International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
DOI: 10.22192/ijarbs Coden: IJARQG(USA) Volume 6, Issue 2 - 2019

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.02.016

Impacts of the Productive Safety Net Program on the Livelihood of Households: The case of Enebse Sar Midir District, Ethiopia.

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Abstract

The Productive safety net program is a large social safety net program in the world and designed to alleviate the food security problem of food insecure smallholder farmers in Ethiopia since 2005 G.C. Assessing the impact of productive safety net program to the predetermined outcomes is becoming an important issue. So that the main objective of this study was to examine the contribution of the productive safety net program to livelihood of households in Enebse Sar Midir district, Amhara regional state, Ethiopia. To do the research well, Primary data were collected from 225 sample households with semi structured questionnaires and supported by qualitative information's. Propensity score matching was employed to examine the contribution of the program. Propensity score matching analysis result shows that the productive safety net program had no brought a significant contribution to the livelihoods of households by their asset accumulation and food consumption measures.

Keywords: Productive safety net program, propensity score matching, livelihood, contribution.

Introduction

Food insecurity is inability and difficulty to access to nutritious and adequate food at all times for all peoples. If it is not alleviated and withstand over a period of time it creates a vicious circle of destitution and being a problem of sustainable development. The major reason for food insecurity is the low level of livelihood resiliency due to lower asset accumulation (IFAD, 2014).

EnebseSarMidir district is the one in which food insecure communities are residing in and affected by recurrent drought. Out of the 156,738 total population of the woreda 108,018 (71.3%) of the peoples were highly affected by the 2015 El-Nino drought and 24 kebeles from 35 kebeles are food insecure and affected by transitory and chronic food insecurity for a long period of time (WOA annual report, 2016).

Lower and middle income countries in the world are exercising different social safety net programs to curtail this problem. The government of Ethiopia in collaboration with World Bank donor communities started to alleviate those problems by launching productive safety net program in 2005 and the program completes three program phases. The aim of the program was building household and community asset to improve food security and graduate them from the program (PSNP PIM, 2004).

Depending on the PSNP PIM (2006) the main outcome indicator of the phase one and two program was to graduate 90% beneficiaries from PSNP at the end of 2009 but only 1.3% of beneficiaries were graduated until 2009 (Gilligan *et al*., 2009). The third phase the plan was graduating beneficiaries annually and ending poverty at the end of 2014 but the only achieved was 37.84% (MoA, PSNP report, 2015). That is why PSNP is launched again as phase four (2015-2020).

The main challenges beside this should be studied in such a way that whether PSNP havean impact on the food security improvement or not.No more studies were conducted even in East Gojjam and particularly in Enebse Sar Midir district.

Studies conducted by Anderson et al.,(2009), Habtamu (2011), Tadele (2011), wheeler et al., (2010 and 2012), Yitagesu (2014), Nesreddin (2014) and Hermela (2015) on the impacts of the PSNP focused the impact on the livestock and tree holding, HH resilience, asset accumulation, sustainable land management, food security improvement, reducing vulnerability, HH welfare and labor supply. Even though those studies were conducted beyond the study area, there is debate between them. Anderson et al., (2009), Habtamu (2011), Tadele (2011), wheeler et al., (2010 and 2012) conclude that the PSNP impact on asset sustaining and accumulation wasn't significant rather it covers the hungry gap. Besides this Yitagesu (2014), Nesreddin (2014) and Hermela (2015) studies result shows that PSNP plays a great role in preventing depletion of livestock assets, increasing household income and reducing poverty by enhancing asset accumulation.
There was also a methodology difference in an analysis of the research data to examine the impact of productive safety net program. Authors like: Yitagesu (2014) and Hermela (2015) used simple data analysis by SPSS and excel using data received from respondents the before and after situations. Anderson et al., (2009), Habtamu (2011), Tadele (2011), wheeler et al., (2010 and 2012) and Nesreddin (2014) used the PSM evaluation method. But in all PSM studies, they don't consider and test the spill-over effect. All used respondents (treated and control) from PSNP kebele in which the effect of a program may benefit or affect the eligible groups taken as a control group.

Besides these findings, as far as the knowledge of researcher no one had a research of study about the contribution of the PSNP to livelihood asset accumulation and food security improvement in the EnebseSarMidir district of Amhara regional state in which it has its own geographical, social economic and anthropological features. Hence, this study was done to fill those gaps, i.e. the impact of the PSNP to livelihood asset accumulation and food security improvement.

Description of the study area:

EnebsieSarMidir is one of the 64 food insecure districts of the Amhara region with a population density 145 persons per Km^2, located at the center of 10° 45′ N and 11° 1′ N of latitude and 38° 14′ E and 38° 18′ E of longitude (WoFED, 2015). The topography of the woreda is very undulating and mountainous where the plain land is only 19%, mountainous, 43% and the undulating part constitutes 38%. The altitude range varies from 1200-meter a. s. to 3800 meters above sea level (WoA, 2015).

From the total population, 44.2% of the community members were chronically food insecure and they have been supported by the Productive Safety Net Program since 2005. Households in food insecure kebeles are more vulnerable to different natural hazards like drought and they face recurrent food shortage within a range of 3 to 9 months (WoA, 2016).

Research strategy and design:

To enhance the validity and reliability of the finding the researcher used both quantitative and qualitative methods of research. Primary data were collected from PSNP kebele households and non-PSNP kebele households by using a semi structured questionnaire. Additional qualitative information also collected from KFSTF, appeal committees and DAs and secondary data from district office of agriculture, Kebele agriculture office, MoARD, PNSP implementation unit reports, working papers and articles.

The sampling technique employed was multistage sampling technique. Specific study areas or two Kebeles was selected randomly, in which one of them would be non-PSNP kebeles. Then, beneficiary HHs from PSNP kebele and non-beneficiary households from both PSNP and non-PSNP kebeles was also selected randomly. Then, the distribution of households in each kebele was adjusted based on the household numbers of non-PSNP kebeles and beneficiary household numbers of PSNP kebeles in order to represent the population properly. Household heads, which are the units of analysis, were selected in

systematic random sampling after the sample size was calculated by Yamane's formula (1967).Often, survey researchers use an acceptable "margin of error" falls between 4% and 8% at the 95% confidence level (Data Star Inc., October 2008). So the acceptable margin of error used for this research was 6% at 95% confidence level.

$n = \frac{N}{1+N(e)^2} = \frac{1164}{1+1164(0.06)^2} = 225$ Where N= Total population, n= sample size and e= acceptable error term.

Distribution of sample households in each kebele (study area)

Kebele		Total numbers of HH heads		Sample household heads	
		Non PSNP HH heads	PSNP users HH heads	Non PSNP HH heads	PSNP user HH heads
PSNP kebele	Enebre	277(24)	324(134F)	70	74
Non PSNP kebele	Enejerer	563(90F)		81	-
Total		840(146F)	324(1344)	150	74
		1164		225	

Data analysis method

Hence there were no baseline data for all control and treatment group and the inability to know the counterfactual outcome to examine the impact of the PSNP on livelihood of households I used Propensity score matching method (PSM) using STATA version 13.

To measure the contribution of the PSNP to livelihood of households, food item or food security situation and asset accumulation taken as a measure of livelihood. Food security in this case was measured by calorie intake. The acceptable level of food secured individual calorie intake is 2100 kcal (FAO).

$$HH\ FS\ Situation = \frac{Total\ net\ calorie\ consumed\ by\ ahousehold}{Household\ size\ in\ adult\ equivalent}$$

Asset accumulation also computed by converting all fixed assets they have in monetary terms and use as triangulating and supplementary analysis beyond food security measurement.

Econometric model specification

Due to the binary nature of the dependent variables, appropriate regression used was a binary logistic regression. To made impact evaluation result wouldn't be affected by spill-over effect, the control groups were selected from PSNP &non-PSNP kebeles. According to Wooldridge (2002), in order to explain the model, the following logistic model mathematical formula used.

$$pi = \in \left(y = \frac{1}{xi}\right) = \frac{1}{1+e^{-(B_0+B_1xi)}} \quad \text{---------- (1)}$$

In the logistic distribution, the possibilities of response of Pi (response variable) are 1 or 0 for individual i, and Xi is the data of exogenous variables, when β0+β1Xi in equation 2 is obtained

$$pi = \frac{1}{1+e^{-zi}} \text{---------- (2)}$$

According to Harrel (2001) cited by Hayalu (2014) if "Pi" is the possibilities of participation in PSNP, the vice versa of participation is 1-Pi. Zi is between -∞ and +∞. Then the possibility of non-participation can be explained as in equation 3 as follows:

$$1 - pi = \frac{1}{1+e^{zi}} \text{---------- (3)}$$

When we divide the graduate by non- graduate we get equation 4;

$$\frac{1}{1-pi} = \frac{1+e^{zi}}{1+e^{-zi}} = e^{zi} \text{---------- (4)}$$

When it transformed to natural logarithmic function, we get equation 5;

$$Li = ln(\frac{1}{1-pi}) = zi = B_0 + B_1 Xi \text{---------- (5)}$$

When there are more than one exogenous variable, (X1, X2..... XK), binary and logistic models apply. Thus, the non-linear logistic regression model is applied based on both its parameters and variables. ''L'' is called ''logit'' and models such as this called ''logit models'' (Guajarati, 1995, 2004). In these situations, equation 1 is used for proper transformations:

$$pi = \in \left(\frac{1}{xi}\right) = \frac{1}{pi} = \frac{1}{1+e^{-(B_0+B_1X_1+B_2X_2 \ldots BKXK}} \text{---------- (6)}$$

According to Agresti (1996) and Tuzunturk (2007) in binary logistic regression models, categorical dependent variable has the following assumptions:

i. The Conditional mean of logistic regression has a value between 0 and 1
ii. If the data is X, the possibility of Y's being 1 is Pi, that is, E (Y =1| X i....Xk) =Pi
iii. N, number of observations about dependent variables are statistically independent

For participation of PSNP;

Zi = (β0+β1radio +β2 mobile +β3 sex +β4 age+β5 education + β6Famnumber+ β7ownland+ β8currTLU+ β9irrigation + β10 amount of fertilizer+ β11 fertility of the soil + β11agricultural extension

The treatment effect of the PSNP clients (i, individual) written as;

∇i= (**Y (**1**) T=1) -(Y (**0**) T=0) ---------- (**1**)**

he PSNP written asThe average treatment effect on beneficiaries of t:

ATT = ∈)y^1/T=1) - ∈(y^0/T=1) ---------- (2)

The probability for a household participating in PSNP given his observed covariates *X* is written as: P(x) = pr

(T=1/x) ---------- (3)

To evaluate the impact, the student researcher used all algorithms of propensity score and selects the best method for discussion, conclusion and recommendation.

Results and Discussion

The major assumptions employed by a logistic regression model are model estimation (specification)test, normality, hetero scedasticity and Multi co linearity. The model was tested to assure whether predict or variables were correctly selected or not. Based on the results of analysis, there was no omitted relevant predictor variable and unnecessary variables weren't added in the model. To do this **_hat** was predicted as a predictor to build the model. **_hat** should be a statistically significant predictor because it is predicted value from the model and **(_hatsq)** shouldn't have a predictive power. The insignificance of **_hat** and significance of **_hatsq** indicates relevant variables are omitted. So that based on link test command of STATA 13, the model specification was found appropriate because **_hat** was statistically significant and **_hatsq** wasn't for all logistic regression of identification of determinants of graduation and participation in PSNP (Appendix 1).

Normality, hetero scedasticity and multicollineality test were measured and so there is a normal distribution of error terms(ε) and the variance of error terms is constant i.e. homo scedasticity and there were no correlated explanatory variables.

Econometric analysis

Econometric analysis was employed to examine the contribution of the PSNP towards the improvement of livelihood of households and to identify the attribution of different factors for participation in PSNP in the program kebele. To examine the contribution of PSNP propensity score matching (PSM) was employed. In the propensity score matching analysis three comparisons were made. The first is the comparison between PSNP kebele users and their counterfactuals, the second is between PSNP users and non-users of PSNP kebele and the third comparison was between non users of PSNP and non-PSNP kebele. The first two comparisons used to examine the contributions of PSNP and the last comparison is to check whether or not the program had a spill-over effect for non-users of PSNP kebele.

Based on the z-value of logistic regression result (Table 4.27),male household head, educated, who use relatively high amounts of fertilizer, who have large TLU (animal holding), who have radio and mobile had a less probability to participate in the productive safety net program of public work component or as the above variable's value increases the probability to participate in PSNP decreases. Five explanatory variables, i.e. family number, amount of fertilizer used, fertility of the soil, irrigation and livestock holding (TLU) were found significant above 95% confidence level.

Table 4.27: logistic regression results of determinants of participation in PSNP

Log likelihood = -70.957231,
Number of Obs = 144, LR chi2 (12) = 57.60, Prob>chi2 = 0.0000 and Pseudo R^2 = 0.2887

PSNP	Coef.	Std.Err.	Z	p>|z|	95% conf. interval		VIF
Sex*	.398454	.2008459	-1.83	0.068	.1483322	1.070131	1.22
Age	1.002968	.0200706	0.15	0.882	.9643917	1.043087	1.32
Education	.9529065	.0507604	-0.91	0.365	.8584353	1.057774	1.54
Family number *	1.27938	.1641148	1.92	0.055	.9949707	1.645088	1.59
Own land	1.040133	.0931608	0.44	0.660	.8726694	1.239732	1.17
Irrigation **	6.737369	5.977025	2.15	0.032	1.13998	38.33802	1.06
Fertility of soil ***	.3499042	.1315478	-2.79	0.005	.1674699	.7310744	1.31
Amount of fertilizer ***	.308767	.1102473	-3.29	0.001	.1533571	.6216671	1.68
Current TLU ***	.580379	.0987287	-3.20	0.001	.4158275	.8100469	2.01
Agricultural extension	1.277745	.698215	0.45	0.654	.4377972	3.729195	1.22
Mobile	.9265706	.513418	-0.14	0.890	.3134813	2.738706	1.58
Radio	.3110496	.2436064	-1.49	0.136	0.0670177	1.443676	1.50
_cons	52.36882	81.9232	2.53	0.011	2.44059	1123.701	1.43

*, ** and *** indicates the significance level at 90%, 95% and 99% confidence level

Propensity score matching

All steps those were performed to compute impact evaluation by propensity score matching methods after the decision was made between covariate matching (CVM) and propensity score matching (PSM).

Propensity score estimation: Propensity score estimation summarizes observed characteristics of sample households into a single indicator, i.e. Conditional probability of receiving treatment on a given "x" characteristics to reduce dimensionality(x) = Pr(T=1/x)=F(βx). The propensity score estimation was done by logistic regression estimation followed by the command "predict p score" by STATA version 13.

Choosing matching Algorithm: Based on Dehejia and Wahba (2002) the three criteria's of selecting matching algorithm are; the first is balancing test or equal means test which suggests that a matching estimator should balance all explanatory variables and in t-test analysis the algorithm with the insignificance of more explanatory variables is preferred because after propensity score estimation there shouldn't be a mean difference between the two groups. The Second criterion is, considering into pseudo-R^2value, the smallest value is preferable. Third, a matching estimator that results in the largest number of matched sample size is preferred. To select and conclude a matching estimator, an estimator that balances all explanatory variables, with lowest pseudo-R^2 value and produces a large matched sample size is preferable. To select the estimator those three tests were made for three comparisons. So that based on "pstest" analysis the three criteria's results of the first comparison (comparison of users and non-users of PSNP kebele) was figured out by the following table 4.28

Table 4.28: selection of matching algorithm for users and non-users of PSNP kebele comparison

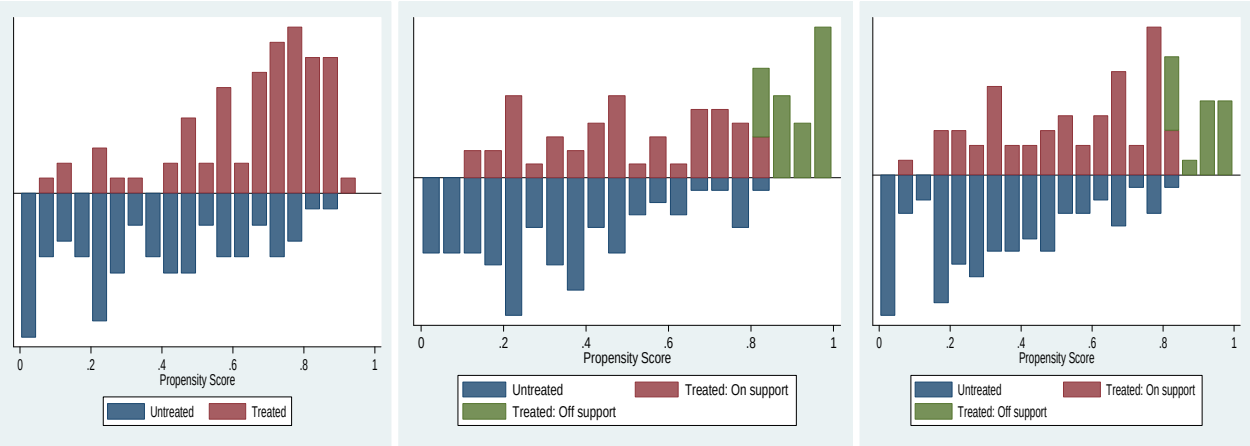
Matching estimator	Alternative tests conducted within estimator	Criteria's			
		Balancing test	Pseudo-R^2	Matched sample size	Mean biases
Nearest Neighbour	n(1)	9	0.144	144	12.2
	n(2)	10	0.101	144	11.8
	n(3)	11	0.096	144	10.7
	n(4)	11	0.069	144	10.7
	n(5)***	12	0.041	144	10.5
	n(6)	12	0.043	144	12
	(by average weight)	11	0.050	143	9
Kernel Matching	(Band width 0.05)	12	0.041	141	8.3
	(Band width 0.1)	12	0.041	141	8.3
	(Band width 0.25)	12	0.041	141	8.3
	(Band width 0.5)	12	0.041	141	8.3
	(Band width 0.8)	12	0.041	141	8.3
Caliper/ radius matching	0.25*STD.ofPscore	12	0.071	142	8.9
	0.05	12	0.066	137	7.9
	0.1	11	0.078	142	9.9
	0.25	11	0.089	142	11.5
	0.5	11	0.89	142	11.5
	0.8	11	0.089	142	11.5
Stratification matching	(tested with different block)	11	0.089	133	11.5

*** is selected matching algorithm based on selection criteria's.

Source: own computation result, 2017 G.C

Based on the above value and tests conducted for other two comparisons, NNM with 5 neighbor was found the best estimator for comparisons of users and non-users of PSNP kebele and kernel matching with all tested bandwidths were found the most preferable and fitted propensity score matching algorithm for comparing of users with non-PSNP kebele households and between non-users of two kebeles. After the selection was made analysis was done by adjusting mean bias within a range of ≤ 5 and the result of the selected matching algorithm was used for interpretation and results and discussion.

Imposing common support /checking overlaps: Once the matching estimator was selected the third step was checking the range of common support and looking the distribution of propensity score overlap and drop the non-treated who fall outside of the region of common support.An area of common support is a propensity score within a range of the lowest and highest estimated value of households in the treatment group.



a) within PSNP kebele b) users with non-PSNP KA HHs c) comparison between non-users of two kebeles

Figure 4.4: overlaps of propensity score on common support

Average treatment effect on treated

Comparisons of users and non-users of PSNP kebele;. Based on the selected methods of analysis (Nearest Neighbor with 5 neighbors) the impact evaluation result showed that the mean difference between treated and non-treated households by all three measurements was not significance within a range of above 90% confidence intervals. Even though there was no significance mean difference within a range of 90% confidence interval, the day mean food consumption (calorie intake) of PSNP users exceeds by1031.05 kilocalories and the food security status of users also exceeds by 17.56% than non-users of PSNP kebele households. The mean asset accumulation of non-PSNP users exceeds by 2651.35 ETB than users or the asset accumulated by PSNP users is lessened by 2651.35 than non-users of the same kebele (Table 4.29).

Different researchers found different results about the impacts of the productive safety net program in their research area. A similar result of this study was found by Habtamu (2011), Camilla Andersson et al., (2009), Gillingal et al., (2008), Wheeler et al., (2010) and Tadele (2011). Those studies declared that the productive safety net program had no brought statistically a significant impact on food consumption, asset accumulation (like livestock holding and durable assets) and welfare of household members. But Nesreddin (2014), Hermella(2015) and Yitagesu (2014) studies shows that the productive safety net program had a statistically significant impact on improving food consumption, asset accumulation(like livestock and consumer durable assets), develop absorptive resilience and improve working behaviors of community members. As we can see from the time of the research recent researches indicates that the productive safety net program is playing a great role in improving the livelihoods of targeted households. This may because of that the changes in the implementation of the program in its program phases, but as we can see from the results of this study it is not similar with the results of recent studies.

This may because of the mischief of the implementation modality changes in each phase, especially the graduation implementation was not implemented according to the graduation guideline and they graduate without they score a significant asset accumulation. Forced graduation was the main challenge of productive safety net program beneficiaries in the study area. Based on the information gained from key informants, focus group discussion and household interview, there was a mass forced and quota system graduation from the program especially in 2012 G.C.

The other reason may be lacks and proper implementations of other interventions beyond transfer to build productive assets. The main interventions implemented by PSNP to led households for graduation are livelihood interventions (access to credit and technical follow up, initiations of saving, provisions and introductions of improved livestock and plant seeds), facilitating alternative irrigation water sources by building different irrigation structures , public work activities especially in sustainable land management practices and awareness raising events in social, gender provisions and nutrition related activities. So that based on the survey conducted at the study area those interventions were not implemented as per the PIM.

Table 4.29: NNM n (5) results for comparison of users and non-users of PSNP kebele households

Outcome variable	Sample	Treated	Controls	Difference	Std. Err.	t-stat	Mean biases
Kilocalorie intake	Unmatched	8109.47	9042.45	-932.97	733.90	-1.27	
	ATT	8109.47	7078.42	1031.05	982.99	1.05	3.00
Total asset accumulation	Unmatched	6758.78	18296.92	-11538.14	2239.97	-5.15	
	ATT	6758.78	9410.13	-2651.35	3195.62	-0.83	3.00
Food security status	Unmatched	0.4189	0.3571	0.0677	0.08168	0.76	
	ATT	0.4189	0.2432	0.1756	0.11490	1.53	

Source: own computation result, 2017 G.C

Comparison of users with non-PSNP kebele households; this research analysis was conducted to examine the contribution of the program by minimizing problems which occur in impact evaluation (spill-over effect) and triangulate with above PSM analysis results. Even though the mean difference between treated and non-treated by all three criteria was not significance within a range of above 90% confidence interval PSNP users had less calorie intake, food security status and asset (table 4.30). Non-PSNP kebele households exceed the PSNP users by 976.91 Kcal, 3908.34 ETB and 3.38% by mean calorie intake, asset accumulation and food security status respectively.

Table 4.30: Kernel matching results of comparison of users and non-PSNP kebele HHs

Outcome variable	Sample	Treated	Controls	Difference	Std. Err.	t-stat	Mean biases
Kilocalorie intake	Unmatched	8109.47	10785.19	-2675.71	1149.91	-2.33	
	ATT	8608.07	9584.99	-976.91	1539.79	0.63	4.1
Total asset	Unmatched	6858.78	18538.64	-11779.85	3059.65	-3.85	
accumulation	ATT	8354.88	12262.92	-3908.34	3858.78	-1.01	4.1
Food security status	Unmatched	0.4189	0.7037	-0.2847	0.0768	-3.71	
	ATT	0.54160	0.5754	-0.0338	0.1031	-0.33	

Source: own computation result, 2017 G.C

Comparison of non-users of two kebeles; this propensity matching analysis was made to check whether the program has spill-over effect for non-users of PSNP kebele and to assure the examination of contribution of PSNP by comparing two groups within PSNP kebele was the right measure or not. So based on the result (table 4.31) the program had no any economic importance for livelihood improvements (spill-over effect) for non-users of PSNP kebele. Non-PSNP kebele household's mean calorie intake and asset accumulation exceeds by 2539.14 Kcal and 5449.53 ETB respectively than PSNP kebele non-users. But the mean difference between those two parameters was not significance even within range of above 90% confidence interval. The food security status of non-PSNP kebele households exceeds by 40.59% than non-users of PSNP kebele HHs and it is significance at 95% confidence interval.

Table 4.31: Kernel matching results of comparison of non-user HHs between two kebeles

Outcome variable	Sample	Treated	Controls	Difference	Std. Err.	t-stat	Mean biases
Kilocalorie intake	Unmatched	9042.45	10785.19	-1742.74	1207.16	-1.44	
	ATT	9307.94	11847.08	-2539.14	1621.93	-1.57	3.7
Total asset accumulation	Unmatched	18296.92	18538.64	-241.71	3626.8	-0.07	
	ATT	17673.42	23122.96	-5449.53	4772.92	-1.14	3.7
Food security status	Unmatched	0.3571	0.7037	-0.3465	0.07675	-4.52	
	ATT	0.3703	0.7763	-0.4059	0.1015	-4.00**	3.7

** Significance at 5% probability level
Source: own computation result, 2017 G.C

Quality check and Sensitivity analysis: The quality of the analysis was checked by "pstest" to understand and manage the mean bias to not more than 5 and balancing test before and after matching was conducted. Based on selected propensity algorithms treated and non-treated household were insignificance by all covariates after matching. To see the propensity score distribution of treated and control groups before and after matching graphical analysis was done.

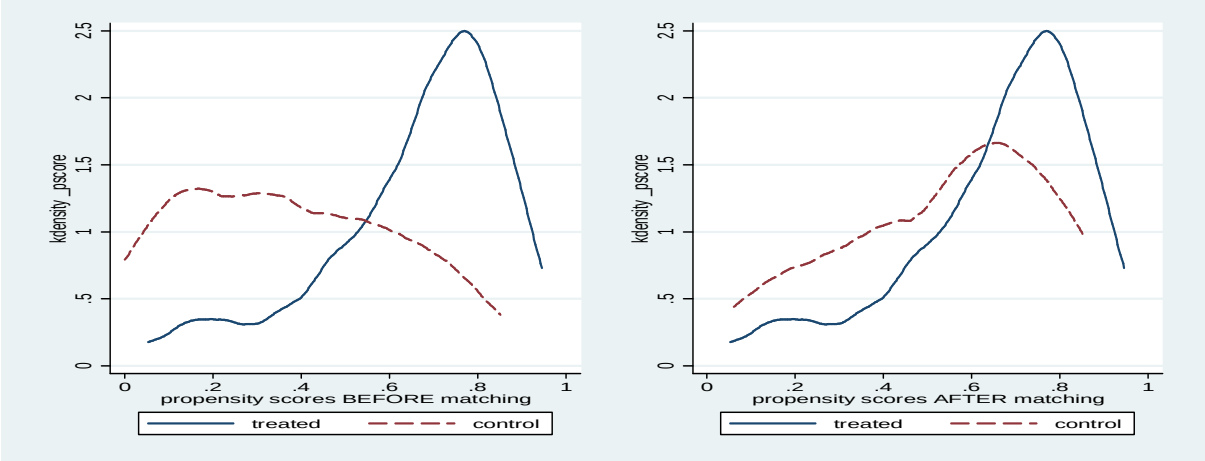


Figure 4.5: distribution of propensity score before and after matching

Checking whether or not inference about treatment effect may be changed by unobserved (hidden bias) factors or deviation of the estimated result from assumptions is very important and critical stage of applied evaluation. In experimental random assignment where Γ=1 and in non- experimental or non-random assignment impact evaluation, where the average treatment effect on treated based on outcome variables is insignificant, computing sensitivity analysis isn't required (Rosenbaum, P.R.,2002). Hence, there is significance difference in food security status between non-PSNP users of PSNP kebele and non-PSNP kebele households, computing sensitivity analysis was found important.

To conclude how strongly an unobservable variable, influence the selection process and undermine the implication of analysis, using *mhbound* for binary outcome variable and *rbounds* for continuous outcome variable are recommended commands (Cliendo et al., January 2007). From the analysis results of *mhbounds* Q_{mh}^{+} indicate about the positive hidden bias (unobservable) variables and Q_{mh}^{-} indicates about negative unobservable selection effects. When there is significance value ofQ_{mh}^{+} and Q_{mh}^{-} within a range of gamma (up to Γ=2) or the range you test we conclude that the study is insensitive to bias (Cliendo et al., January 2007). So that based on the *mhbounds* analysis result of this research (Appendix 3), hence, value of Q_{mh}^{+} and Q_{mh}^{-}were significance within a tested gamma range Γ=2, there estimated results of food security status difference between non-PSNP users of two kebele households was insensitive to hidden bias.

Summary and Conclusion

Sex, family number, irrigation, fertility of soil, amount of fertilizer used and current animal holding(TLU) were found significant covariates to determine participation in PSNP. Sex, amount of fertilizer used and current TLU affects the participation negatively.

Even though there was no significance mean difference even within the range of above 90% confidence interval, the day's mean food consumption (calorie intake) and food security status of PSNP users exceeds non-users of PSNP kebele. This indicates that PSNP plays a role in filling the shortage of food gap. The mean asset accumulation of non-PSNP users is greater than users. Non-PSNP kebele households exceed the PSNP kebele users by and non-users by all parameters (mean calorie intake, asset accumulation and food security status).

The impact analysis was employed by checking the spill-over effect problem for PSNP kebele non-targeted households. So that based on the PSM analysis, it was found that PSNP had no a significant benefit to non-targeted households or there was no spill-over effect.

In general, productive safety net program had no significant contribution to asset accumulation, food consumption and to improve the food security status rather it used for smoothing food consumption and solves immediate food shortages.

Recommendations:

Based on the findings of this study, the possible recommendations which can enhance and improve the livelihoods of households in the studied area are; -
Increasing the participation of Productive safety net program beneficiaries in off farm income generating activities should be done, because, off-farm income generating activities helps beneficiaries as a source of sustainable income.

The program should strengthen the gender and social development provisions including family planning provided by the program implementation manual to increase women's participation in productive works and income generating activities and decreasing the burdens of women in social and reproductive works. Because based on this study female have more probability to participate in the program that means women are categorized in the poor category of wealth status and a large family member leads to poverty and participation in PSNP.

Intervention which can improve the numbers and quality of animal holding and oxen of households should be done.

Household should be encouraged and create awareness to develop the fertility of the soil by different soil and water conservation measures as well as utilize soil fertilizer for their farm land.

The implementation modalities of the program should perform as per the PIM i.e. transparency and accountability workings should be kept, because the targeting mechanism, graduation process and support, timeliness of transfer affects the protection and creation of assets and then graduation and food security status.

Finally, additional research in different areas of the country with large sample size should be done and the program implementers of all levels, program designers and donors should re-evaluate the program interventions those should be implemented by the program based on such scientific research findings in order to enhance the capability of households to stabilize and build assets to able to resilience to shocks and stress and to make food security sustainable.

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Subject: Medicinal Plants

Quick Response Code

DOI:10.22192/ijarbs.2019.06.02.016

How to cite this article:

Walelign Abiye, Bamlaku Alamirew and Anteneh Dagnachew. (2019). Impacts of the Productive Safety Net Program on the Livelihood of Households: The case of Enebse Sar Midir District, Ethiopia. Int. J. Adv. Res. Biol. Sci. 6(2): 129-140.

DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.02.016