

# Assessment of the Impact of Productive Safety Net Program in Kindo Didaye Woreda, Wolaita Zone, Southern Nations Nationalities and Peoples' Regional State, Ethiopia

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## Abstract

Poverty and food insecurity go together in many circumstances. Chronic food insecurity is one of the main problems which have been affecting millions of Ethiopians. Productive Safety-Net Program (PSNP), is one of the main food security Programs, has been undertaken by the government of Ethiopia with the aim of fulfilling food gap and promoting asset accumulation to food insecure households. However, studies indicate that the success of PSNP in achieving its aim is an area of debate. The study was to assess and explore the impact of PSNP on economic changes of the beneficiaries by looking at changes of the probability of food gap months, asset accumulation and SLM practices in Kindo Didaye Woreda, Wolayta zone, SNNPRS. The research used random sampling technique to collect cross sectional data from 97 PSNP and 89 non-PSNP participants. It was analyzed by both descriptive and econometrics methods. In econometric analysis propensity scores matching technique was applied to estimate the impacts of PSNP on asset accumulation and Sustainable Land Management (SLM) practices. The study revealed that the mean number of months that a household cover its food requirements for PSNP participants was 2.63 whereas for non-PSNP participants was 1.82 months. This implies that PSNP has contributed to decline food gap more for PSNP participants than non-PSNP participants. It showed that PSNP Participant has positive impact on livestock holding (0.63 TLU) and SLM (soil bund (13 m/ha) and stone bund construction (14 m/ha) and chemical fertilizer use (10.9 Kg/ha)) and showed an adverse effect on the value of non-livestock assets holding as likely due to expense of beneficiaries' transfer on consumption. Almost all PSNP can be considered as narrowing food gap and promoting asset accumulation and SLM practices over time. Despite the long-term requirement of sustainable livelihood improvement, it is understandable that PSNP is possible instrument for practitioners and policy makers to reach the poor. Therefore, to sustain food security in the study area considerable effort should be made to cover the remaining food gap and create awareness on asset accumulation together with further work on environmental impact of the program.

**Keywords:** Productive Safety-Net Program, Food gap, Asset accumulation, Sustainable Land Management practices, Propensity Score Matching

## 1. Introduction

Ethiopia is one of the developing countries and its economy is highly depending on agriculture. Out of the estimated population of 83.5 million, about 83% is rural population and depend on agriculture based livelihoods (CSA, 2007). According to (Ayele, 2008; Gilligan *et al.*, 2008), the frequent production losses and seasonal food shortages through asset sales and renting out agricultural land were found to perpetuate food insecurity and poverty.

Poverty and food insecurity go together in many circumstances. According to World Bank report (2008), poverty and food insecurity mutually reinforce each other, i.e., poverty aggravates food insecurity. Particularly, the chronic food insecurity occurrence for several decades is the defining feature of poverty in Ethiopia (Gilligan *et al.*, 2008). Food insecurity is persistence problem in Ethiopia and responses to food insecurity have conventionally been familiarized emergency food based interventions. Starting from 2005, to solve the problem of chronic food insecurity, the governments of Ethiopian and consortium of donors have established a new social protection program called the productive safety net program (PSNP).

The productive safety net program (PSNP) is the largest social protection which represents an innovative attempt to tackle chronic food insecurity through predictable response with predictable resources for a predictable problem (Pankhurst, 2009). Thus, PSNP has been introduced having typical responses to food insecurity by providing transfers to food insecure households with the aim of enabling them to protect asset depletion during time of food gap and promoting asset accumulation to be engaged in sustainable productive activities over specified period. It has two components: public works (PW) and direct support (DS) with approximately 80% of the beneficiaries receive these benefits through their involvement in public works project (MoARD, 2006). The stated rationale of PSNP is to address immediate human needs and simultaneously encouraging chronically food insecure households to engage in production and investment on asset accumulation through multi-year predictable resource transfer, rather than through a system dominated by emergency humanitarian aid.

Different studies evaluated the performance of the PSNP based on its predetermined objectives. Evaluation

on the impact of PSNP in Amhara region indicated that although it has been crucial for saving rural poor households in times of food shortages, there was no increase in their livestock holdings (Andersson *et al.*, 2009). Arega (2012) explored that graduation from PSNP is controversial issue and found that the food they produce can be consumed not more than six months of the year. According to Tadele (2011), the PSNP was not successful on the participants' in terms of asset accumulation (changes in livestock and non livestock assets) and SLM practices. Ayele (2008) examined that the amount of support received by participants was not enough to prevent households from selling assets and there was no change in asset accumulation to ensure household food security. As being one of the food insecure Woreda where PSNP is widely operating and regarding to PSNP no study was conducted and its outcome is unknown in the study area.

## 2. Objectives of the Study

### 2.1. General Objective

The general objective was to assess and explore the impacts of PSNP intervention on economic outcomes of the beneficiary households and the contribution of the program to SLM practices in the study area.

### 2.2. Specific Objectives of the Study

1. To examine whether or not participation in PSNP changes the number of months that PSNP households have a food gap in a year,
2. To examine the impact of participation in PSNP on the asset accumulation of the program households, and
3. To assess the impact of participation in PSNP on sustainable land management practices.

## 3. Methodology

### 3.1. Description of Study Area

Kindo Didaye Woreda is one of the twelve Woredas found in Wolayta Zone, Southern Nations Nationalities and Peoples Region (SNNPR). It is located at about 470 km south of Addis Ababa, between 6°39" and 6°61" N Latitude and 37°13" and 37°29" E Longitude. The total area of Kindo Didaye Woreda is 380 square kilometer (KDWoA, 2011). According to the National Population and Housing Census of Ethiopia (CSA, 2007), the total population is currently 113,560. It is characterized by small landholdings with high populations and the major economic activities are crop cultivation and livestock rearing.

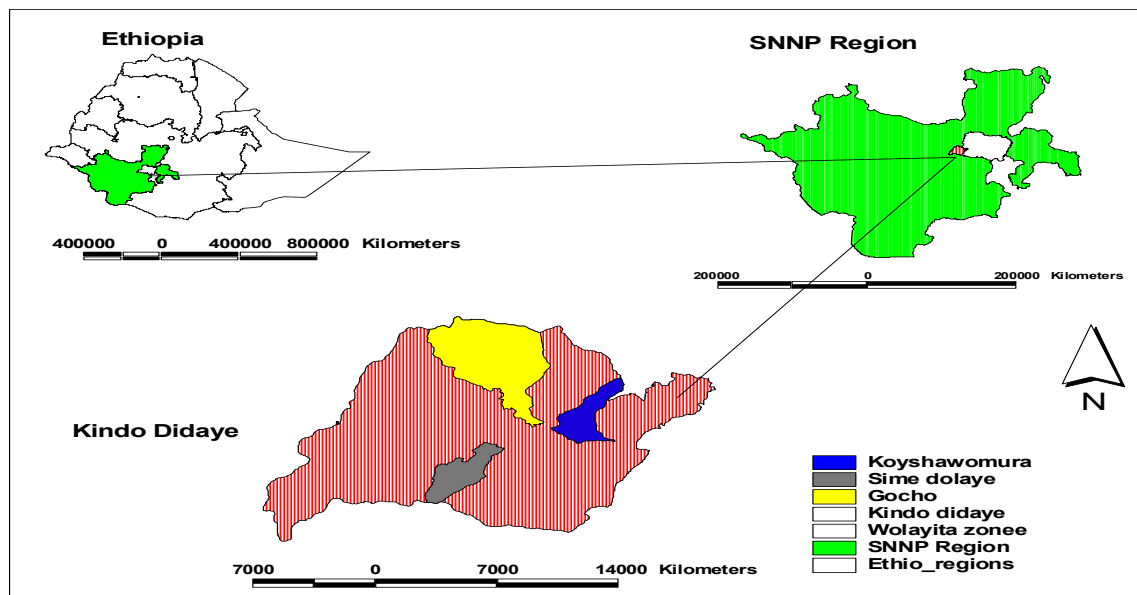


Figure 1 Map of study area  
Source: adapted from KDWoA, 2012

### 3.2. Sources and Methods of Data Collection

The sources of data were both primary and secondary. The primary data were gathered from households by using structured questionnaire. Then household surveys were carried out to obtain data at the household level concerning changes in the intervention characteristics at two separate points in time 2005 and 2012. Secondary data were collected from regular and statistical reports of documented sources such as climate, demographic,

different manuals of PSNP, reports of office of agriculture and other related sources.

### 3.3. Sampling Method

Simple random sampling method was used to select both kebele and households in the study as it is identified as chronically food insecure and mostly similar livelihood activities and agro-ecology. Then of the total 19 kebeles three kebeles were randomly selected (KoysaWamura, Sime Dolaye and Gocho). From those of eligible chronic food insecure household heads in each kebele, 186 total sample sizes were comprised of 97 from beneficiary and 89 from non-beneficiary household heads. The sample size were determined by using rule of thumb,  $N \geq 50 + 8m$ . Where N is desired sample size and m is the number of explanatory variables (Green, 1991).

### 3.4. Methods of Data Analysis

Both descriptive and econometrics methods of data analysis were employed. Descriptive analysis was used to explain, compare, interpret and accordingly to arrive at conclusion of the study. In econometrics methods of data analysis Propensity score matching model was used to address the impact of participation in PSNP on asset accumulation and sustainable land management practices.

#### 3.4.1. Econometrics Analysis: Propensity Score Matching Model

Propensity score matching (PSM) is the most frequently used and well recognized method among researchers for evaluating the impacts of development programs and matching treated and non-treated units on pre-program characteristics based on survey questionnaires using recall as baseline data (Asian Development Bank, 2006; Caliendo and Kopeinig, 2005). The main challenge across different types of impact evaluation is to find a good counterfactual namely, what would have happened to the program groups if the program had not existed (Baker 2000; Asian Development Bank, 2006). In other word, a beneficiary's outcome in the absence of the intervention would be its counterfactual (Khandker *et al.* 2010). The program's impact can truly be assessed only by comparing actual and counterfactual outcomes, the counterfactual is not observed.

So to assess the impact of intervention one has to create a convincing and reasonable comparison group for beneficiaries to find counterfactual outcomes. Propensity score matching constructs a statistical comparison group that is based on a model of the probability of participating in the PSNP, using observed characteristics. Participants are then matched on the basis of this probability, or propensity score, to non-participants. Households for which no match is found are dropped because no basis exists for comparison (Khandker *et al.*, 2010). This was done because of two assumptions about the data. The first assumption is that, beneficiaries have the same average outcome as non-beneficiaries would have had if they did not receive the program. The second assumption is that, for all post-program observable beneficiary household and community characteristics (outcome variables) that are correlated with program participation. Therefore, PSNP beneficiaries were used as treatment group and non-beneficiaries as control group because they were found in similar wealth status before the program.

According to Khandker *et al.* (2010), Estimating propensity scores and Calculation of treatment effects are the most important steps of PSM implementation.

#### 1. Estimating propensity scores

Estimating the propensity score involves decision on two choices; what model to be used for the estimation and what variables should be included in this model. Regarding the decision of choosing the type of model to be used, for the binary treatment case, logistic model was widely used for estimating the propensity score (Caliendo and Kopeinig, 2005). STATA version 10 computing software, by using binary logistic model with psmatch2 program and matching algorithm, was used for the estimation purpose. According to Gujarati (2004), the dependent variable in logistic model is binary indicating whether the household was a participation in the PSNP which takes a value of 1 and 0 otherwise.

The logistic model is mathematically formulated as follows:

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad \text{---(1)}$$

Where  $P_i$  is the probability of participation in the productive safety net program and  $Z_i$  is a linear function of  $m$  explanatory variables ( $X_i$ ), and expressed as:

$$Z_i = \beta_0 + \sum \beta_i x_i + u_i \quad \text{---(2)}$$

Where  $\beta_0$  = intercept,  $\beta_i$  = regression coefficients to be estimated,  $i = 1, 2, 3, \dots, n$ ,  $u_i$  = a disturbance term, and  $x_i$  = pre-intervention characteristics.

The probability that a household belongs to the non participant group is:

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad \text{---(3)}$$

Then the odds ratio can be written as:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad (4)$$

The left hand side of equation (4)  $\frac{P_i}{1 - P_i}$  is simply the odds ratio in favour of participating in PSNP. It is the ratio of the probability that the household would participate in the PSNP to the probability that he/she would not participate in the PSNP.

Finally, by taking the natural log of equation (4) the log of odds ratio can be written as:

$$Li = \ln\left[\frac{P_i}{1 - P_i}\right] = \ln\left[e^{\beta_0 + \sum_{i=1}^m \beta_i X_i}\right] = Z_i = \beta_0 + \sum \beta_i X_i \quad (5)$$

Where,  $Li$  is log of the odds ratio in favour of participation in the PSNP, which is not only linear in  $X_{ij}$  but also linear in the parameters.

Regarding the choice of what variables should be included in the model; PSM relies on choosing a set of variables  $X$  (covariates) that reasonably satisfy the conditional independence and common support conditions (Caliendo and Kopeinig 2005). Conditional independence states that given a set of observable covariates  $X$  that are not affected by treatment; potential outcomes  $Y$  are independent of treatment assignment.

## 2. Calculation of treatment effects

PSM model ensures that treated and untreated households are comparable based on observable variables.

The effect of household's (individual) participation in the PSNP on a given outcome ( $Y$ ) is specified as:

$$T_i = Y_i(D_i=1) - Y_i(D_i=0) \quad (6)$$

Where  $T_i$  is treatment effect (effect due to participation in PSNP),  $Y_i$  is the outcome on

Household,  $D_i$  is whether household  $i$  has got the treatment or not (i.e., whether a household participated in the PSNP or not).

As discussed earlier only one of the potential outcomes ( $Y_i(D_i=1)$ ) is observed for each individual  $i$ . The unobserved outcome ( $Y_i(D_i=0)$ ) is called counterfactual outcome. Hence, estimating the individual treatment effect ( $T_i$ ) is not possible and one has to shift to estimating the average treatment effects of the population than the individual one.

For the most evaluation studies, there are two average treatment effects: average treatment effect (ATE) and average treatment on treated (ATT). ATE is answers the question "what is the expected effect on the outcome if individuals in the population were randomly assigned to treatment? The most prominent one is called ATT, which focuses explicitly on the effects those whom the program is actually intended (Khandkeret *al.*, 2010). Average treatment effect on the treated (ATT) is defined as the difference between expected outcome value with and without treatment for those who actually participated in the treatment. Mathematically specified as:

$$T_{ATT} = E(T|D=1) = E[(Y(1)|D=1)] - E[(Y(0)|D=1)] \quad (7)$$

Since the counterfactual mean for those being treated,  $E[Y(0)|D=1]$  is not observed, there is a need to choose a proper substitute for it to estimate ATT. Though it might be thought that using the mean outcome of the untreated individuals,  $E[Y(0)|D=0]$  as a substitute to the counterfactual mean for those being treated,  $E[Y(0)|D=1]$  is possible, it is not a good idea especially in non-experimental studies. That is in particular case, variables that determine household's participation in the PSNP could also affect household's asset accumulation and investment in SLM. Therefore, the outcomes of individuals from treatment and comparison group would differ even in the absence of treatment leading to a self-selection bias. However, by rearranging and subtracting  $E[Y(0)|D=0]$  from both sides of equation 7, ATT can be specified as:

$$E[Y(1)|D=1] - E[Y(0)|D=0] = T_{ATT} + E[Y(0)|D=1] - E[Y(0)|D=0] \quad (8)$$

In equation 8, both terms in the left hand side are observables and ATT can be identified if no self-selection bias. That is, if and only if  $E[Y(0)|D=1] - E[Y(0)|D=0] = 0$ . However, this condition can be ensured only in a randomized experiments (i.e., when there is no self-selection bias). Therefore, some identified assumptions must be introduced for non-experimental studies to solve the selection problem.

**Conditional Independence Assumption (CIA):** The CIA is given as:

$$Y_0 \perp Y_1 \perp D/X, \forall X, \quad (9)$$

Where  $\perp$  indicates independence

$X$ -is a set of observable characteristics

$Y_0$  -non-participants and

$Y_1$  -participants

Given a set of observable covariates ( $X$ ) which are not affected by treatment (in our case, participation in the PSNP), potential outcomes (asset accumulation and level of investment in SLM activities) are independent of treatment assignment (independent of how the households were selected in PSNP). The implication of CIA assumption is that the selection is solely based on observable characteristics ( $X$ ) and variables that influence treatment assignment (participation in PSNP) and potential outcomes (asset accumulation and investment in

SLM practices) are simultaneously observed (Bryson *et al.*, 2002; Caliendo and Kopeinig, 2005).

Hence, after adjusting for observable differences, the mean of the potential outcome is similar for  $D=1$  and  $D=0$ . Therefore,  $E(Y_0 / D=1, X) = E(Y_0 / D=0, X)$ .

**Common support:** Imposing a common support condition ensures that any combination of characteristics observed in the treatment group can also be observed among the control group (Bryson *et al.*, 2002).

Based on the above two assumptions, the PSM estimator of ATT can be written as:

$$ATT = E[Y_1 - Y_0 / D = 0, P(X)] = E[Y_1 / D = 1, P(X)] - E[Y_0 / D = 0, P(X)]$$

Where  $P(x)$  is the propensity score computed on the covariates  $X$ . The above equation shows that the PSM estimator is the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants.

#### 4. Results and Discussion

##### 4.1. The Probability of Food Insecurity Status of Sampled Households

An important mechanism to evaluate the impact of PSNP on households' improvement in their food security is the decline of average months of food gap since the start of PSNP intervention, 2006. That is the households with the lower the number of average months of food gap are with lower problem of food gap and the lower asset depletion for the sake of purchasing food for consumption.

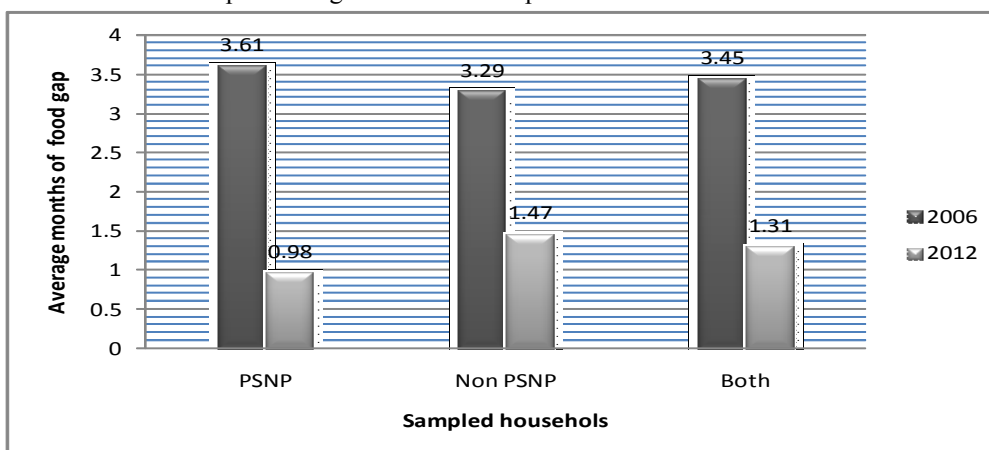


Figure 2 Average months of food gap

Figure 4 depicts that households experienced an improvement in their food security by a decline in average months of food gap in 2006 to in 2012 for sampled households. From 2006 to 2012 the average months of households' food gap has declined for the PSNP participants from 3.61 to 0.98, for non PSNP participants from 3.29 to 1.47 and for both sampled households from 3.45 to 1.31. That is the number of months that a household covered its food requirements for PSNP participants was by 2.63 months whereas for non PSNP was by 1.82 months. This infers that decline of the average months of food gap among PSNP participants is substantial and much higher than non PSNP participants. Thus, PSNP can have considerable impact on declining average months of food gap which has an implication of improvement in food security during the last seven PSNP implementation years in the study area. Despite the considerable decline of the number of food gap among PSNP participants, there is remaining months of food gap even among PSNP participants in the study area. This result is consistent with the study of Gilligan, *et al.* (2008) who found that food security has significantly improved by 0.36 months among PSNP beneficiary when compared to the comparison group.

##### 4.2. The Mean values of Asset Holding of Sampled Households

Asset holding by households is another very important outcome to evaluate the impact of PSNP since its intervention has been started. The principal household assets in which PSNP can have impact in the context of farmers were mainly livestock and real value of production and consumer durable goods.

Table 1 the mean livestock (in TLU) holding of sampled households

Livestock (TLU)	PSNP		Non PSNP		T-value	P-value
	Mean	Std. Dev	Mean	Std. Dev		
Livestock holding, in 2006	2.34	2.01	2.47	1.82	3.22	0.000
Livestock holding, in 2012	3.94	2.30	3.12	1.82	7.18	0.000

Source: own survey result (2012)

As shown in table 1, PSNP participants have increased mean livestock (in TLU) holding from 2.34 TLU in



2006 to 3.94 TLU in 2012. While that of non-PSNP participants have increased from 2.47 TLU in 2006 to 3.12 TLU in 2012. There was a significant increase in mean livestock (in TLU) holding observed in both PSNP participants and non participants. However, the magnitude of mean livestock holding for PSNP households increased more than non-PSNP households. The implication is that the PSNP participants were expected to lead increased livestock holdings. The result conformed to Burns and Solomon (2012) and World Bank (2012) in that participation in PSNP has led beneficiaries to a boost in livestock holdings, such as sheep, goats and cattle. Whereas it was inconsistent with Mulugeta and Feyera (2011) who found that non PSNP had higher livestock holdings than PSNP participants.

Other asset holdings of the sampled households consist of the value productive assets (include all asset used to produce outputs like ploughing equipments, sickle, spade, beehives, pick axes and axes, etc.), household assets and household consumer durable goods (which include telephone, radio, tape, bed, chair, table, home, jewelers, etc.) are collectively non-livestock assets.

Table 2 the average values of non livestock assets of sampled households.

Asset values in time dimension	PSNP		Non PSNP		T-value	P-value
	Mean	Std. Dev	Mean	Std. Dev		
Value of assets (ETB), in 2006	385.21	223.66	427.69	224.82	2.52	0.463
Value of assets (ETB), in 2012	1189.04	756.21	1208.44	735.07	0.17	0.927

Source: own survey result (2012)

Table 2 shows sampled households' mean value of non-livestock assets before and during program period (in 2006 and 2012). The mean value of non-livestock asset holding of PSNP households increased from 385.21 ETB in 2006 to 1189 ETB in 2012 and that of non PSNP households increased from 427 ETB to 1208 ETB in the same period. As we can see, there was no considerable difference in the values of asset holding between PSNP and non PSNP households but the improvement of the value of asset over the specified period within the two groups was economically meaning full. This result is similar with the study of Sabates and Devereux (2010) in which there was no such a much difference in the change of asset holding rather than all groups had meaning full asset holdings in 2008.

## 4.2. Results of Econometric Analysis

### 4.2.1. Propensity Score Matching (PSM) Results

In the estimation of PSM the variable that shows participation is used as dependent variable and variables that would affect participation and outcomes are employed as explanatory variables.

Table 3 shows the program participation estimation variables results of the logistic model and predicts participation in PSNP with a given level of significant probability values. The value of pseudo-R<sup>2</sup> is 0.1349 which are fairly low. This low pseudo-R<sup>2</sup> value indicates that the allocation of the program has been fairly random (Pradhan and Rawlings, 2002). Accordingly, it suggests that treatment group did not have diverse characteristics overall and hence it is an indication obtaining a good match between treated and control groups. From the Table 3, family size, frequency of development agents (DA) visits, the number of average months of food insecurity prior to the intervention of PSNP and sex of household heads were found to have positive and significant influence on participation in PSNP, whereas access to credit was found to influence negatively.

Family size is found to be highly significant to determine household food insecurity and it is consistent with the finding of Tadele (2011). Such significant positive relationship between large family size and participation in PSNP might be due to the fact that large family size is associated with higher food demand and has higher chance of being food insecure and is in line with the main criteria for targeting in PSNP compared to small family size.

Households who are frequently visited by DA had higher chance of being included in the program. This might be DA may understand problems of these households to consider them during selection as they being member of kebeles food security task forces. Sex of the household head was found to have positive and significant effect on the program participation at 10% level of significances. This suggests that male headed households have higher chance to be included in the program than female headed households. The possible explanation for this relationship might be because male headed households are higher than the female headed households because only 21(11%) of the sample size were female headed in the study area. On the other hand, access to credit was found to have negative and significant effect on the program participation at 1% level. This indicates that the inverse relationship between the household access to credit and participation in PSNP might be because households who have accessed a credit are more likely to engage in other livelihood activities and hence become food secured. As a result, their probability of inclusion in the PSNP is low.

Table 3 Logit results of household program participation based on asset accumulation outcome indicators

Variables	Coefficients	Robust Std. Error.	z-value	P-value
HHSEX	1.157599	0.6286973	1.84*	0.066
AGEHH	-0.0126121	0.0229217	-0.55	0.582
HHEDUC	0.0060503	0.0646192	0.09	0.925
FMEMBEREDUC	-0.0452032	0.0573014	-0.79	0.430
FAMLSZ	0.1183889	0.1004564	1.18***	0.001
LABOR FORCE	0.2585867	0.1703042	1.52	0.129
AVEMONTHFIS.	0.6946622	0.3562883	1.95*	0.051
LAND	0.5410658	0.5799909	0.93	0.351
DAVISIT	0.3828056	0.0639801	5.98***	0.000
CREDIT	-1.810147	0.4701963	-3.85***	0.000
LVSTOCK	-0.0432587	0.0991575	-0.44	0.663
IRONSH	0.6130314	0.3963253	1.55	0.122
INCOME	0.003836	0.0001576	2.43	0.015
_cons	3.210176	1.593325	2.01*	0.044

Sample size = 186      LR chi2(13) = 34.74      Prob> chi2 = 0.0067  
 Log likelihood = -111.38175      Pseudo R2 = 0.1349

Source: own survey result (2012)

\*\*\*, and \* the 1%, and 10% of significant level

#### 4.2.2. Impact of PSNP on Asset accumulation

Asset accumulation is very important outcome that can best used to evaluate the impact of PSNP. Thus, PSNP participants appear to have been saving some of the transfers through increased asset holdings as a way to insure against future food security shocks and eventually overcome probable poverty traps (Hoddinott *et al.*, 2012).

As revealed in the table 4, participation in PSNP had brought a positive impact on accumulation of livestock (TLU). This can infer that by participating in the program an individual is expected to accumulate more 0.63 livestock (TLU) in the course of 7 years compared to non participants TLU. World Bank (2009) also reported that the growth rate in livestock holdings among PSNP beneficiaries was 28.1 percent faster than among non-PSNP beneficiaries.

However, asset holding of PSNP participants is less by about 61 Ethiopia birr than that of non PSNP participants. The adverse impact of PSNP on non-livestock asset value in this study might be because households in the study area use the PSNP transfer mainly for consumption smoothing purpose than non-livestock asset accumulation. The same adverse impact on non-livestock asset accumulation was also found by Andersson *et al.*, (2009), Gilligan *et al.*, (2008) and Sabates-Wheeler *et al.*, (2010). In contrary to this, households in the program experienced a slow but steady rise in the value of their productive assets (World Bank, 2012).

Table 4 Average treatment effects on the treated (ATT) households' of asset accumulation outcomes

Asset accumulation outcomes	Treated	Controls	Difference	S.E.	T-stat
Change in TLU (06-12)	1.6	0.97	0.63	0.39	1.62
Change in value of assets (ETB) (06-12)	801.99	863.79	-61.8	128.02	-0.48

Source: Own survey result (2012)

#### 4.2.3. Impact of PSNP on SLM Practices

As shown in the table 5, PSNP participants had brought positive impact on soil bund, stone band and chemical fertilizer application. The implication of results are that PSNP participants constructed more 13 and 14 m/ha soil and stone bund respectively. This additional more constructed SLM practices on household level might be due to the experience of public work activities done on communal lands and hillside sites in the study area. In case of fertilizer usage, PSNP participants could bought about 10.9Kg/ha more chemical fertilizer usage than that of non-PSNP participants. This might be PSNP participants get additional income from PSNP and better accessed in credit (HABP) to buy chemical fertilizer. The finding is in line of Gillian *et al.*, (2008).

Whereas participating in PSNP has negative impact on manure and compost application in fertility improvement practices. This can be interpreted as PSNP participants' usage less by 10.27 and 10.11 quintals of manure and compost respectively per hectare compared with non PSNP participants. This might be the reason

that PSNP participants are more likelihood to shift them in chemical fertilizer usage than non PSNP participants because they are better accessed to credit. The finding is consistent with Tadele (2011).

Table 5 Average treatment effects on the treated (ATT) of SLM practices

Outcome Categories	Outcome	Treated	Controls	Difference	S.E.	T-stat
Fertility improvement practices	Chemical fertilizer (kg/ha)	81.31	70.32	10.99	88.98	0.12
	Manure (qt)	109.4	119.67	-10.27	28.57	-0.36
	Compost(qt)	39.21	49.33	-10.11	10.24	-0.99
Physical SWC practices	Stone bun (m/ha)	18.05	3.9	14.15	8.97	1.58
	Soil bun (m/ha)	36.25	23.01	13.24	35.84	0.37

Source: Own survey result (2012)

## 5. Conclusions and Recommendations

### 5.1. Conclusions

PSNP operates in the rural parts of the country where there are prevalence of food insecurity having the aim to address immediate consumption gap and encouraging chronically food insecure households to be engaged in production and asset accumulation. This study attempted to assess and explore the impacts of PSNP on economic changes of the PSNP participants in the study area.

The result infers that decline of the average months of food gap among PSNP participants is substantial and much higher than non PSNP participants. Thus, participating in PSNP can have considerable impact on defending food insecurity and preventing asset depletion at household level through predicted transfer to increase purchasing power of food. This is an implication of improvement in food security during the course of last seven PSNP implementation years in the study area.

PSNP participants have additional positive impact on asset accumulation in terms of livestock (TLU), application of soil bund, stone bund and chemical fertilizer use compared to non-PSNP participants. Participation in PSNP enables food insecure households to be engaged in asset accumulation and SLM practices to increase productivity and sustain improvement of food security.

Hence, PSNP can not only be considered as protective (protecting the shortage of food), but also it is considered as preventive (preventing asset depletion) and promotional (promoting asset accumulation and application of SLM practices) for the poor. It is obvious that participation of the poor in such social protection program is gradually improves food security and offers important lessons as possible instrument for practitioners and policy makers in the area where there are prevalence of food insecurity.

### 5.2. Recommendations

The recommendations of this study will help to maximize the achieved positive impacts and will help to minimize the unintended impacts.

- Government and donors should consider retargeting the poor those had not yet participated and the beneficiaries those till remained chronically food insecure households and link asset accumulation and SLM practices with sufficient and continues training on business plan development and resources saving so as to increase productivity and sustain improvement of food security.
- Further research should focus on the impacts of environmental changes, the most important priorities for public works focus, because of the limitation of this study in the study area.

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