

ACCESS TO IMPROVED SEEDS AND ITS EFFECT ON FOOD SECURITY OF POOR FARMERS

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ABSTRACT

This paper presents a post intervention assessment of improved seed access beneficiaries in southern Ethiopia. The primary objective of the assessment was to investigate whether seed access really counts on food security or not. Through a multistage stratified sampling, 330 households were selected and qualitative and quantitative data were collected. The findings of the study revealed that significant achievements have been observed as a result of seed access ranging from harvesting higher yield, to improving dietary diversity; intake and meal frequency. Importantly, seed access have reduced months of food shortage; implying their food security situation improved. Among 84.7% of the seed beneficiaries who disclosed improvement of their livelihoods, 27.3%, 37.5% and 41.5% of them respectively have purchased heifers, farm implements; and started saving and about 51.2% became debt free. With respect to annual income, seed beneficiaries earned 41.8 % higher income than non-beneficiaries. Therefore, sustainable access to improved seeds by chronically food insecure people should be ensured in the long run in order to improve food security.

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INTRODUCTION

Ethiopia is predominantly an agrarian country where agriculture is the dominant economic sector of which the crop sector contributes much for food security and seed plays an important role in increasing crop production. Its agriculture is characterized by the use of inadequate production technologies that in a variable climate produces important fluctuations in crop yields, uncertainties, and food insecurity. Nationally two thirds of farmers do not have access to improved seeds and they only use the local varieties since the improved seeds are very expensive (IFPRI, 2010). Similarly, only one third of farmers in the study area have access to improved seeds (Adugna, 2013). Through livelihood resilience project and protection of depletion of livelihoods asset and improving coping strategies. The main aim being reducing food and nutrition insecurity through improved food availability, access for targeted populations by enhancing access to capital and household assets. The project provides technical and material inputs like improved seeds of Maize, Haricot Bean, and Sweet Potato cuttings, poultry and other livelihood schemes.

The beneficiaries were systematically selected through participatory selection process and all are chronically food insecure. This assessment hence expected to answer whether the provision of seeds to chronically food insecure people have counted on food security or not. The primary objective of this study is to assess the role of seed access on the livelihoods of beneficiaries.

The study areas and sampling

Wolayta is one of the zonal administrations of Southern Nations, Nationalities and Peoples Region (SNNPR) in Ethiopia. It is one of the most densely populated parts of Ethiopia. The major economic activities are crop production (production of root crops and cereals – predominantly maize), and livestock rearing. Seasonal migration is also another means of livelihood for majority of rural youths. The study areas Boloso Sore and Damot Pullasa are two of the 12 *woredas* in Wolayita Zone and they are bordered with one another.

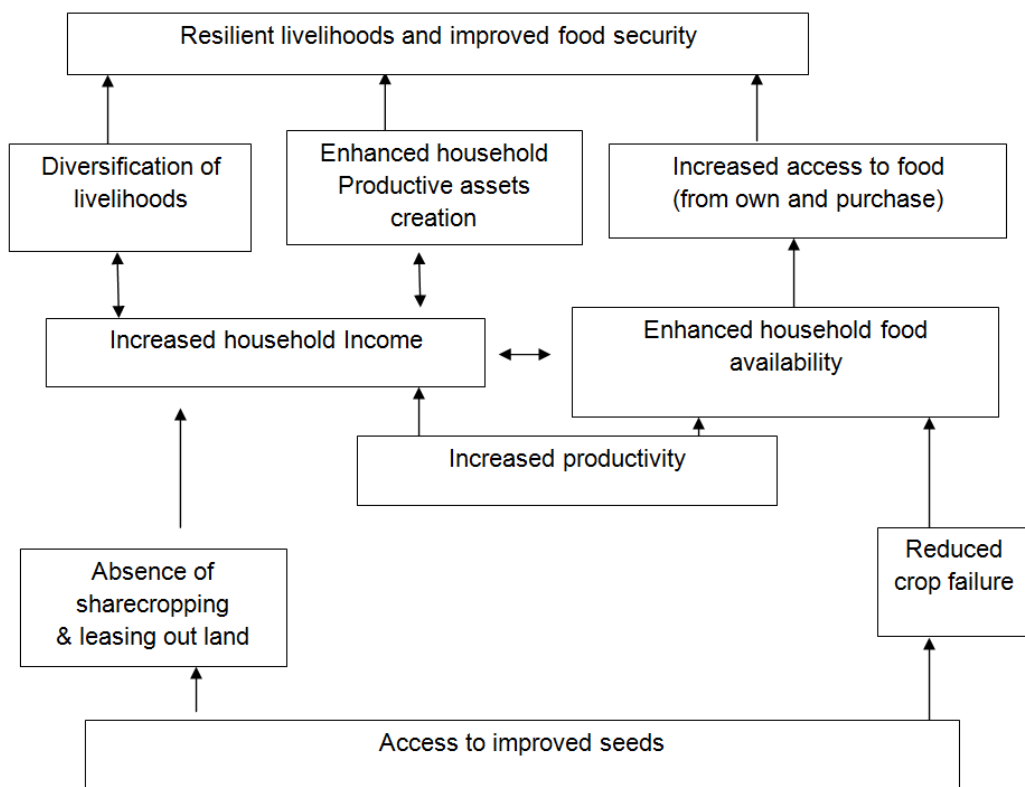


Figure 1. Conceptual framework

Table 1. Socio-demographic characteristics of respondents

Average	Beneficiaries	Non beneficiaries	Boloso sore	Damot pullasa	Total
Education	2.78	1.64	2.43	2.65	2.26
Family size	5.78	5.58	5.43	6.06	5.69
Active labor	2.55	2.5	2.22	2.33	2.53
Age	39.4	39.54	39.78	38.99	39.46
Sex					
Male	72.2	57.5	58.9	75	65.5
Female	27.8	42.5	41.1	25	34.5
Marital status					
Single	2.8	2.1	3.7	0.8	2.5
Married	78.4	68.1	67.4	83.1	73.3
Widow	18.8	29.9	28.9	16.2	23.6

Source: Survey, December, 2013

Based on the 2012 data from *woredas* office of agriculture they have a total population of 210,639, and 108,328 respectively. The study districts are chosen for a Livelihood and Disaster Risk Reduction (DRR) program. A three-stage stratified systematic sampling procedure was used to select sample households. To have samples with different livelihood patterns, highland, midland, and low land areas as well as; moisture stress and moisture rich kebeles were selected. A total of 330 samples, 180 beneficiaries and 150 non-beneficiaries were covered by this study. Since, the purpose of this study is to see the comparative livelihood effect of each commodity; proportional samples were drawn by commodity.

Data collection and survey methods

The survey adapted commodity systems assessment methodology for problem identification (LaGra, 1990) and used a participatory approach where the beneficiaries, non-beneficiaries, and woreda level stakeholders are involved. Specifically, Participatory Rural Appraisal tools (PRA) including Focus Group Discussions (FGD), and Household Survey were used. The methodology was based on questionnaires addressed directly to the beneficiaries and non-beneficiaries. Primary data on post-harvest handling, storage & gaps, increment in yield and yield loss, marketing, income, access to agricultural inputs, food shortage and households coping mechanisms, constraints of crop production, were gathered from the selected households through structured interview. Focus Group Discussions (FGDs) were held at each kebele and both men and women were involved. Further, key informant interview (KII) with experts, primary cooperatives leaders was held. In order to record success stories, case stories of successful beneficiaries were gathered. In addition to primary data; secondary sources included published and unpublished information about seed supply and crop production in particular. In interpreting findings, data from baseline and project progress reports as well as woreda agricultural reports were used.

Data analysis and interpretation

Qualitative data gathered through FGDs, KIIs was described soon after field visit. Quantitative data gathered through interview was entered to excel sheet starting from the middle stage of data collection by one professional data filler. Soon after data entry, data screening and checking for outliers was done. Data analysis was done on 320 respondents due to delayed reporting of some questionnaires and time shortage. Descriptive statistics like mean, standard deviations, percentages, histograms, and cross tabulation were used to present data.

Conceptual framework of the study

The conceptual framework below is used to guide the livelihood impact of seed access is indicated in Figure 1. The framework highlights the different levels of direct and indirect benefits of improved seed use. Access to improved seed would help poor farmers to use their unused land and the land that they might lease out for rich farmers. In addition; this could reduce crop failure and increase land use efficiency so that yield will improve. Increment of yield can enhance availability of food to the household or increase income. This could enhance access to productive assets and finally the household would have built resilience against any shocks.

RESULTS AND DISCUSSION

Socio-demographic characteristics of respondents

Age, sex and the number of active force are the most important factors that affect capability of farmers. Education has been widely perceived as one of the most important socio-economic determinants of household poverty. The average education level achieved by respondent was 2.26 years of schooling with 53.4 households have no formal education; and the maximum schooling attained was 10+3. The family size and the number of able bodied active family members is 5.8 and 2.53 people. About 34.5% of the interviewed households are women-headed. About 73.3% of respondents were married, while 23.6 were widows. Comparison with respect to socio-demographic factors shows that beneficiaries have higher level of education, family size, married, and men respondents than non-beneficiaries. Since the respondents are from the poor sections of the community, if family size continues at the same rate, many people will be landless after certain years. This is especially the case where expansion of good-quality crop land is nearly exhausted, as in the study area. In such cases, further production growth must come primarily from yield growth (Jayne and Daniel 1995; Samuel, 2006). Comparison of household socio-demographic characteristics indicates that there is a significant variation with respect to average family size, sex composition and marital status between Boloso Sore and Damot Pulasa. This implies that there are more family members, male heads and married households in Damot Pullasa than Boloso Sore. However, there are no visible variation with respect to age, active labor and education level of respondents between the two woredas.

Crop production

Mixed farming (crop and livestock) is the dominant livelihood activity in the study woredas (56.8%). Although, crop farming dominates livelihoods of farmers, livestock keeping is also an integral part of farming. This indicated that the core means of livelihood for respondents is from crop and livestock (Fig 2).

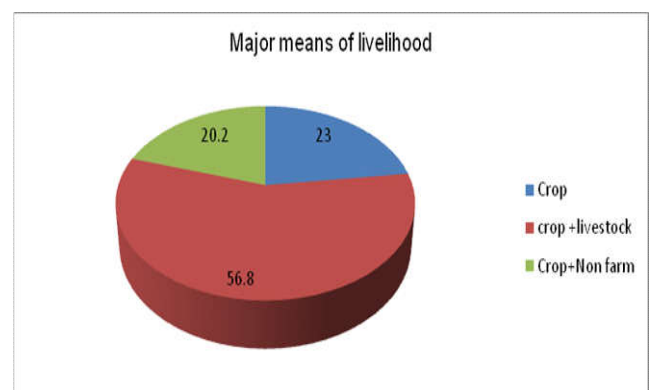


Figure 2. Major means of livelihood

Average yield obtained from major crops

According to experts FGDs, the survey year is relatively good than the prior year in terms of receiving timely and adequate rain. Yield increment for crops of investigation is ensured by access to improved seeds (Table 2). As expected, improved seed use has significantly contributed towards achieving household's goal of increased production.

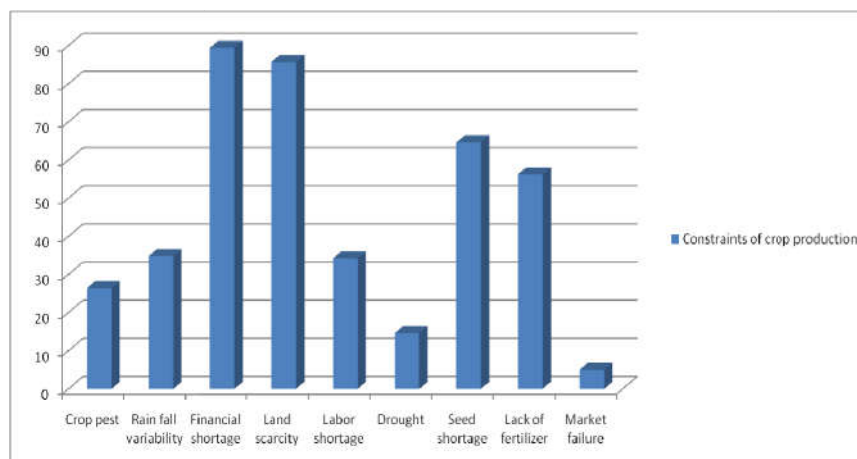


Figure 3. Constraints of crop production

Table 3. Access to improved seeds and fertilizer

Improved seed	Other sources	Seed access	Fertilizer
Maize	33.9	25.8	55.0
Sweet potato	4.7	4.7	1.60
Haricot bean	29.8	24.2	44.4
source of improved seeds			
Office of agriculture	11.8		
Seed access	54.7		
Market	68.3		

Source: Survey, December, 2013

Table 4. Access to fertilizer and credit

Access to	Beneficiaries	Non beneficiaries	Boloso Sore	Damot Pullasa
Fertilizer				
H/ bean	69.9	30.1	64.3	65
Maize	66.1	33.9	35.7	35
Credit	54.0	46.0	58.5	41.5
Source of credit				
Relatives	46.3	53.7	53.7	46.3
Local money lenders	56.7	43.3	68.8	39.2
Microfinance	66.7	33.3	76.2	23.8

Source: Survey, December, 2013



Figure 4. Reasons for not accessing fertilizer

However, it should be noted that data related to yield, and income was not absolutely free from the respondents' conservative character to provide accurate information on the applied questionnaire. But to lessen these trouble different methods were used like convincing farmers about the objectives of the study, selecting better enumerators who are working and living with respondents.

The major crops grown by sample households during the survey period are maize, sweet potato, teff, coffee, Irish potato, and haricot bean. The survey data revealed that average size of total and cropped land holding was 0.35 ha and 0.31 for beneficiaries and 0.29 ha and 0.26 ha for non-beneficiaries respectively. In both woredas land shortage is an acute problem due to population growth.

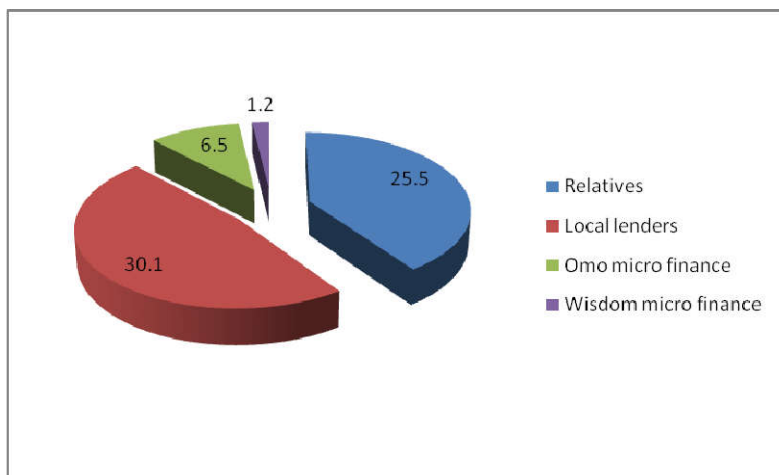


Table 5. Access to market by respondents

Where did you sell	%	When did you sell	%
Farm gate	13.5	After a week	10.8
Village market	24.9	After a month	47.7
Woreda market	58.6		

Source: Survey data, Dec, 2013.

Table 6. Food security status

	Beneficiaries	Non-beneficiaries	Difference
Number food shortage months	4.86	5.32	0.46
Received food access	69.1%	30.1%	39.0

Source: Survey data, December, 2013

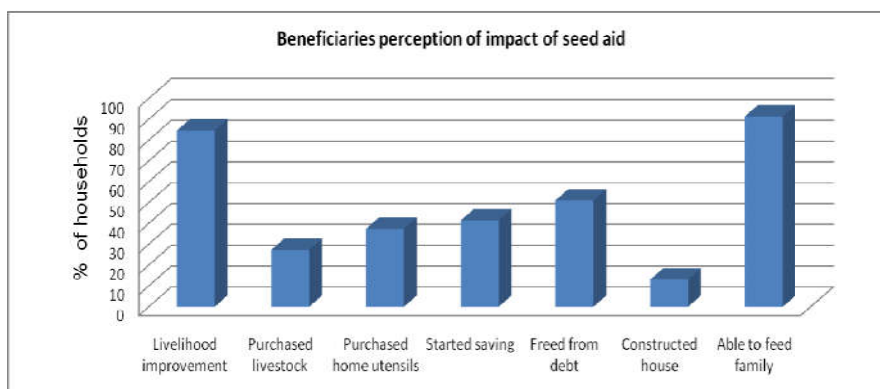


Figure 6. Beneficiaries' perception of livelihood improvement

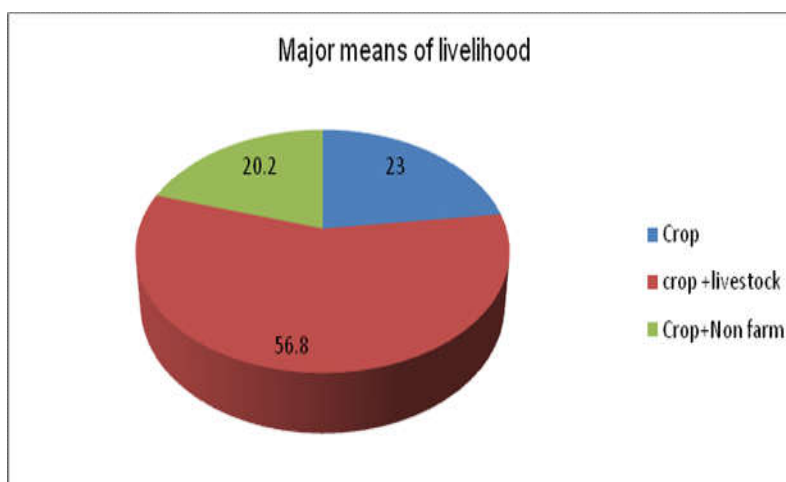


Figure 7. Major means of livelihood

The contribution of the seed access to household production can be derived from available estimates of the average yield obtained per hectare. Beneficiaries and non-beneficiaries obtained an average yield of 59.65 q/ha and 39.13 q/ha of maize and 162.87 q/ha and 149.83 q/ha of sweet potatoes as well as 24.37 q/ha and 17.42 q/ha of haricot beans. Beneficiaries have harvested higher yields for all crops except teff.

to personal, environmental, and reporting factors. The amount of produce used for home consumption and sold varies from crop to crop. About 98% of the sweet potato produced is used for home consumption and preserved for seed, while about 71% and 69.2% of maize and haricot bean was used for home consumption. Other crops like Teff (48.1%), taro (79.3%), potato (67.2%) of the total produce were consumed.

Table 7. Crop production and yield increment

	Beneficiaries	Non beneficiaries	Difference
Maize	59.65	39.13	20.52
Sweet potato	162.87	149.83	13.05
Haricot bean	24.37	17.42	6.94

Source: Survey, December, 2013

Table 8. Income source and average income

Source of income	Beneficiaries	Non beneficiaries	Difference
Crop sale	1804.31	1283.79	501.11
Livestock	1816.33	1378.57	437.76
Livestock product	683.00	688.64	5.64
Wage work	530.11	559.88	29.78
Firewood& charcoal	452.61	342.78	109.83
Renting land	778.33	1187.50	409.17
Safety nets	1101.22	1633.16	531.94
Petty trade	482.04	505.00	22.96
Handcrafting	567.41	433.53	133.88
Total	3136.11	2210.40	925.71

Source: Survey, December, 2013

Table 9. Food security indicators of beneficiaries and non-beneficiaries

	Increased	Same	Reduced
Diversity of meal			
Beneficiary	61.3%	15.6%	23.1%
Non beneficiary	11.1%	20.8%	67.4%
Quantity of meal			
Beneficiary	69.4%	11.0%	19.1%
Non beneficiary	16.6%	32.4%	51.0%
Family income			
Beneficiary	67.6%	12.1%	19.7%
Non beneficiary	9.0%	28.3%	62.8%
Quality of meal			
Beneficiary	57.2%	23.7%	19.1%
Non beneficiary	7.0%	29.4%	63.6%

Source: Survey data, December, 2013.

Table 10. Household expenditure

Expenditure	Beneficiaries	Non -beneficiaries	Difference
Food	2329.36	2174.4	154.96
Non Food	1083.80	748.10	335.71
Total	3413.16	2922.5	490.67

Source: Survey data, December, 2013

The increase in crop production for beneficiaries has been mainly from improved seed access and that of lower yields due to limited use of modern inputs by non-beneficiaries. Farmers FGDs also indicated that almost all households had eaten green maize and the availability of maize seed is an important contributor to food security and income. Table 3 also shows that there are variations between the two beneficiary woredas with respect to the amount of yield obtained. For instance, more maize per hectare was reported in Damot Pullasa than Boloso sore. In contrary, more quintals of sweet potato per ha is reported in Boloso Sore than Damot Pullasa. The variations between the two woredas in yield obtained may be attributed

This evidence has ensured that improved seed access is a guarantee for increased food supply and ensured food security. The average price for one quintal maize and haricot bean is 600 and 700 Ethiopian birr respectively. About 26.1% of the respondents sold immediately after the harvest, and not waits for some extra months when they could get more money, whereas; 47.7% waited at least a month adjusting time to sell their harvest (Table 7). The quality of yield produced also varies between commodities. Majority of the respondents reported that quality of maize (47.7%) and haricot bean (46.7%) products were good. Numerous constraints to yield and productivity growth have been identified, including lack of

access to improved seeds and fertilizer, inadequate and delayed rain, and constraints in market development. There is evidence suggesting that many of the non-benefiting farmers have not used seed-fertilizer together due to cost, of fertilizer. According to the report from office of agriculture from 2011 to 2013; the price of improved seeds has been inflated. The price of teff (kunchu) inflated from 55 to 296; wheat (HAR 604) from 245 to 235.5; Maize (pioneer) from 533.91 to 577.75 birr per 12.5 Kg. respectively. The major constraints to crop production were financial and land shortages, while lack of improved seed and fertilizer brought a significant challenge.

Access to farm inputs

The national strategy road map for poverty reduction realizes that poverty reduction in Ethiopia is impossible without significant growth in crop yields. Thus, improving farmers' access to fertilizers, improved seeds supply, agricultural credit and other inputs is given due emphasis. Thus, improving farmers' access to fertilizer, improved seeds supply, agricultural credit and other inputs is given due emphasis.

Access to seed: the role of seed in

Farmers can access seeds from different sources; from office of agriculture; or purchase from local market or from other farmers and others from NGOs. When the people were asked about their main source of improved seeds, 68.3% success they purchased from market, 54.7% seed access, and only 11.8% got through office of agriculture. The seed use profile of respondents indicated that only 33.9%, 29.8%, 4.7% respectively (Table 3) have utilized improved seeds of maize, haricot bean and sweet potatoes respectively.

Access to fertilizer

According to a recent IFDC assessment, Ethiopia must double its fertilizer use to meet the nation's Growth Transformation Plan (GTP) crop production targets by 2015 (IFDC, 2013). According to CSA, only 39 percent of Ethiopian farmers and according to ERSS survey 35% use fertilizer (IFPRI, 2012). The baseline survey also indicated that only 37% of the investigated communities had access to fertilizer. Thus, meeting the national target will be difficult since poor farmers are lagging behind utilizing fertilizer. The major source of fertilizer is through the federal ministry of agriculture. The distribution of fertilizer is commonly limited in agricultural relief programs as its controlled by the federal government. Very poor farmers do not afford to buy fertilizer. According to experts FGDs, the quota system of distributing fertilizer to rural households is not without criticism. The quota approach prescribes every kebele must distribute the amount prescribed for to all of its dwellers. As a result, poor farmers receive fertilizer on credit and sell through informal channels to local merchants to meet their immediate cash needs.

While asked whether they have applied fertilizer or not to the crops they had grown, 69.9% of the beneficiaries and 30.1% of the non-beneficiaries have reported that they used fertilizer. Proportions of fertilizer use by beneficiaries are significantly higher than that of non-beneficiaries and this implies the fact that access to improved seeds would enhance access to fertilizer. However, an important issue here is that not all of the beneficiaries would be able to apply fertilizer. This implies that access to fertilizer by the poor sections of the community

is limited. Overall, while rating the reasons of poor access to fertilizer nearly half of them mentioned lack of finance, and one third of the farmers indicated fear of debt, expensiveness and land shortage (Figure 4). Thus, reforms are needed to improve fertilizer distribution and to accelerate growth in fertilizer use by small farmers (Mellor and Dorosh, 2010).

Access to credit

Poor farmers lack finance to purchase agricultural inputs like seeds, fertilizers and chemicals. Thus, availability and accessibility of credit by the poor is of paramount importance. The effort made by federal and regional governments so far to create access to finance is encouraging. However, access is still a major challenge. In the context of the study areas; there are two formal sources of credit institutions: Omo and wisdom microfinance institutions. When farmers want to get credit from these formal institutions, they must come with a financial statement from the bank that states the client has proven saving of up to 20% of the amount s/he want to borrow which perhaps is difficult for the poor. In addition, it is mandatory to have a guarantee and collateral to access credit. As a result of the above constraints the number of farmers who accessed credit does not exceed 54% and 46% of the beneficiaries and non-beneficiaries respectively and more than half of those who used credit accessed credit from relatives and local money lenders (Fig 5). The share of omo and wisdom micro finance institutions is little. Thus, availability of credit service does not ensure access and mechanisms have to be sought by institutions to allow the poor access credit.

Access to market

All over the rural areas of Ethiopia; market access and marketing facilities are the major constraints influencing farmers' livelihoods. Over half of the farmers used woreda / local market to sell their produce, while 67.9% of them sell directly to wholesalers. About 26.1% of the respondents sold immediately after the harvest, and not waits for some extra months when they could get more money, whereas; 47.7% waited not more than a month to sell their harvest when prices are lowest due to immediate cash needs (Table 5). As a result, only 39.3% of the respondents indicate that the price for their produce is fair, while above half dissatisfied with the price level. Especially there is a lack of a fully functioning market for maize and haricot bean. Since the investigated farmers are non-surplus producers that do not have full market information services from relevant institutions. Rural markets in Ethiopia in general are thin and the transaction costs of entering are high due to the lack of transport infrastructure (Tucker and Leulseged, 2010).

Food security situation

Significant parts of Ethiopia are characterized by persistent food insecurity (FDRE, 2003). Similarly, about 69.1% of the beneficiaries and 30.1% of non-beneficiary households have received food assistance during the survey period. This indicate that majority of the beneficiaries of seed are food access dependents. All of the investigated households reported that they face food insecurity at least for three months. The post-harvest survey found that beneficiaries and non-beneficiaries had run out of their own-produce and faced severe months of food shortage for 4.86 and 5.32 months respectively; implying that – in the absence of food and seed access – the number of food shortage months would be more than this.

The difference between beneficiaries and non-beneficiaries' with respect to months of food shortage is statistically significant.

Overall effect of seed access

It is clearly evident that this seed access project has had significant impacts in the lives of the beneficiaries of the two woredas. This can be seen through a number of indicators such as improved productivity, increased income, improved food availability and enhanced access to livelihood assets like livestock, home utensils, and house. In most FGDs, communities believed that the livelihood of seed beneficiaries has been improved. Importantly, the beneficiaries have been able to feed their family and reduced months of food shortage. Specifically, households who took maize and haricot bean seeds have earned income and started new business. As sweet potato can be grown in relatively marginal soils with very low (or no) levels of external inputs, it is particularly important for a large number of resource poor farmers. The high vitamin A content of many of the sweet potato varieties is viewed as important by nutritionists not only for its role in child developmental health but also because of the high incidence of households with HIV-positive members (Stathers, 2005).

The priority need expressed by almost all communities was for the continuation of this support and expansion to remaining poor. Although there are conflict of interest by beneficiaries to choose among the given seeds many of them are preferring maize to haricot bean, haricot bean to sweet potatoes; and cows/ and oxen to crop etc. According to the interview held among successful beneficiaries; some of the beneficiaries have constructed iron sheeted house, others have purchased heifers, and others have initiated new business. About 84.7% of the very poor and poor households who benefited from seed access showed that their livelihood was improved as 27.3% of them purchased livestock from the income they earned, 37.5% of them fulfilled household utensils and farm implements; 41.5% started saving; 51.2% freed from debt (who run continuous debt before); constructed new iron roofed house (who owned poorly furnished grass roofed house before); 91.5% able to feed their family (who usually faced 7-9 months of food shortage before).

Therefore, it is possible to conclude that access to improved seed has enhanced households' access to livelihood assets like food, house, income, and implements. The success of seed beneficiaries varied between the target woredas. Majority of beneficiaries who purchased livestock and constructed house are from Boloso sore. Whereas, the higher number of beneficiaries who reported that they have purchased household utensils, started saving and able to feed their family are from Damot pullasa (Figure 12). This Variation can be explained in relation to personal, response and environmental factors.

Improved food availability through increased crop productivity

The estimated yield of the maize cultivars ranged from 39.13 to 59.65 q/ha for non-beneficiaries and beneficiaries respectively. This indicate that beneficiaries produced 20.5 q/ha of maize higher than non-beneficiaries. Similarly, they produced 13.05 qt/ha of sweet potatoes and 6.94 q/ha of haricot beans. It is now clear that the impact of the seed access on yield is significant (Table 12).

Improvement of household income

Farmers have a diversity of income sources, with a large proportion relying on off-farm income for survival. The most important sources of income are sale of crops, and off farm income. The surveyed households' income comes from crop sale, livestock and livestock product sale, and nonfarm sources. This implies that most households were found to diversify and adapt in order to cope with livelihood challenges. This included diversifying income sources by engaging in different off-farm activities in addition to farming. In general seed beneficiaries earned an annual mean income of 3136.11Birr per household, which is 41.8 % higher than that of non-beneficiaries. Safety nets, renting land wages and petty trades were an important source of off-farm income. A few households were engaged in handicrafts, and income from the sale of firewood, charcoal and other natural resources gatherings were important to them.

Increased resilience against food shortage

Sustainable household resilience to food insecurity is developed through savings and investment in the form of improved yield, enhanced assets (livestock), and access to improved seeds. Increased mean yields can mean increased food supplies, higher calorie intakes and better nutrition levels. Access to improved seeds through seed access has increased the diversity of mean consumed (61.3%), quantity of food consumed (69.4%) and family income (67.6%) relative quality of meal (57.2%) of beneficiaries (Table 9). The proportion of beneficiaries with improved dietary diversity, intake and income are significantly higher than that of non-beneficiaries. Similarly, the average frequency of meal consumed by beneficiaries and non-beneficiaries was 1.78 and 1.63 respectively and this is statistically significant figure. A reduced level of dietary diversity and intake for majority of non-beneficiaries is most likely a key indicator of the fact that seed has improved food insecurity in the study area. This evidence has ensured that irrigation use is a guarantee for increased food supply and ensured food security.

Enhanced capability to buy food and nonfood items

Expenditure pattern is used to measure the impact of seed on household ability to expend on basic food and nonfood items. Consumption expenditure on different food items are generally used as main yardstick for measuring standard of living in developing nations (Kiros, et al, 2009). Patterns of household expenditure can be influenced by changes in the provision seed access and the conditions under which they are provided. According to the survey, over 2329.36 and 2174.4birr respectively was spent on food by seed beneficiaries and non beneficiaries (Table 10).When we compare the food and nonfood expenditure both groups, spend more on food than nonfood items. In percentage terms beneficiaries and non beneficiaries spent 53.5% and 65.6% for consumption. Increasing food expenditure share means households have less resource to spend on other non-food consumption goods like on education, health, and consumer durables. The results also indicate that even though access to improved seeds expenditures are increasing, implying that beneficiaries expend more than non beneficiaries.

Conclusion

The seed support provided beneficiaries with access to improved seeds of maize, haricot bean and sweet potatoes.

These crops are also of priority to the poor in terms of ensuring food security and improving earnings. The participants, from at least reducing number of severe food shortage months, to earning more income, and building assets like purchasing heifers, and constructing houses. The crops thrive best in areas where land shortage is an acute problem. Most of the farmers do not own storage facility and they do not have surplus to be stored for a long period of time. Even those who owned traditional storage facility possess unsafe stores and there is large post harvest loss. The yield loss for the crops of investigation indicates that there is high loss, with average estimates of more than 20 percent of the gross production.

Recommendation

Based on the finding of the study the following recommendations were given to improve the monitoring and implementation of remaining project periods. Ensure the availability, distribution and access to quality seeds to chronically food insecure and poor people at affordable price. Reaching all the very poor and needy farmers is challenging. Therefore, efficient targeting and selecting the needy and poor should be prioritized. Include household counseling approach: After successfully distributing seeds and the follow up is necessary.

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