The proxies used for each of these components are, respectively, the household's own food production, total household earned income, liquid asset stocks, the number of income sources and the number of crops grown. The first variable is included in the indicator to reflect the source of household food supply. The second indicator was the household's ability to access food through earned revenues. The third reflects the household's ability to cope with short-term food shortages, while the fourth and fifth variables are indicative of the household's strategy in reducing the risk of entitlement failure.

Accordingly, by grouping the data obtained from respondents for each of the five variables into quintiles or five scales (very low to high) the variables were examined to identify households' level of vulnerability to food insecurity. Moreover, the association of households' level vulnerability to food insecurity along with participation in ACSI credit program was assessed.

Households' own food production

Households' own food production was estimated on the basis of the type of crop grown, farm size, quality of land, fertilizers used, and condition of the agricultural season. Using these indicators farmers were first requested to state the amount of products obtained and checked against the WoARD crop assessment report for the Kebele in 2009/10 production year.

If the responses of the farmers highly deviate from the prior assessment made by WoARD, the respondents were requested to justify the reasons for

the deviations. If there were peculiarities attributed to the household and the reason found to be convincing the amount indicated by the household was taken into consideration. Otherwise, the necessary amendment was made on the amount produced based on the reports on crop production assessment made for each crop on average basis.

This was done on one side because in most cases there is disagreement between agronomy experts and Kebele administration because of expectation of more relief food by the Kebele administration though it seems decreasing from time to time. On the other side, there exists poor crop assessment by experts due to poor sampling techniques and biasness that arises from rain fall data for the season.

After getting information on production level for each crop the total amount produced was compared to the annual food requirement of each household based on the family size of each household . Each family member was considered to require 2.36 quintals of grain per year. According to Mulat (1999), the 2200 calories per person per day level set by the Ethiopian government was used as a minimum required for an active and healthy life. This level of calorie intake was calculated to require about 2.36 quintals of grain (cereals or pulses) per person per year.

The result had revealed that large proportion of both clients and non-clients were concentrated in low and medium own production category (Table 18).

Households' annual earned income

Households' annual earned income was calculated on the basis of income obtained from agriculture, self employment, formal employment, informal employment, relief, and remittance by households. The earned income was assessed by placing them into five categories, from very low to very high

income level. Significant differences was observed in earned income between clients and non-clients.

Table 18 . Distribution of sample households by own food production (%)

Households' own food production	Category				Total (N=170)		$\chi 2$ value	p value
	Clients (n=108)		Non-clients (n=62)					
	No	%	No	%	No	%		
Very low (0-20%)	19	17.59	14	22.58	33	19.41		
Low (21-40%)	31	28.70	19	30.64	50	29.41		
Medium (41-60)	33	30.56	13	20.97	46	27.06		
High (61-80%)	16	14.82	7	11.29	23	13.53		
Very high (>=81%)	9	8.33	9	14.52	18	10.59		
Total	108	100.00	62	100.00	170	100.00	3.677	0.451

Source: own survey, 2011

In general, the proportion of clients had increased with an increasing level of income while proportion of non-clients had increased with decreasing level of income (Table 19).

Liquid asset stock of households

Among the various available household asset stocks recorded, those assets considered as liquids are identified on the basis of information obtained directly from respondents, group discussion, key informants, and review of literature. As a result, chicken, sheep and goats were identified as liquid

livestock assets. In addition, jewelries like gold and silver are liquid assets that can easily be changed into money. Therefore, selected livestock type (chicken, sheep and goats), and jewelries (gold and silver) owned by sample households were taken for comparison by putting the sum of the estimated values of these liquid asset stocks into five categories ranging from very low to very high.

Table 19. Distribution of sample households by annual earned income

Annual earned income	Category							
	Clients (n-108)		Non-clients (n-62)		Total (N=170)			
	No.	%	No.	%	No.	%	X^2 value	P valu
Very low (0.00 – 662.00 EB)	14	12.96	20	32.26	34	20.00		
Low (663.00 – 1128.00 EB)	20	18.52	14	22.58	34	20.00		
Medium (1822 – 2923.00 EB)	22	20.37	13	20.97	35	20.59		
High 1822 – 2923.00 EB)	23	21.30	10	16.13	33	19.41		
Very High (> = 2924.00 EB)	29	26.85	5	8.06	34	20.00		
Total	108	100.00	62	100.00	170	100.00	15.157***	0.00

Note: *** significant at 1% probability level
Source: Computation from own survey, 2011

There was differences in proportion of households between the two groups in estimated value of liquid asset stocks they own ($p<0.10$). The proportion of clients increased with an increasing level of income while vice versa holds true for non-clients (Table 20).

Table 20. Distribution of sample households by estimated value of liquid asset stocks (%)

Estimated value of liquid assets	Category: Clients (n-108)		Non-clients (n-62)		Total (N=170)		X^2 value	P value
	No.	%	No.	%	No.	%		
Very low (0.00 – 400.00 EB)	18	16.68	21	33.87	39	22.94		
Low (401.00 – 894.00 EB)	19	17.59	10	16.13	29	17.06		
Medium (895 – 1352.00 EB)	24	22.22	10	16.13	34	20.00		
High (1353.00 – 2070.00 EB)	21	19.44	13	20.97	34	20.00		
Very High (> = 2071.00 EB)	26	24.07	8	12.90	34	20.00		
Total	108	100.00	62	100.00	170	100.00	8.366*	0.079

Note: * significant at 10% probability level; Source: Computation from own survey, 2011

Households' crop diversification

According to IFAD (2007), the proxy indicator for crop diversification is the type of crops grown by the household. On the other hand, Maji and Rahim (1995) define crop diversification as the cultivation of different types of crops requiring different inputs at various points in time. In this study, however, instead of taking the type of crops grown directly as proxy

indicator for crop diversification, the different crops grown were categorized by using certain indicators established during focus group discussion with added expertise idea. The indicators identified and considered to categorize the crops were, purpose of the crop or marketability of the crop, difference in exposure to pest risk, and difference in length of growing cycle (i.e., short or long growing cycle). Although drought is a covariant risk for all rain- fed crops, differences in length of growing cycle for the crops was taken as proxy indicator to identify their relative difference in exposure to drought risk. Growing cycle refers to the time period required by a crop from germination to seed setting or time period they require to ripe to be harvested. Crops with shorter growing cycle are those that take a period of 3 to 4 months to be harvested while crops with longer growing cycle are those that require 5 to 7 months time period to be harvested. On the other hand, all vegetable crops grown through irrigation are placed in a different category. Accordingly, the first category of crops consists of the majority of cereals grown for the household food, with shorter growing cycle, and with similar pest risk. These include, staple cereals such as maize, and sorghum the second crop category comprises maize, sorghum, and millet. These are cereals mainly grown for household consumption with relatively longer growing cycle and have similar pest risk. Teff (third crop category) and pulses (ground nut, and chickpea), fourth crop category, are high value crops grown mainly for market and they can be considered as cash crops for the study area. These crops are with shorter growing cycle and with different pest risk.

The fifth category was vegetable crops (cabbage, potato, onion, tomato, etc.) that are perishables with relatively higher storage and transportation risk as compared to cereals and pulses. Vegetables are marketable and less prone to

drought risks as they are grown in irrigable farm lands, of course, with different pest risk.

The result reveals that 96% of the clients cultivated cereal crops with shorter growing cycle in a total area of 31.457 Ha mainly for consumption, while 89% of the non-clients cultivated same in a total area of 14.054 Ha. Similarly, 30% of the clients grow cereal crops with longer growing cycle in a total area of 4.776 Ha for consumption, while 16.13% of the non-clients cultivated same in a total area of 1.87 Ha (Table 21).

Among the clients, 24% grew teff mainly for market in a total area of 2.765 Ha. whereas, 16.3% of the non-clients grew in a total area of 1.102 Ha. Furthermore, 49% of clients cultivate pulses mainly for market in a total area of 9.376 Ha, while 27% of the non-clients grew in a total area of 2.489 Ha. Moreover, 12% of clients grow vegetables mainly for market in a total area of 3.5 Ha, while 6% of the non-clients grow same in a total area of 1.25 Ha (Table 21).

In general, the proportion of clients exceed the non-clients in all crop diversification categories specially in producing marketable crops (Table 21).

On the basis of responses obtained on types of crops grown, five categories were derived to assess the diversification level from very low to very high (Table 22). Large proportion (53.23%) of non-clients fall into very low category while 46.3% of clients fell into low category. In general clients grew more diversified crops than non-clients.

Table 21. Distribution of sample households by type of crops cultivated (%)

Crop type	Category								
	Clients (n=108)			Non-clients (n=62)			Total (N=170)		
	No.	%	Ha	No.	%	Ha	No.	%	Ha
Sorghum	93	86.11	15.909	47	75.81	8.619	144	84.71	24.528
Maize	78	72.22	12.488	29	46.77	4.404	108	63.53	16.892
Teff	21	19.11	3.060	11	17.74	1.031	32	18.82	4.091
Sub total	104	96.30	31.457	55	88.71	14.054	159	93.53	45.511
Pepper	30	27.78	3.901	10	16.13	1.745	40	23.53	5.646
Sesame	4	3.70	0.50	1	1.61	0.125	5	2.94	0.625
Millet	2	1.85	0.375	0	0.00	0	2	1.18	0.375
Sub total	32	29.63	4.776	10	16.13	1.87	42	24.71	6.646
Lentil	26	24.07	3.498	12	19.35	1.826	38	22.35	5.324
Horse bean	22	20.37	3.222	5	8.06	0.585	27	15.88	3.807
Field pea	10	9.26	2.052	2	3.23	0.375	12	7.06	2.427
Chick pea	4	3.70	0.479	1	1.61	0.063	5	2.94	0.542
Pea	1	0.93	0.125	0	0.00	0.00	1	0.59	0.125
Sub total	53	49.07	9.376	17	27.42	2.849	70	41.18	12.225
Vegetables	26	24.07	2.765	10	16.13	1.102	36	21.18	3.867
Fruit	13	12.04	3.50	4	6.45	1.25	17	10.00	4.75
Total	105	97.22	51.874	56	90.32	21.125	161	94.71	72.999

Source: own survey, 2011

Table 22 . Distribution of sample households by diversification of crops cultivated (%)

Diversification of crops	Category							
	Clients (n=108)		Non-clients (n=62)		Total (N=170)			
	No.	%	No.	%	No.	%	$\chi2$ value	P value
Very low=1	26	24.07	33	53.23	59	**34.71**		
Low=2	50	46.30	19	30.64	69	**40.59**		
Medium=3	24	22.22	9	14.52	33	**19.41**		
High=4	7	6.48	1	1.61	8	**4.70**		
Very high=5	1	0.93	0	0.00	1	**0.59**		
Total	108	100.00	62	100.00	170	**100.00**	16.313***	0.006

Note: *** significant at 1% probability level; Source: own survey, 2011

Overall, the ratings of households on the basis of own food production, earned income, liquid assets stock, number of income sources and types of crops grown was given by using tercile evaluation method (IFAD (2007) (Table 23). It was assumed that belonging to the low tercile contributes nothing to the households' food security measure and takes a value of zero; the medium tercile, 1 point; and the high tercile, 2 points. The partial scores were added for each individual household. Total scores of up to 3 points were presumed to reflect extreme vulnerability, while 4 to 7 indicate medium vulnerability, and from 8 to 12 low vulnerability (Table 23).

As a result, 30% of sample population fell into the category of extreme vulnerability, 58% as medium vulnerability, and the remaining 12% were characterized as low vulnerability to food insecurity. The result had indicated that there was significant difference ($\chi 2=7.383$, $p=0.025$) in proportion of households between the clients and the non-clients across the level of vulnerability to food insecurity (Table 23).

In general, the non-clients are associated with relatively low income, low staple food production, low diversification and scarce assets which make them more vulnerable to food insecurity than clients. Moreover, the result revealed that households' level of vulnerability to food insecurity is negatively associated with their participation in ACSI credit program. Therefore, we can conclude that clients are less vulnerable to food insecurity than non-clients.

Table 23 . Distribution of sample households by level of vulnerability to food insecurity (%)

Level of vulnerability	Category: Clients(n=108)	Category: Non-clients (n=62)	Total (N=170)	$\chi 2$ value	P value
Extreme vulnerability	24.07	38.71	29.41		
Medium vulnerability	59.26	56.45	58.24		
Low vulnerability	16.67	4.84	12.35		
Total	100	100	100	7.383**	0.025

Note: ** significant at 5% probability level; Source: own survey, 2011

Results on further analysis reveal that clients' level of vulnerability to food insecurity is negatively associated with amount and frequency of borrowing. As the frequency of borrowing and amount borrowed increases, the level of vulnerability of clients to food insecurity is reduced. This indicates that the mere participation of households in ACSI program credit doesn't reduce the households' vulnerability to food insecurity, rather, in addition to the utilization of loan for the intended purpose, reducing households vulnerability to food insecurity largely depends on amount and frequency of borrowing. Taking into account the heterogeneous capabilities of households, determining the threshold level for the amount and frequency of borrowing which is expected to reduce households' vulnerability to food insecurity is beyond the objective of the study and requires further study.

Nevertheless, in this study, an attempt had been made to examine the association of size of loan, frequency of borrowing, and proportion of loan used for intended purpose with clients' level of vulnerability to food insecurity using correlation analysis. Moreover, F-test and Chi-square test, respectively, were conducted to test the significance of the mean difference in amount and frequency of borrowing, and the percentage of loan utilized for intended purpose among the vulnerability groups.

Accordingly, the findings indicate that for the clients, the borrowing period ranges from 1998 to 2006. The average frequency of borrowing was 1.76 ranging from 1 to 5.. In addition, the average size of loan borrowed was 2408.89 EB per household ranging from 360.00 EB to 17400.00 EB. Moreover, the amount of loan utilized for the intended purpose was 91%.

Similarly, by using the same attributes clients were also evaluated based upon their level of vulnerability to food insecurity. Clients belonging to the category of extreme vulnerability to food insecurity had borrowed at an average 1568.46 EB with an average frequency of borrowing 1.5 and 96% utilization of loan for intended purposes.

On the other hand, clients falling in the category of medium vulnerability to food insecurity had borrowed at an average loan amounting to 2123.91 EB with 1.80 frequency of borrowing and 94% utilization of loan for intended purpose. The low vulnerability category of households had borrowed, on average 4636.11 EB which is almost twice the overall average for clients, and with highest frequency of borrowing (2.0) and the utilization of loan for intended purpose (76%) (Table 24).

The frequency of borrowing and size of loan borrowed are negatively associated with clients' level of vulnerability to food insecurity. While percentage of loan used for intended purpose is positively associated with the clients' level of vulnerability to food insecurity.

The lowest percentage of utilization loan for intended purpose observed in low vulnerability category of clients may be due to the reason that the large size of loan they borrowed enables them to use it flexibly. These clients other than using the proportion of the loan for immediate consumption, they can use the loan for other productive purpose or asset accumulation. This was consistent with the information obtained during focus group discussion and key informants interview. On the other hand, though the medium and extreme vulnerability categories reported relatively better proportion of loan utilization for the intended purpose, the remaining proportion of loan is

mostly used for immediate consumption. This has a far reaching implication on repayment of loan and the sustenance of food security of the households.

In conclusion, within the limit of loan size, clients who had borrowed large amount of loan and who had used the loan for the intended purposes were more likely became less vulnerable to food insecurity.

Table 24 . Clients' level of vulnerability to food insecurity, frequency of borrowing and amount borrowed

	Level of vulnerability						
	Extreme(n=26)	Medium (n=64)	Low (n=18)	Total (N=108)	F /χ2 value	P value	r value
Mean frequency of borrowing	1.5	1.80	2.0	1.76	2.757*	0.068	-0.221
Mean amount borrowed (EB)	1568. 46	2123.91	4636.11	2408.89	11.524***	0.000	-0.375
Loan amount used for intended purpose (%)	95.62	93.97	75.67	91.31	85.971**	0.035	0.272

Note: ***, **, * significant at 1%, 5%, and 10% probability level; Source: own survey, 2011

Clients experience towards ACSI credit and savings program

Although it seems beyond the objectives of the study, assessment of some of the issues related to services rendered by the institution in terms of clients experience towards the services had been carried out. The result indicates

that clients have different practical experience towards ACSI's credit and savings program. The Majority of the clients 73%, 73%, and 65% have responded that their experience towards the size of loan, eligibility criteria, and repayment schedule, respectively, is positive (Table 25). Whereas, 64%, 32% and 28% of the clients have negative experience to group responsibility for repayment, compulsory savings, and level of interest rate, respectively.

Of the clients, 7% and 21%, respectively, have negative experience towards efficiency on processing the loan application as well as supervision and technical assistance of ACSI staff. The implication is that the ACSI staff members are required by clients to increase their efficiency on processing loan application as well as supervision and technical assistance in order to satisfy clients on the service delivery and enable clients to use the loan effectively and efficiently.

b. Non-clients reasons for not participating in ACSI credit and saving program

Non-clients were also asked whether they have tried to become a member of loan group in ACSI. The majority (73%) responded that they haven't tried to become members of loan group while the remaining (27%) responded otherwise (Table 26).

Table 25. Distribution of clients by their experience to ACSI credit and saving program, (N=108) (%)

Attribute	Negative	Fair	Positive	Very positive	Total
Eligible criteria	1.85	24.07	73.15	0.93	100
Group responsibility for repayment	63.89	8.33	27.78	0.00	100
Loan application processing Efficiency	7.41	33.33	56.48	2.78	100
Size of loan	3.70	20.37	73.15	2.78	100
Loan utilization flexibility	4.63	34.26	54.63	6.48	100
Repayment schedule	12.04	23.15	64.81	0.00	100
Level of interest rate	27.78	25.93	45.37	0.93	100
Compulsory saving	32.41	19.44	43.52	4.63	100
Supervision and technical assistance	21.30	26.85	50.00	1.85	100

Source: own survey, 2011

The respondents have different reasons for not trying to become a member of loan group. Among others, the three major reasons and the proportion of respondents are fear of indebtedness (58%), taking group responsibility is unacceptable (30%), and no need of credit (24%).

Table 26 . Distribution of non-clients by reasons for not trying to become a member of loan group in ACSI, (N=62) (%)

Reasons	Number of households (%)
No need of credit/Due to religious reasons	24.19
Unable to form group	3.23
Unable to meet compulsory saving requirement	1.61
Taking group responsibility is unacceptable to me	29.67
Group require members to pledge asset as collateral	1.61
Group meeting requirement is time consuming	1.61
Unhappy with the repayment time and length of ACSI loan	1.61
High interest rate	3.23
Fear of indebtedness	**58.06**
Conflict with credit and saving committee	1.61
Lack of knowledge of ACSI's activities	1.61
Feel that I do not fulfill the criteria	1.61
Disagreement with spouse over taking the loan	3.23

Source: own survey, 2011

Those non-clients who have tried but failed to become members of ACSI loan group were also asked to identify the reasons for their failure to participate in program credit. According to their response the reasons that impeded them from becoming member of loan group and the percentage respondents are conflict with credit and saving committee (55%), unable to form a group (28%), family problem or domestic conflict (10%), and absence during delivery time (7%) (Table 27).

Table 27. Distribution of non-clients by reasons for failure to become loan group members in ACSI, (N=62)

Reasons	Number of households (%)
Unable to form group	27.59
Conflict with credit and saving committee	55.17
Family problem or domestic conflict	10.34
Absence at the time of delivery	6.90

Source: own survey, 2011

CONCLUSIONS

Credit facility by ACSI in reducing households' vulnerability to food insecurity has been demonstrated by this study. Agriculture is the primary source of income for the large proportion of both sample clients and non-clients followed by PSNP, and self employment. The survey results indicated also that the annual mean income obtained by clients of ASCI has far excelled that of non-clients based on the assessment of two years result. In terms of income diversity, sample clients had participated in larger number of income sources. In addition, larger proportion of clients had also participated in more remunerative development activities.

Age, sex, education level of household head, family size, number of economically active members of the household, farm size and livestock holding were positively related to households' participation in ACSI credit program. Due to being associated with ASCI larger proportion of clients have cash savings as compared to non-clients.

With respect to changes in households' living condition over the past five years, many clients have perceived that their overall living condition has improved as a result of their participation in ASCI credit program.

With respect to households' experience to food shortage over the past 12 months, larger proportion of non-clients had experienced food shortage in amount or frequency of meals for larger number of months.

With regard to households' level of vulnerability to food insecurity, there was significant difference between the two groups. More of the non-clients fall under extreme vulnerability category while relatively more clients fall under medium vulnerable and less vulnerable categories. Thus, rural households' level of vulnerability is negatively associated with their participation in ACSI credit program. In general, the result indicates that non-clients are associated with relatively low income, low staple food production, low diversification of income sources and scarce assets which make them relatively more vulnerable to food insecurity than clients.

Mere participation of households in ACSI credit program doesn't reduce the vulnerability of households to food insecurity; rather, in addition to the utilization of loan for the intended purpose, it also depends on amount and frequency of borrowing.

The major reasons for non-clients not to become members of ASCI loan group were fear of indebtedness, unacceptability of group responsibility,, and no need of credit (due to religious reasons).

In summary, it is obvious that ACSI has been playing a considerable role in alleviating the financial constraint of rural households and it has traveled long distance in terms of outreach and depth. However, for better attainment

of the institutions' objective still there is a need to maximize efforts and make necessary arrangements specially in addressing the able but poor rural households.

To further increase outreach and depth of the institution's services raising the awareness level of the population about the services through print and electronic media, public meeting etc. is required. This will help to minimize fear of households for indebtedness and/or to improve risk orientation of the households as it has affected significant number of eligible households to refrain from participating in the program. The awareness raising should be supported with added information about the available niches for rural households in on-farm and non-farm self employment that can be exploited through increasing their financial capabilities. This should take into consideration that the heterogeneous capabilities of households and spatial differences. To this end, increasing the effort in identifying more remunerative activities is also required. This includes along with own food production focusing on the type of livestock, such as, sheep and goats fattening, poultry production, high value crops production and petty trade, which are considered as more remunerative activities in the study area.

The approach in the implementation of the program should focus on households rather than only the heads of the household. This will reduce domestic conflict in the households and increase the number of clients and improve the utilization of loan for intended purpose. Moreover, clients should be trained and consulted for effective utilization of the credit. The ACSI staff has to be trained as how to provide efficient services in processing loan applications, how to provide technical support and training in credit, finance, and business management, and how to undertake

supervision. Similarly, to avoid complaints and conflicts among clients and Kebele credit committee and deliver efficient service training for Kebele credit committee is also required. Although the availability of alternative financial services or institutions for the rural households are important, in some cases overlapping of the services are resulting in inefficient utilization of the resources. As a result, there is a need for institutions that deliver financial services to revisit their approaches in terms of dimensions of their services and selection of target groups.

References

Abdulai, A. and A. C. Rees, 2001. Determinants of Income Diversification amongst Rural Households in Southern Mali. Food Policy 26 (2001) 437–452. Department of Agricultural Economics, Swiss Federal Institute of Technology, Switzerland. [On line] Available from: http://www.mpra.ub.uni-muenchen.de/8050/1/MPRApaper8050.pdf. [Accessed on 15 February 2011].

ACSI (2008). The 2006-2010. Strategic Business Plan. Revised in 2008. Bahir Dar.

ACSI, 2010. Annual Reports on Credit and Savings Activities (2004-2009), published Magazine. ACSI, September 2004 E.C No. 16. Annual Reports on Credit and Savings Activities published Magazine.

Bananuka, J., 2006. Biotechnology Product Development and Diffusion in Africa: Case Studies on Product Development partnerships. BIO-EARN, SIDA.

Canagarajah, S., C. Newman and R. Bhattamishra, 2006. Non-farm Income, Gender, and Inequality: Evidence from Rural Ghana and Uganda. Food Policy 26 (2001) 405–420. World Bank, Elsevier Science Ltd., Washington D.C. [On line] Available from: http://www.ingentaconnect.com/content/els. [Accessed on 13 October 2011].

Chang. H., 1997. Cooking Coal Procurement Policies of the Japanese Steel Mills: Changes and Implications, Resources Policy 23 (3): 125 - 135.

Ellis, F., 2002. Rural Livelihood and Diversity in Developing Countries. Pp. 37, 38. New York: Oxford University Press.

Ellis, F., 2002. Rural Livelihood and Diversity in Developing Countries. Pp. 37, 38. New York: Oxford University Press.

Ersado, L., 2006. Income Diversification in Zimbabwe: Welfare Implications from Urban and Rural Areas. World Bank Policy Research Working Paper 3964. The World Bank, Washington D.C. [On line] Available from: http://www-wds.worldbank.org./servlet/WDSContentServer /WDSP/IB/2006/07/11/.pdf. [Accessed on 5 January 2012].

International Fund for Agricultural Development (IFAD), 2007. Household Food Security and the Role of Women IFAD's Experience in Guatemala. [On line] Available from: http://www.ifad.org/gender/thematic/guatemala/guat_2.htm. [Accessed on 15 June 2011].

Minot, N., M. Epprecht, T. Tran Anh and L. Q. Trung, 2006. Income Diversification and Poverty in the Northern Uplands of Vietnam. International Food Policy Research Institute, Washington D.C. [On line] Available from: http://www.hpai-research.net/docs/rbr01.pdf.[Accessed on 15 January 2011].

Mulat Demeke, 1999. The Challenges of Increasing Food Production in Ethiopia. In: Alemayehu Geda and Berehanu Nega (eds.). The Ethiopian Economy and Performance. Proceedings of the Eighth Annual Conference of the Ethiopian Economy, Nazreth, Ethiopia.

NBE (National Bank of Ethiopia), 2010. Annual Report 2009/10. Addis Ababa, Ethiopia. Oxford Dictionary of English, 1998. UK: Oxford University Press.

Rees, C.A., 2002. Rural Household Strategies in Southern Mali Determinants and Contribution of Income Diversification to Income Level and Distribution. Reprint Thesis No. 14,596. Swiss Federal Institute of Technology, Zurich. [On line] Available from: http://www.sgasse.ch/media/archive1/zeitschrift/rieder/fsr07croleree s_v2.pdf. Accessed on 15 December 2011].

Schwarze S., 2004. Determinants of Income Generating Activities of Rural Households: A Quantitative Study in the Vicinity of the Lore-Lindu National Park in Central Sulawesi/Indonesia, Dissertation Geboren