Economics
2022; 11(4): 190-199
http://www.sciencepublishinggroup.com/j/eco
doi: 10.11648/j.eco.20221104.13
ISSN: 2376-659X (Print); ISSN: 2376-6603 (Online)

Assessing the Impacts of Productive Safety Net Programme on Smallholder Farmers Expenditure in West Hararghe Zone, Oromia Region, Ethiopia

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To cite this article:
Birhanu Angasu, Nimona Sime, Gosa Alemu. Assessing the Impacts of Productive Safety Net Programme on Smallholder Farmers Expenditure in West Hararghe Zone, Oromia Region, Ethiopia. *Economics*. Vol. 11, No. 4, 2022, pp. 190-199.
doi: 10.11648/j.eco.20221104.13

Received: October 20, 2022; **Accepted**: November 12, 2022; **Published**: November 29, 2022

Abstract: Productive Safety Net Program is implementing smoothing consumption and protecting asset depletion in the study areas. Thus, the purpose of this study were to assess the impact of productive safety net program on smallholder farmer's expenditure and analyze factors affecting participation of smallholder farmers in productive safety net program in the study area. For this study both primary and secondary data were used. Primary data were collected from 264 households (114 users and 150 non-users) and supported by secondary data. To address the aforementioned objectives descriptive statistics and econometric models (Propensity score matching (PSM) and Logit model) were employed. The econometric result of Logit model indicated that the likelihood of participating in the program was positively affected by age and marital status, while income obtained from farm, food aid and extension service accessibility was affected negatively the participation of household in PSNP. The PSM estimation results revealed that participation in PSNP had brought significant impact on household expenditures. Those households participated in PSNP in the study area uses the PSNP income mainly for home expenditure purpose. It can be recommended that policy makers should have to give attention in designing and implementing PSNP through giving care for youth age participants, strength extension services and availing fund timely.

Keywords: Expenditure, Logit Model, PSM, PSNP, Impact

1. Introduction

Ethiopia remains vulnerable to a range of shocks and stresses that could undermine the impressive progress made in poverty reduction. The country remains one of the world's most food insecure countries, with all key dimensions of food security indicators [6]. According to the former research, Ethiopia's poverty levels fell by around 20% between 2011 and 2016 although they remain high especially in the rural areas [17]. In the country food production was lagged behind the population growth over the last three decades. In responses to food insecurity conventionally emergency food-based interventions have been practiced [15]. As a result in 2005, the government of Ethiopia and a group of collaborators implemented PSNP against food insecurity and economic shocks as a social protection program [8].

The Productive Safety Net Program (PSNP) designed to the needy households with primary goals as smoothing consumption, protecting asset depletion in times of shocks and thereby encouraging asset accumulation of eligible households that live in chronically food insecure woredas, and creating community assets through public works (labor-intensive community-based activities) [13]. In PSNP a food-insecure people are employed in public work for five days a month during the agricultural slack season. They also intended to create valuable public goods as well as stimulate investments by reducing seasonal liquidity constraints [2].

West Hararghe Zone is the zone in which a great number of chronically foods in-secured households are found. In all rural woredas of the zone there were chronically food in-

secured households. In all of (450) *kebeles* found in the zone were food insecure as well within which safety net programme are functioning. From a total rural population of the zone estimated as 1,917,945 (male 979,828 and female 938,117) 411,716 (366,029 public work clients and 45,687 direct supports (those who do not have other means of support)) were safety net users [16].

PSNP aiming of graduating the poor beneficiary by improving their incomes and escape from the food insecurity. According to the previous study, PSNP together with the other food security program, encouraged households to engage in production and investment, increased use of modern farming techniques and entry into nonfarm own business activities [1]. However, in study area as observed farmers supported by the program within the last five years were still the beneficiaries of the program.

Safety net program enables the smallholder farmers not to oversee their annual income generating activities/ farming practices in the study area. The beneficiary oversees the program as main options for their livelihoods despite devoting their time and labor on farming practices. It brings an impact directly or indirectly on the community livelihoods. Despite regional government investing more on PSNP in the area, its impact on household home expenditure was not analyzed. Therefore, the study designed to investigate in the zone on the impact of safety net on smallholder farmer's expenditure.

2. Objectives of the Study

1) To assess the impact of productive safety net program on smallholder farmer's expenditure in the zone.
2) To analyze factors affecting participation of smallholder farmers in productive safety net program in the study area.

3. Methodology

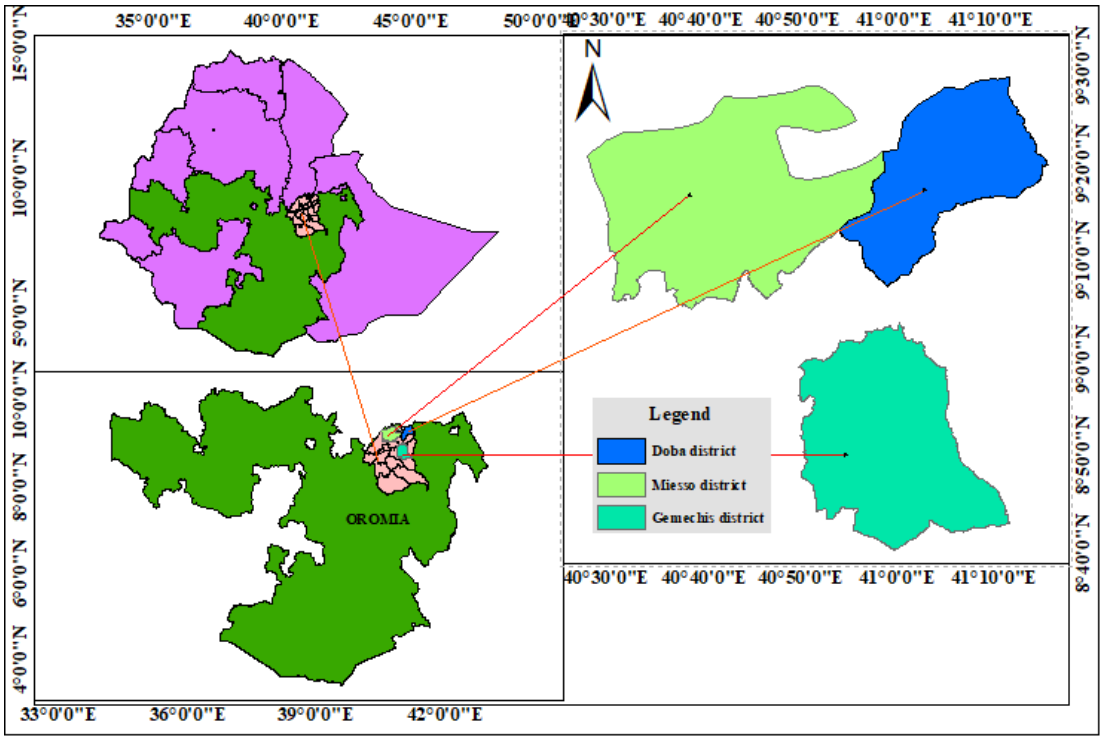
3.1. Description of the Study Area

The study was conducted in three districts (Gemechis, Doba and Mieso) of West Hararghe zone of Oromia National Regional State; based on the PSNP potential users [16].

Gemechis district is one of the 15 districts of West Hararghe Zone located at 343 km South-east of Addis Ababa and 17 km from Chiro, the zonal capital town. The district is found from 1300 to 3400 meters above sea level. The district covers an area of 77,785 hectares. Agriculture is the mainstay of the community [7].

Doba district is found in West Hararghe Zone located at 382 km South-east of Addis Ababa and 57 km from Chiro, the zonal capital town. The district is bordered on the south by Chiro, on the west by Mieso, on the north by the Somali Region, on the east by the East Hararghe Zone and on the southeast by Tulo. The district is found from 1400 to 2500 meters above sea level. The district covers an area of 700.47 square kilometers [4].

Mieso district is found in West Hararghe Zone located at 300 km East of Addis Ababa and 25 km from Chiro, the zonal capital town. The district is found from 900 to 1600 meters above sea level. The district covers an area of 142,683 hectares. Agro ecologically the district is classified as (lowland). The mean annual rainfall ranges from 400 to 900 mm with an average of 790 mm. The mean annual temperature ranges from 24°C to 28°C [12].



Source: Own sketch from GIS data, 2021

Figure 1. *Map of the study area.*

3.2. Sampling Technique and Sample Size

A combination of purposive and random sampling technique was applied for this study. Firstly, three (3) districts were selected purposively based on high number of safety net beneficiaries. Secondly, out of high number of safety net user *kebeles* found in each district, 3 (three) *kebeles* were purposively selected from each district. Accordingly, a total of nine (9) *kebeles* were selected out of the three districts. Thirdly, representative sample households found in the selected *kebeles* were stratified into two (users and non-users). Finally, 264 sample households (114 users and 150 non-users) were randomly drawn from these strata based on probability proportional to size of the population in each stratum.

Table 1. *Number of sample respondents.*

Districts	Kebeles	PSNP users	Percent	PSNP no-users	Percent
	Ifa Aman	19	16.67	20	13.33
Doba	Lenco Wadesa	26	22.81	33	22
	Baha Adu	8	7.02	11	7.33
	Hida Dima	9	7.89	9	6
Gemechis	Kuni Segariya	12	10.53	18	12
	Waltane	6	5.26	12	8
	Gulufa	10	8.77	11	7.33
Mieso	Harkonca	18	15.79	27	18
	Buri Mulu	6	5.26	9	6
Total		114	100	150	100

Source: Own computation, 2021

3.3. Data Types, Source and Method of Collection

The study was used both primary and secondary data sources in collection of qualitative and quantitative data. Secondary data were collected from published and unpublished documents of the district and zone offices to support the primary data. The primary data was collected through focused group discussions and direct interviewing of the selected representative sample households by using semi-structured questionnaires and checklists.

3.4. Method of Data Analysis

To answer the specific objectives of the research objectives both descriptive and econometric analyses were employed.

3.4.1. Descriptive Analysis

Descriptive statistics such as mean, standard deviation, frequency and percentage were employed to understand socio-economic situation and home expenditures of farmers. Qualitative data were also analyzed through description, discussion and narration. Garret score was calculated and used to provide overall ranking of major constraints of PSNP program participants.

3.4.2. Econometric Model

From econometric models propensity score matching (PSM) was used to analyze impact of PSNP on household home expenditures. The PSM technique enables us to extract from the sample of nonparticipating (non-users) households a set of matching households that look like the participating (users) households in all relevant pre intervention characteristics. In our study participation in PSNP is treatment and those participants are treatment groups while nonparticipant group members are counterfactual groups. This study attempts to estimate the average impact of treatment on treated (ATT). According to the former study, ATT refers that mean impact of the program on individuals who actually participated [3].

PSM provides reliable estimates of program impact on smallholder farmers. In other words, propensity score expresses how likely a person is to select the treatment condition on a given observed covariates. This score is useful because match participants from treatment condition to participants from counterfactual condition who have a very similar estimated propensity score creates a balance between treated and untreated participants. It also expected to create balance on covariates that used to estimate the propensity score.

According to the earlier research, the PSM model is specified as:

$$E(x) = P\,(D=1 \mid X) \qquad (1)$$

Where,

E (x) is the abbreviation for propensity score,

P is a probability,

D=1 a treatment indicator with values 0 for counterfactual and 1 for treatment, and

X is a set of observed covariates [10].

While, logistic model was used to analyze factors affecting participation of smallholder farmers in productive safety net program. According to the former study, the logistic regression model was used to examine the quality of propensity scores [11]. It used to determine the joint effect of different independent variables and to examine why some of the beneficiaries become food self-sufficient soon and others lag behind [9].

4. Results and Discussions

Results of the study were described using the STATA 15 computer program.

4.1. Descriptive Statistics Results

This section presents demographic and socio-economic characteristics of sample respondents in the study areas. Out of 264 total respondents utilized, 114 were PSNP users and 150 PSNP non-users. According to FGD, PSNP in study area increased dependency and focus more on communal work while works of individual participants were ignored. As a result, most of PSNP user households were not reached their graduation from the program.

Table 2 presents that statistically there was a significant difference between the two groups in terms of age, education status, household size, distance of market, and livestock owned. Compared to non-participants, PSNP participant households had smaller age, shorter distance, dependence ratio, off/non-farm income, farm income and owned fewer livestock size. However, as compared to non-participants, PSNP participant households had larger in household size, amount of credit, and land owned.

Examining the demographic and socio-economic characteristics of sample respondents, investigator find that age and household size have negative and statistically significant effects on using PSNP. However, education levels, distance of market and livestock size have positive and statistically significant effects on using PSNP. Being users of PSNP is most responsive to age and household size. Livestock size owned has a positive contribution for households being out of PSNP users.

Cattle, goats, donkeys and poultry are the main livestock reared by sample households in the three districts. Few beehives (mostly traditional) are also reared in the study area. Table 1 reveals that there is a statistically significant difference in between the two groups (PSNP participants and non-participants). Land is an important means of agricultural production that plays a central role in producing crops and rearing livestock. But, in this study size of land owned is not statistically significant among the two groups.

Table 3 presents the results of chi-square for the dummy and categorical variable. Based on their values, food aid is the most important input, followed by marital status and accessibility of household to extension service. Accordingly, non-participating households had slightly higher percentage of male headed households and accessible to extension service as compared to PSNP participating households. Access to extension service and marital status of household head was statistically significant at 5% significance level.

Table 2. *Demographic and socio-economic characteristics of sample respondents.*

Variables	User (N=114)		No-user (N=150)		Total Mean	t-test
	Mean	St. Dev	Mean	St. dev		
Age of household head	34.22	1.06	42.79	.86	37.92	-6.358***
Educational status (years of schooling)	3.01	.29	3.79	.28	3.45	1.914*
Household size (in number)	6.68	.22	5.86	.18	6.22	-2.959***
Distance of nearest market (walking hours)	1.27	.09	1.46	.08	1.38	1.667**
Amount of credit (number)	.12	.03	.09	.03	.11	-0.793
Dependency ratio (number)	111.84	9.17	124.30	7.10	118.92	1.092
Livestock owned (TLU)	1.97	.21	2.62	.16	.65	2.572**
Off/non-farm income (number)	1937.28	543.42	6011.47	2484.31	4252.16	1.410
Farm income (number)	11444.34	1247.15	20841.21	6309.64	16783.47	1.283
Land owned (timad[1])	4.45	.34	4.17	.26	4.29	-0.679

***, ** and * were significance level at 1%, 5% and 10% respectively.
Source: Survey result, 2021

Table 3. *Demographic and socio-economic characteristics of sample respondents (dummy and categorical variables).*

Variables	Characteristic	User (%)	Non-user (%)	Overall %	Pearson chi[2]
Sex of household head	Male	85.09	89.33	87.5	1.067
	Female	14.91	10.67	12.5	
Marital status of household head	Unmarried	.88	1.33	1.14	8.380**
	Married	92.11	98	95.45	
	Widowed	3.51	0	1.52	
	Divorced	3.51	.67	1.89	
Off/non-farm participation	Yes	20.18	26	23.48	1.223
	No	79.82	74	76.52	
Food aid	Yes	12.28	35.33	25.38	18.176***
	No	87.72	64.67	74.62	
Access to extension service	Yes	65.79	78	72.73	4.869**
	No	34.21	22	27.27	

***, ** and * were significance level at 1 %, 5% and 10% respectively.
Source: Survey result, 2021

[1] 1hectare = 8 timad in study area

4.2. Econometric Estimation Results

This section describes the econometric analysis results in the examination of the impact of PSNP on smallholder farmer's expenditure using propensity score matching model. Before undertaking the economic estimation, different econometrics assumptions were tested using relevant techniques. First the presence of strong multicollinearity among the independent variables has been tested. According to the model result there is no serious multicollienraity among the variables (Mean VIF = 1.22 and less than two for each independent variables). Secondly, to control the hetroscedasticity problem among the explanatory variable, instead of Bresch Pagan test (hettest), robust standard error calculation of logit model has been employed.

Propensity score matching (PSM) model was better over the Heckman's two stages model when there is no selectivity bias in the data set. The existence of selection bias occurred when mills lambda became significant. In this study, the mill's lambda was insignificant which indicated that there was no selectivity bias in the model (Mills lambda's coefficient was 190.811; P>z = 0.855). Hence, the Heckman two-stage model was found inappropriate for this data set.

Propensity score matching (PSM) model result:

Propensity score matching (PSM) was applied to deal with the objective of assessing the impact of PSNP on household expenditures of the study. The matching process was performed for household expenditure.

(i). Estimation of Propensity Scores

This part presents the results of the logistic regression model employed to estimate propensity scores for program participation of households. As specified earlier, participation of households in PSNP in this model is binary indicating whether the household was a participant in the PSNP which takes a value of 1 and 0 otherwise.

Table 4 below demonstrates the program participation estimation results of the logitic model. The pseudo-R 2 value of the estimated model result was 0.2233 which is fairly low. This low pseudo- R 2 value indicates that the allocation of the program has been fairly random [14]. Therefore, the result suggests that treatment households do not have diverse characteristics overall and hence obtaining a good match between treatment and counterfactual households become easier.

Logistic regression was employed in order to see the larger extent variables contributor to the home expenditures of the households. The explanatory variables that were selected to measure its association with home expenditure were sex, age, marital status, level of education, distance of market, dependence ratio, household size, off/non-farm participation and income, land owned, livestock owned (TLU), farm income, food aid and extension access. These variables were entered and processed to measure the relationship between those independent variables and the outcome variable.

As indicated on Table 4, among possible predictor variables stated age, marital status, farm income, access of food aid and credit access of households has significant effect on expenditure of households at 1% and 5% level of significance. Such strong positive relationship age and food aid in between participation in PSNP might be due to the fact that age increment is associated with higher house expenditures as well as availability of food aid has higher chance of being home expenditures as compared to small age households and those not accessible for food aid.

Households who are married and widowed had higher chance of being included in the program. This might be because respondents as being married it increase the members of family which increases home expenditures of households. In other word, being the household become divorced it leads a household more of aid dependence which increases the chance of participation in PSNP program. Households were selected to participate in PSNP program by kebele administration and the surrounding community in the study area.

Contrarily, access to extension contact and availability of food aid were found to have negative and significant effect on the program participation at 1% and 5% level of significances, respectively. This is due to household accessible to extension contact would decrease home expenditures using awareness created by DA on production. This suggests that rarely contacted households have lesser chance to be included in the program than more contacted households. Similarly, households accessible more for food aid have lesser chance of being participate in the program. As a result, more accessed household for extension contact and food aid probability of their inclusion in the program is low.

Table 4. *Logit results of household program participation.*

Variables	Coefficients	Std. Err.	Z	P>|z|
Sex of household head	-0.0942	0.4634	-0.2	0.839
Age of household head	0.0717	0.0171	4.19***	0.000
Marital status of household head	1.4687	0.6118	2.4**	0.016
Education level	-0.0063	0.0500	-0.13	0.900
Distance from nearest market	-0.1393	0.1689	-0.82	0.410
Dependence ratio	0.0022	0.0019	1.16	0.247
Household size	0.1007	0.0798	1.26	0.207
Off/non-farm participation	0.1320	0.4309	0.31	0.759
Farm income	0.0000	0.0000	-0.93	0.355
Land owned	-0.0032	0.0517	-0.06	0.950
Livestock owned (TLU)	-0.0954	0.0899	-1.06	0.289

Variables	Coefficients	Std. Err.	Z	P>|z|
Farm income	0.0000	0.0000	-2.4**	0.016
Food aid	-1.3237	0.3941	-3.36***	0.001
Access extension services	-0.7280	0.3395	-2.14**	0.032
Constant	-5.1577	1.4767	-3.49***	0.000
Observation =264 LRchi2 (14)=80.63 Prob> chi2=0.000				
Log likelihood=-140.214 Pseudo R^2=0.2233				

***, **and * means significant at 1%, 5% and 10% probability levels, respectively.
Source: Survey result, 2021

Based on the above participation model the distribution of the propensity score for each household included in the treated and counterfactual groups was computed to identify the existence of a common support. Figure 2 depicts the distribution of the household with respect to the estimated propensity scores. The figure shows that most of the treatment user households were found in the right side and partly in the middle while most of non-user households are found in the left side of the distribution. It also reveals that there is no area in which the propensity score of the user and the non-user groups are similar.

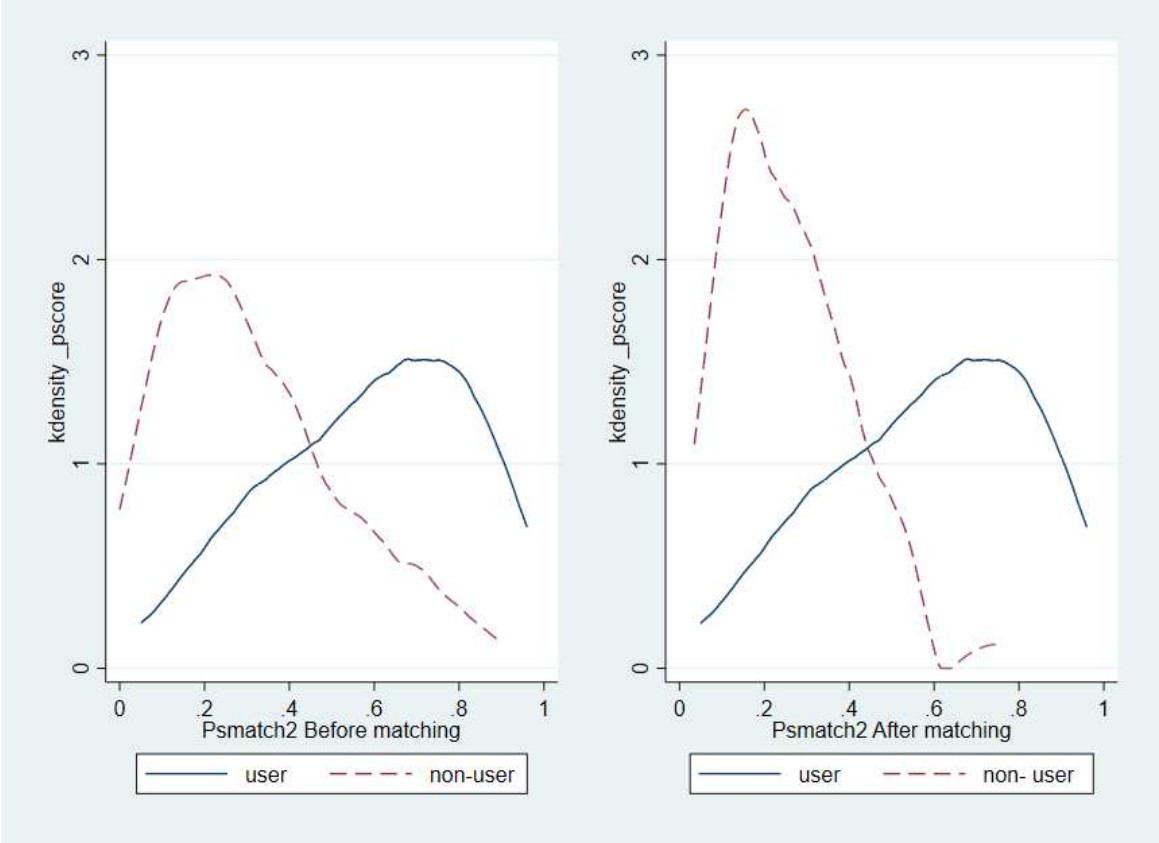


Figure 2. *Kernel density of propensity score distribution.*

(ii). Matching Program and Non-Program Households

There are four important tasks that must be carried out before conducting the matching work itself. First, estimating the predicted values of program participation (propensity score) for all the sample households. Second, imposing a common support condition on the propensity score distributions of household with and without the program is another important task. Third, discarding observations whose predicted propensity scores fall outside the range of the common support region is the next work.

As depicted on Table 5, the estimated propensity scores vary between 0.0565 and 0.9277 (mean = 0.553) for PSNP User households and between 0.0467 and 0.9595 (mean = 0.341) for non PSNP participant (control) households. The common support region would therefore, lie between 0.0565 and 0.9595 which means households whose estimated propensity scores are less than 0.0565 and larger than 0.9595 are not considered for the matching purpose.

Table 5. *Distribution of estimated propensity scores.*

Groups	Obs.	Mean	STD	Min	Max
All households	264	0.451	0.247	0.0511	0.9704
User of PSNP	114	0.553	0.199	0.0565	0.9277
Non-user of PSNP	150	0.341	0.172	0.0467	0.9595

Source: Survey result, 2021

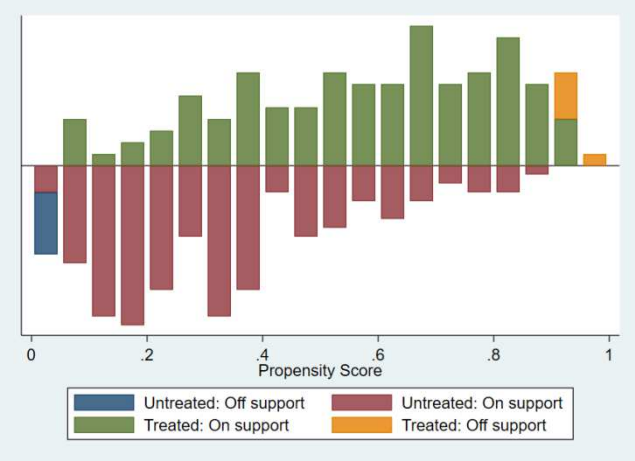


Figure 3. *Graph of propensity scores of participant households.*

Figure 3 above indicated distribution of estimated propensity scores before and after the imposition of the common support condition for participant and non-participant households, respectively. As depicted on this Figure, most of the participant households have propensity score around 0.6 while majority of the non- participant households have propensity score around 0.3.

(iii). Choice of Matching Algorithm

Different alternatives of matching estimators were conducted to match the treatment program and counterfactual households fall in the common support region. The decision on the final choice of an appropriate matching estimator was based on three different criteria as suggested by [5]. First, equal means test which suggests that a matching estimator which balances all explanatory variables (i.e., results in insignificant mean differences between the two groups) after matching is preferred. Second, looking into pseudo-R 2 value, the smallest value is preferable. Third, a matching estimator that results in the largest number of matched sample size is preferred. To sum up, a matching estimator that balances all explanatory variables, with lowest pseudo-R^2 value and produces a large matched sample size is preferable.

Table 6 below presents the estimated results of tests of matching quality based on the three performance criteria. Looking into the result of the matching quality, nearest neighbor matching (NN) of neighborhood 5 was found to be the best for the data researchers have at hand. Hence, the estimation results and discussion for this study are the direct outcomes of the NN matching algorithm with a neighbor of 5.

Table 6. *Matching performance of different estimators.*

Matching algorithm	Balancing test	Pseudo- R^2	Matched Sample size
Nearest Neighbour			
NN-1	12	0.046	252
NN-2	12	0.048	252
NN-3	12	0.049	252
NN-4	11	0.049	252
NN-5	14	0.042	252
Caliper			
0.1	13	0.034	224
0.25	12	0.047	247
0.5	12	0.042	256
Kernel			
Band width of 0.1	13	0.032	224
Band width of 0.1	11	0.048	247
Band width of 0.1	12	0.038	256

Source: Survey result, 2021

(iv). Testing the Balance of Propensity Score and Covariates

Once the best performing matching algorithm was chosen, the next task was to check the balancing of propensity score and covariate using different procedures by applying the selected matching algorithm. It should be clear that the main intention of estimating propensity score is to balance the distributions of relevant variables in both groups.

Table 7. *Propensity score and covariate balance.*

Variable	Sample	Mean		Standardized bias		t-test	
		Treated	Control	%bias	% reduced	T	p>|t|
Sex of household head	U	0.8509	0.8933	-12.7		-1.03	0.303
	M	0.8727	0.8881	-4.6	63.8	-0.4	0.69
Age of household head	U	42.7890	34.2200	78.6		6.36***	0.000
	M	36.1130	34.5240	14.6	81.5	1.43	0.155
Education level	U	3.0088	3.7867	-23.9		-1.91*	0.057
	M	3.0353	3.6783	-19.8	17.3	-1.64	0.101
Marital status	U	2.0965	2.0000	29.3		2.47**	0.014
	M	1.9664	2.0070	-12.3	58	-1.57	0.119
Distance to nearest market	U	1.2707	1.4622	-20.8		-1.67*	0.097
	M	1.3146	1.4685	-16.7	19.6	-1.44	0.15

Variable	Sample	Mean		Standardized bias		t-test	
		Treated	Control	%bias	% reduced	T	p>|t|
Dependence ratio	U	111.8400	124.3000	-13.5		-1.09	0.276
	M	126.5300	122.8100	4	70.2	0.37	0.71
Household size	U	6.6842	5.8600	36.6		2.96***	0.003
	M	5.8129	5.8951	-3.6	90	-0.34	0.737
Off/non-farm participation	U	0.2018	0.2600	-13.8		-1.1	0.271
	M	0.3154	0.2378	18.4	-33.3	1.47	0.143
Land owned	U	4.4474	4.1650	8.4		0.68	0.498
	M	3.8815	4.0192	-4.1	51.2	-0.39	0.699
Livestock owned (TLU)	U	1.9687	2.6228	-31.7		-2.57**	0.011
	M	2.6803	2.5345	7.1	77.7	0.59	0.554
Income farm	U	11444.0000	20841.0000	-16.9		-1.28	0.2
	M	12052.0000	13936.0000	-3.4	80	-1.24	0.216
Food aid	U	0.1228	0.3533	-56		-4.4***	0.000
	M	0.4056	0.3427	15.3	72.7	1.1	0.273
Access to extension services	U	0.6579	0.7800	-27.3		-2.22**	0.027
	M	0.7406	0.7692	-6.4	76.5	-0.56	0.575

***, **and * means significant at 1%, 5% and 10% probability levels, respectively.
Source: Survey result, 2021

The balancing powers of the estimations are ensured by different testing methods. Reduction in the mean standardized bias between the matched and unmatched households, equality of means using t-test and chi-square test for joint significance of the variables used are employed here. The 5th and 6th columns of Table 7 above shows the standardized bias before and after matching, and the total bias reduction obtained by the matching procedure, respectively. The standardized difference in covariates before matching is in the range of 1% and 36.6% in absolute value whereas the remaining standardized difference of covariates for almost all covariates lies between -3.6% and 18.4% after matching. Therefore, the process of matching creates a high degree of covariate balance between the treatment and counterfactual samples that are ready to use in the estimation procedure. Similarly, T-values also reveal that all covariates became insignificant after matching while eight of them were significant before matching.

As indicated in Table 8, the values of pseudo-R^2 are fairly low. This low pseudo-R^2 value and the insignificant likelihood ratio tests support the hypothesis that both groups have the same distribution in the covariates after matching. These results indicate that the matching procedure is able to balance the characteristics in the treated and the matched comparison groups. Hence, these results can be used to assess the impact of PSNP among groups of households having similar observed characteristics. This enables us to compare observed outcomes for treatments with those of a counterfactual group sharing a common support.

Table 8. *Chi-square test for the joint significance of variables.*

Sample	Pseudo R^2	LR	chi^2	p>chi2
Unmatched	0.222	80.24	0.000	27.7
Matched	0.042	16.77	0.269	9.9

Source: Survey result, 2021

All of the above tests suggest that the matching algorithm investigators have chosen is relatively the best for the data at hand. Therefore, investigators could proceed to estimating the average treatment effect on the treated (ATT) for the sample households.

(v). Treatment Effect on the Treated

The estimation result presented in Table 9 provides a supportive evidence for the effect of the program on households' home expenditures. The PSM estimation result shows that participation in PSNP had brought a significant impact on home expenditures in the study area. This might be because households in the study area use the PSNP transfer mainly for consumption smoothing purpose.

Table 9. *Average treatment effects for outcome variables of interest.*

Outcome variable	ATT on Treated	ATT on Controls	Difference	S. E.	T-stat
Expenditure	5976.606	4620.416	1356.189	460.1047	2.95***

Source: Survey result, 2021

4.3. Graduation

In study districts, PSNP stayed more than 16 years since started. However, graduation arises from the program was not undertaken in study area. According to FGD, the beneficiaries were not showed any difference from being beneficiaries from the program in terms of graduation. PSNP brought a positive influence on increment of family size, high dependence and lack of self-esteem to leave the program. These resulted their degree of dependence rather their graduation from the program. Thus study result coincided with the former research result which indicated food aid was associated with a dependency syndrome due to it might change the behavior of recipients making dependent them on aid and less active on their

socioeconomic activities particularly in developing countries [18]. Households were believed that they haven't other options to leave the program. This is because of existence of drought, large family size, shortage of land owned and existing current inflation. According to district agriculture office, PSNP brought high dependence, decrease in production and less focusing for private/ individual farms rather communal works.

4.4. Constraints

Table 10. *Problems encountered in the PSNP program of the study area in Garret Ranking method.*

No	Problems	Scores				Sum score	Average score	Rank
		1	2	3	4			
1	Shortage of fund	148	56	0	0	204	68.0	1
2	Unfair on distribution	74	56	44	0	174	58.0	2
3	Corruption	0	0	44	27	71	23.7	4
4	Unavailability on time	0	56	44	0	100	33.3	3
5	Not family based (fixed at 5 max)	0	0	0	27	27	9.0	5

Source: Own computation, 2021

5. Summary, Conclusions and Recommendation

5.1. Summary, Conclusions

Ethiopia remains vulnerable to a range of shocks and stresses that brought food insecurity in the country. For this, among the food-based interventions PSNP were practiced through public work and direct support. However, it blamed by most of farmers as it encourages dependency. From observation farmers supported by the program within the last five years were not graduated from the program. The beneficiary oversees the program as main options for their livelihoods. Thus, it may bring an impact directly or indirectly on the community livelihoods.

The study was undertaken with the objective of assess the impact of productive safety net program on smallholder farmer's expenditure and analyze factors affecting participation of smallholder farmers in productive safety net program in the study area. To address the objectives of the study, both qualitative and quantitative data types were used which collected from both primary and secondary sources. Quantitative data were collected through interviews schedule from a total of 264 respondents using semi-structured questionnaires. Qualitative data were also collected through focus group discussions. For this study both descriptive and econometric analyses were employed.

Out of 264 total respondents utilized in this study, 114 were PSNP users and 150 PSNP non-users. According to FGD, the increased dependency through focusing more on communal work by ignoring works of individual participants. The descriptive results revealed that PSNP participant households had smaller age, shorter distance, dependence ratio, off/non-farm income, farm income and owned fewer livestock size. The t-test result showed that among the demographic and socio-economic characteristics of sample respondents age, education, household size, distance of market and TLU were statistically significant. While, the chi-square result indicated marital status, accessibility of food aid and access to extension service was statistically significant.

Econometric result of the logit model indicated that age, marital status, income obtained from farm, food aid and extension service accessibility were statistically affect the participation of household in the program. In the study area there is significant impact of PSNP on household expenditure obtained in this study might be because households in the study area use the PSNP income mainly for home expenditure purpose.

5.2. Recommendations

Based on the results of study the following recommendations forwarded:

1) Households who are larger age more participants of the program than the smaller age. As the age of household increase the probability of he/she participate in PSNP also increases. Hence, policies makers would focus on ways of attracting youth's users who are agile and stronger to graduate the users from the program.
2) Increasing access of extension services increases the capacity of households for threshold graduation from the program through working his/her tasks. Extension access services beyond making graduation of participants, avoiding the extravagance. Therefore, extension services access should have to be strength and encouraged.
3) Unavailability of fund on time and existence of corruption on distribution was among the major constraints. Thus, program funding agents should have to bring funds timely and implementers at lower levels should have to consider the institutional guidance of the program.
4) This study found that PSNP had not brought any graduation beneficiaries from the program. Thus, program designers, implementers and funding agents should have to re-evaluate the program design and implementation to bring the positive effect on graduation of the beneficiaries.
5) Finally, this study was used cross sectional data. Therefore, it is better if it more validated using panel data to improve its level of prediction and applicability for policy makers.

Appendix

Table A1. *Conversion factors used to estimate tropical livestock units (TLU).*

Livestock category	Conversion Factor
Calf	0.25
Donkey (Adult)	0.70
Donkey (Young)	0.35
Weaned Calf	0.34
Camel	1.25
Heifer	0.75
Sheep and Goat (Adult)	0.13
Sheep and Goat (Young)	0.06
Cow and Ox	1
Horse	1.10
Chicken	0.013

Source: Storck et al., 1991.

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