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The contribution of Productive Safety Net Program for food security of the rural households in the case of Bale Zone, Southeast Ethiopia

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Abstract

Background: Developing countries in general and Ethiopia in particular are affected by a growing problem of food insecurity. Millions of individuals and households especially the rural poor are the main victims of the problem. The government of Ethiopia together with other development partners launched the Productive Safety Net Program (PSNP) in 2005 to help chronically food-insecure households. This study discusses the role of PSNP on the improvement in consumption needs and asset base of the households, effect on community development and determinants of food insecurity level of beneficiaries.

Methodology: Three Woredas have been selected agro-ecologically. Both qualitative and quantitative data-generating techniques were employed. Qualitative data were analyzed thematically and using narration. Frequency distribution table and *t* test were used. Logistic regression was employed to analyze the determinants of food insecurity.

Results and conclusion: Results indicated that PSNP was helping beneficiaries for consumption smoothing, asset accumulation, and development of the local community. The effectiveness of PSNP was significantly determined by age and education level of the household head and occurrence of shocks on the last five consecutive years. The practice of PSNP was challenged by a lack of monitoring and evaluation of structures, low payment and limited awareness of beneficiaries. To assure the positive role of PSNP, culture of savings and accumulation of assets, engagement of beneficiary households in diversified asset building livelihood strategies, targeting and minimizing wrong inclusion and exclusion, and the management as well as monitoring practices of locally constructed community development infrastructures should be enhanced.

Keywords: Asset building, Community development, Food insecurity, Productive Safety Net Program

Background

Achieving food security is a significant and growing challenge in developing countries. People's health and education, their ability to work, human right and equality are impaired by the problem of food insecurity. Women and girls are the most susceptible to the impacts of food insecurity due to their low access and control over resources [1].

Chronic food insecurity is one of the defining features of poverty in Ethiopia. Those individuals and households whose livelihood are heavily dependent on subsistence agriculture are highly affected by the problem [2]. Combinations of factors have resulted in serious and growing problems of food insecurity in the country. These problems can be classified under environmental, socioeconomic and technology-related problems [3].

The Productive Safety Net is a program initiated by different development partners like World Bank (WB) and other organizations in response to the problem of food insecurity. The government of Ethiopia launched

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the program in 2005 with the goal of helping chronically food-insecure households to withstand with stresses and shocks, accumulate and create an asset and to make them food self-sufficient. PSNP transfers food, cash or both based on need and season either through direct support or public work activities. The Program also provides credit and technical support to households based on tailored business plans. Beyond the immediate beneficiaries of the program, the PSN has a multiplier development effect through the participation of able-bodied individuals in different development activities, such as land and water resources rehabilitation and developing community infrastructures, including rural road, schools and clinics [4].

A total of 495,995 households were graduated from PSNP between 2008 and 2012. This indicates that it is bringing a considerable number of poor households out of poverty [4]. In 2008, 252,239 individuals were beneficiaries of the PSNP in Bale Zone. These beneficiaries were from the 13 Woredas of the Zone, and the level of food insecurity was severe in pastoral communities. Therefore, the proportion of program beneficiaries from the pastoral communities were high.

Therefore, it is ideal to investigate the contribution of PSNP on food security of the rural households in Bale Zone, Southeast Ethiopia. It would contribute to the adding insights of the issue and draw some pertinent policy ideas through which the contribution of the program can be maximized.

Review of conceptual and empirical literature

The concept of food security was coined following the first World Food Conference in 1974 in Rome. Ever since its definition has been considerably changing and recently reached more than 250. The recently coined and the relatively comprehensive one is put as 'all people, at all times, have physical and economic access to safe and nutritious food to meet their dietary needs and food preferences for an active, and healthy life' [6].

Sufficiency, access, security and time are the four core issues in the definition of food insecurity. Sufficiency of food involves the calories needed for an active and healthy life, while access refers to entitlement to produce, purchase or exchange food or receive it as a gift. Security is the balance between vulnerability, risk, and insurance. Time refers to the temporal situation of food insecurity whereby food insecurity can be either chronic/permanent or temporal/transitory [7].

There are three main concerns and subsequent theoretical shifts on food security. The first shift is from 'global and national' concern to 'household and individual'. The second shift has been from 'food first' to 'livelihood first' approach. The third shift is from 'objective measurements' to 'people's perception' [7].

The last half a century has brought about significant improvements in aggregate food security and diversity of food. However, many people, particularly in developing countries, have not been able to be benefited from these improvements. In 2013, there were an estimated 842 million people (12% of the world population) who were unable to meet their dietary energy requirements necessary to live an active and healthy life. Around one in eight people on our planet are likely to have suffered from chronic food insecurity [7]. Of the 842 million food-insecure people in 2013, 827 million or 98.2% of the people are living in developing countries, with the highest number of undernourished people coming from Southern Asia, followed by Sub-Saharan Africa and Eastern Asia [8].

Food insecurity in Ethiopia is normally understood in terms of recurrent food crises and famines, and responses to food insecurity have conventionally been dominated by emergency food-based interventions. Since 1998, the numbers of food-aid beneficiaries in Ethiopia have fluctuated between 5 and 14 million every year [9]. Poverty and food insecurity are two different concepts, with their correlation varying significantly among countries, depending on the specific national context. However, in the case of Ethiopia, the overlap of the two concepts is greater than in other countries [10]. Statistics on national poverty trends in Ethiopia indicate that there has been a substantial reduction in poverty over the last 15–20 years [5]. Human Development Index (HDI) increased from 0.275 in 2000 to 0.396 in 2012, although it is still ranked among those countries with the lowest HDI throughout the world [5].

The results from the household consumption and expenditure surveys (HCE) conducted in the country in 1995/1996, 1999/2000, 2004/2005 and 2010/2011 showed that the proportion of people living below the nationally defined poverty line (i.e., headcount index) has decreased from 47.5 to 30.4% in rural areas and from 33.2 to 25.7% in the urban centers during the period of 1995/1996–2010/2011. The depth of poverty (i.e., poverty gap index) stood at 7.8% in 2010/2011 nationwide, with 8% in rural areas and 6.9% in the urban centers. The poverty severity index—while substantially declining during the period of 1999/2000–2004/2005 on a national level—increased in rural (17%) and urban areas (5.1%) from 2004/2005 to 2010/2011. In the context of rural Ethiopia, these data suggest that while the proportion of people below the poverty line and the average gap that separates the poor from the poverty line have declined in the past two decades, there has only been poor improvement in the distribution of income among the rural poor, particularly since 2004/2005 [5].

The causes of food insecurity are many and varied. It includes a low rate of agricultural production, low access to food, the limited capacity of infrastructures and local markets, HIV/AIDS, investment power, finance gap, poor health, shortage of water and poor sanitation, environmental degradation, climate change and natural disasters, conflict and persecution.

In order to deal with the problem of food insecurity, governments in developing countries have implemented various social protection instruments with three functions in common: (1) to maintain the basic level of consumption, (2) to facilitate investments in human capital and other productive assets and (3) to strengthen the capacity of those in poverty. The Productive Safety Net Program (PSNP) was launched by the government of Ethiopia, with donor support, in January 2005. Recognizing that a large component of this food insecurity is 'chronic' rather than 'transitory' and that decades of food aid have had no discernible impact on reducing rural poverty and vulnerability, the PSNP represents an innovative attempt to tackle chronic food insecurity and break Ethiopia's dependence on food aid [11].

The Productive Safety Net Program (PSNP) is targeted toward households that are both food insecure and poor. In Ethiopia, as in many other African countries, there is a pressing need to improve household food security. An emerging consensus suggests that this is most easily accomplished through two development strategies with two complementary dimensions: investments that facilitate income generation and asset accumulation (infrastructure development, improved technologies for agriculture, etc.), and interventions that protect the poorest from hunger, prevent asset depletion and provide a platform on which the growth interventions can take place. Food aid targeting in Ethiopia has a long history of relying on community-based targeting systems, which have been seen as effective. The PSNP adopted this system while further refining the targeting criteria to capture chronic food insecurity—defined as a 3-month food gap or more and receiving food aid for three consecutive years [12].

Chronic food insecurity at the Woreda and household level is a defining feature of the eligibility criteria for PSNP participation. The household must have faced continuous food shortages (usually 3 months of food gap or more) in the last 3 years and received food assistance. The other criteria are households that suddenly become more vulnerable as a result of a severe loss of assets and are unable to support themselves and households without family support and other means of social protection and support [11].

The PSNP uses a mix of geographic and community-based targeting to identify chronically food-insecure households in chronically food-insecure Woredas. After determining PSNP eligibility based on these criteria, households are assigned to public works or direct support: Eligible households with able-bodied adults receive transfers for their participation in public works projects, while those households that cannot provide labor or other means of support receive unconditional transfers. Most beneficiary households participate in public works (90% of all PSNP transfers); a much smaller proportion receives direct support [13]. Public work participants received 6 months of food and cash transfer, while direct support beneficiaries received 12 months of unconditional transfer [12].

Methodology: sampling strategy, data collection and analysis

The study was conducted in Bale Zone, Southeast Ethiopia. Three sample Woredas have been selected from the three agro-ecology classifications into relative *dega*,[1] *weina-dega*[2] and *kolla*.[3] Again each Woreda was classified into relative *dega*, *weina-dega* and *kolla* to pick a single kebele from each agro-ecology zone of the Woreda. Both Woredas and kebeles have been selected using a lottery method of simple random sampling. Kothari's (1990) formula (with 0.5 estimated proportions of respondents, 95% confidence interval and 0.05 margin of error) was used with the following formula:

$$n_0 = \frac{p(1-p)z^2}{e^2}$$

where n_0 = sample size, P = estimated proportion of respondents: 0.5, Z = the number of standard error corresponding to 95% CI which is 1.96. e = margin of error: 0.05 margin of error was selected.

$$n_0 = \frac{0.5(1-0.5)1.96^2}{0.05^2} = 384$$

Therefore, using infinite population sample size determination formula the total numbers of samples included in the study were = 384.

Using finite population sample size determination formula:

$$n = \frac{n_o}{1 + \frac{(n-1)}{N}} = \frac{384}{1 + \frac{(384-1)}{49{,}470}} = 381$$

With the assumption of 10% non-response rate, 39 respondents were added to the calculation of 381*0.01. Therefore, the true sample size was 381 + 39 = 420.

[1] Highland climate.

[2] Midland climate.

[3] Lowland climate.

Survey households were selected in each kebele using the lottery method. The sampling frame of beneficiaries of PSNP was obtained from the program coordinator on each kebele. A total number of samples taken from each *kebele* of selected *Woredas* were allocated proportionally to the total number of PSNP beneficiary households of the *Kebele*. The distribution of sample households in the *Woredas* and *kebeles* is presented in Table 1.

The study employed various data collection techniques, namely household surveys, key informant interviews, direct observations and focus group discussions. A structured interview was conducted based on the questionnaire designed and key informant interview guide with elders, Administrator of the Zone and the three selected *Woredas*, Development Agents of the selected *kebeles* in each *Woreda* and coordinator of the Zone and *Woredas* PSNP.

The results were analyzed using both descriptive such as percentage and mean and inferential (paired *t* test and logistic regression). For the purpose of logistic regression, food security level of beneficiaries was taken as the dependent variable. Age of the household head, family size, education level, marital status, ethnicity, religion, occupation, and availability of unproductive labor force, number of oxen, the size of the farmland, irrigable land, perennial river water, number of livestock, market access, and use of modern agricultural input (seed, fertilizer, pesticide and herbicide) and occurrence of shocks during the last 5 years were independent variables included in the study. It can also goes in line with the variables hypothesized and indicated in the conceptual frame work developed by authors (Fig. 1).

Results and discussion

Demographic and socioeconomic characteristics of sample households

From the total sample households, female-headed households covered about 19%. Of which 22% were from Goro, 16% from Gololcha and 19.6% from Saweyna Woredas. The remaining 81% were male-headed households. Of which 78% were from Goro, 84% from Gololcha and 80.4% were from Saweyna (Table 2). With respect to educational background of respondents, 62.5% do not read and write, 30% achieved primary first cycle, 5.5% achieved primary second cycle and 0.7% achieved high school education. The ethnic background of households was Oromo. About 22% of the household head were not productive as a result of old age (67%) and disability (25%).

The mean age of the respondents was 44.04 with a standard deviation of 12.982 and the maximum and minimum value being 22 and 90 years of age, respectively. Additionally, respondents had productive family members ranging from 1 to 12 with a mean and standard deviation of 2.48 and 1.543, respectively (Table 3).

Respondents have an average family size of 7.17 (approximated to eight). The minimum value for the family size of the household was 1 and the maximum one is 21 (very large family size) (Table 4).

The agricultural practices of Bale Zone are constrained by various factors. Among these erosions, the occurrence of pests, low fertility, salinity and sandiness of the soil, frost, and water logging are some of them. However, the distributions of these agricultural constraints vary across agro-climatic zones [14]. Moreover, the ecological variation of the study area can be observed from the spatial map of the study area (Fig. 2).

Table 1 Distribution of sampled households by *Weredas* and *Kebeles*

Wereda	Agro-ecology zone	Total number of beneficiaries of PSNP	Total number of households	Number of sample households taken from the Wereda	*Name of the kebeles*	Number of samples taken from the *kebeles*
Gololcha	Dega	8993	1124	76	Dinsa	25
					Buniya	25
					Gofa	26
Goro	Weinadega	7910	847	68	Kaku	23
					Bili AKiya	23
					Goro Rayya	22
Saweyna	Kola	32,567	6636	276	Gale	92
					Biliso	92
					Arda Galma	92
Total beneficiary households	49,470	8607	420			

Total number of sampled households taken from the Zone: 420

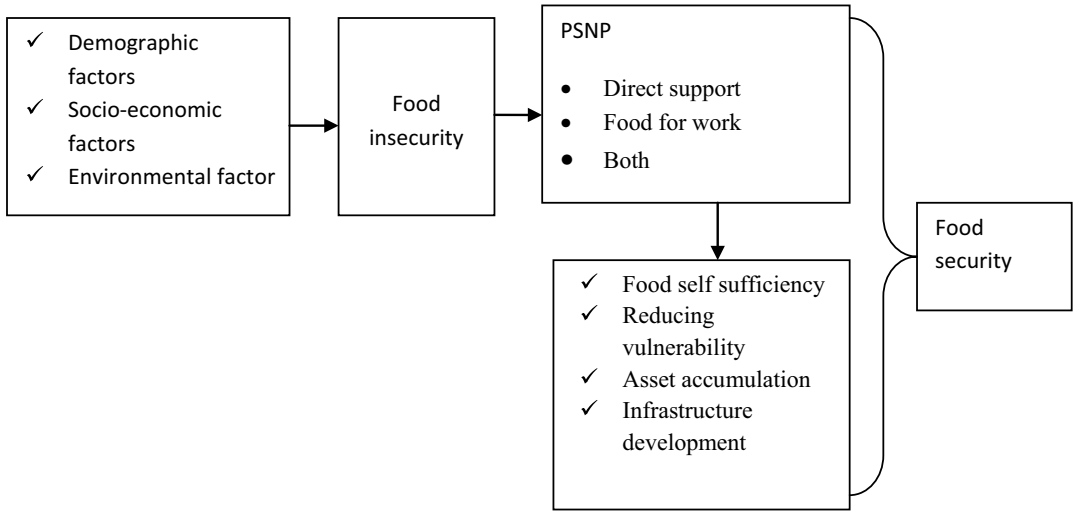

Fig. 1 Conceptual framework *Source*: developed by authors

Role of PSNP on consumption expenditure of households

PSNP helps to protect the basic level of consumption. Similarly, the program was helping households in the study areas to fulfill their consumption needs in different ways. The program increased the number of dining times and the amount of meal at each dining time. Moreover, it increased both the number of dining and the amount of meal at each dining time (Table 5).

Taking into account the overall livelihood effect of PSNP, majority (44.4%) of respondents stated that the livelihood situations of the household are a little bit better after they became a beneficiary of the program (Table 7). The program also provided a better change for 20.3% of the households. Therefore, majority of the respondents (64.7%) claim that their living standard was improved. However, 26.4% of respondents stated that their living standard has been deteriorated further while they are the beneficiaries of the program. But no evidence was found both from the primary or secondary data that realized and supported the negative impact of the PSNP (Table 6).

As depicted in Table 7 above, most of the respondents of the study confirmed that the agricultural sector in the study area has been constrained by multiple factors such as occurrence of pests, low fertility and sandiness of the soil, frost, water logging and salinity of the soil are all problems that affect agricultural productivity. However, the distributions of these agricultural constraints vary across agro-climatic zones.

Table 2 Distribution of male- and female-headed households across Weredas. *Source*: Field survey, 2016

	Sex of the HH head		Total
	Male	Female	
Wereda			
Goro			
Frequency	53	15	68
% within the Wereda	77.9%	22.1%	100.0%
% out of the total	12.6%	3.6%	16.2%
Gololcha			
Frequency	64	12	76
% within the Wereda	84.2%	15.8%	100.0%
% out of the total	15.2%	2.9%	18.1%
Saweyna			
Frequency	222	54	276
% within the Wereda	80.4%	19.6%	100.0%
% out of the total	52.9%	12.9%	65.7%
Total	339	81	420
Percentage	80.7%	19.3%	100.0%

Table 3 Descriptive statistics for age of the household head and productive member of the household. *Source*: Field survey, 2016

	N	Minimum	Maximum	Mean	SD
Age of the HH head	420	22	90	44.04	12.982
Economically productive member of the household	420	1	12	2.48	1.543

Table 4 Descriptive statistics for family size of the household. *Source*: Field survey, 2016

	N	Minimum	Maximum	Mean	SD
Family size of the HH	420	1	21	7.17	3.596

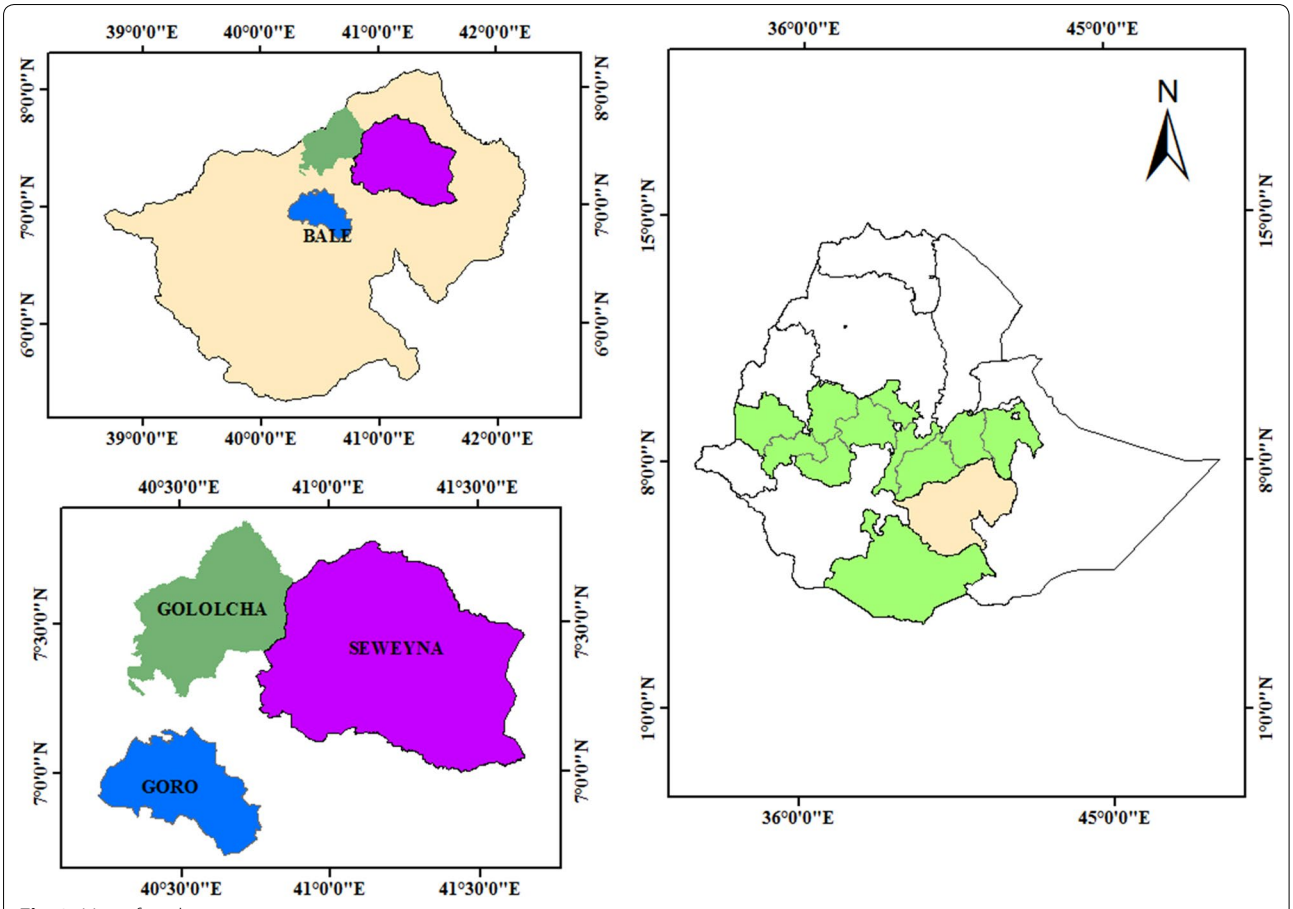

Fig. 2 Map of study area

Table 5 Role of PSNP on consumption. *Source*: Field survey, 2016

Role	Frequency	Percent	Cumulative percent
It helps the household to increase the number of dining time	108	25.7	25.7
It helps the household to increase the amount of meal at each dining time	162	38.6	64.3
It helps the household both to increase the amount of meal and dining times	150	35.7	100.0
Total	420	100.0	

Table 6 Before and after status of the beneficiary households. *Source*: Field survey, 2016

Status	Frequency	Percent	Cumulative percent
Better now	85	20.3	20.3
A little better now	186	44.4	64.7
Same	28	6.7	71.4
A little worse now	27	6.4	77.8
Much worse now	84	20.0	97.9
Don't know	10	2.1	100.0
Total	420	100.0	

PSNP provided beneficiaries the chance of using agricultural technologies such as fertilizer, improved seed, pesticide and herbicide. It is reported that the use of agricultural technologies has increased after households become beneficiaries of the program (Table 8).

Great majorities of respondents (88.6%) replied that the program has brought improvement in the expenditure of food expenses. Food security has four dimensions: sufficiency of food, access, security and time. Access refers to entitlement to produce, purchase or exchange food or receive it as a gift [7]. Therefore, PSNP provided beneficiaries the chance to buy food items through the provision of cash, even if they were unable to produce. The program also increased the food entitlement of recipient households with a direct provision of a food item (Table 9).

Table 7 Constraints of agricultural practice. *Source*: Field survey, 2016

Constraints	Frequency		Percentage	
	Yes	No	Yes	No
Water logging	69	351	16.4	83.6
Soil infertility	201	219	47.8	52.2
Susceptibility to frost	75	345	18	82
Erosion	288	132	69	31
Occurrence of pests	230	190	54.8	45.2
Salinity	53	367	12.6	87.4
Sandiness	152	268	36.2	63.8

Table 8 Effect of PSNP on using agricultural inputs. *Source*: Field survey, 2016

Types of agricultural inputs	Frequency		Percent	
	Yes	No	Yes	No
Fertilizers				
Before PSNP	114	306	72.8	27.2
After PSNP	262	158	62	38
Improved seed				
Before PSNP	104	352	24.8	75.2
After PSNP	273	147	65	35
Pesticide				
Before PSNP	220	200	52.4	47.6
After PSNP	325	95	77.4	22.6
Herbicide				
Before PSNP	127	293	31.2	69.8
After PSNP	250	170	59.5	40.5

Qualitative results showed that the program was playing a key role in meeting the immediate food requirements of beneficiaries through cash and food transfer. However, the long-term livelihood improvement effect of the program was less. This was similar to the finding of Daniel et al. [2], stating that beneficiaries of the PSNP did not experience faster asset growth as a result of the program. In addition, the program increased the feeling of dependency syndrome among the beneficiaries.

One among the principles of PSNP transfer was cash first principle. Cash should be the primary form of transfer when possible. This expenditure of cash in the local markets assists the stimulation and move away from food aid. Food transfers are provided at times and places when food is not available in the market, or where market prices for food are very high. This protects PSNP clients from food shortages and asset depletion [7]. Likewise, total households in Goro and 86.8% in Gololcha Woreda received cash transfer, while in Saweyna Wereda, where the availability of food in the market is limited, households have received both food and cash transfers (Table 10).

Table 9 Improvement in the expenditure of food expense for PSNP beneficiaries. *Source*: Field survey, 2016

Is there any improvement in food expense of the HH?	Frequency	Percent	Cumulative percent
Yes	372	88.6	88.6
No	48	11.4	100.0
Total	420	100.0	

Asset building role of PSNP

Cattle rearing practice is one of the asset and prestige building mechanisms in the pastoral and agro-pastoral community in the Woredas under consideration. However, in the time of rain failure and occurrence of food shortage, depending on the seriousness of the problem people either sell from small ruminants to larger livestock or directly use the animals for immediate consumption. Moreover, when transfer schemes like PSNP and some other direct transfer programs are in place at the time of food gaps, the households will not be forced to sell their livestock, which in turn prevent asset depletion and enable people to retain in their locality.

According to one of the members of group discussants in Saweyna district, PSNP had shown the relief effect and absence of loss in livestock during crop failure.

The maximum value, mean and standard deviation of the estimated value of livestock before and after the program have shown a great difference. The estimated maximum value of livestock before the program was 83,400, while it has increased to 157,100 after households become the beneficiary of PSNP. The mean of two values has been increased from 6052.5065 to 15,859.2947 birr. The standard deviation has also shown increment from 7767.20564 to 16,472.58395. However, the minimum value remained constant, 0.00. Zero value of the estimated value of livestock, both before and after the program, means there are individuals that do not have livestock at all and uses the benefit that they obtain from the program solely for consumption (Table 11).

The paired t test result showed that there was a 9729.68ETB difference in the mean of the estimated value of livestock before and after the PSNP. This difference was supported by the hypothetical analysis with a p value of 0.0000; this result shows there was a significant difference in the estimated total value of livestock before and after PSNP in Bale Zone (Table 12). Some farmers participating in cash transfer from PSNP also engaged in a poultry farm and significantly improved their household income.

Table 10 Wereda and type of provision obtained (cross-tabulation). *Source*: Field survey, 2016

	Types of provision			Total
	Cash	Food	Food and cash	
Wereda				
Goro				
Frequency	68	0	0	68
% within the Wereda	100.0%	0.0%	0.0%	100.0%
% within the type of provision	41.0%	0.0%	0.0%	16.2%
Gololcha				
Frequency	66	0	10	76
% within the Wereda	86.8%	0.0%	13.2%	100.0%
% within the type of provision	39.8%	0.0%	4.8%	18.1%
Saweyna				
Frequency	32	46	198	276
% within the Wereda	11.6%	16.7%	71.7%	100.0%
% within the type of provision	19.3%	100.0%	95.2%	65.7%
Total				
Frequency	166	46	208	420
% within the Wereda	39.5%	11.0%	49.5%	100.0%
% within the type of provision	100.0%	100.0%	100.0%	100.0%

Community development role of PSNP

PSNP was helping the local development in two ways. First, the program allocated a certain proportion of its budget for the construction of local infrastructures. Second, households that have able-bodied adult labor engage in public works and receive transfers for 6 months of the year. Public works focus on integrated community-based watershed development activities such as soil and water conservation measures, rangeland management (in pastoral areas) and development of community assets such as roads, water infrastructure, schools and clinics. These works contribute to improved livelihoods (through increased availability of natural resources, including water and cultivatable land, soil fertility, increased agricultural production and improved market access), strengthened disaster risk management and climate resilience, and nutrition [12].

As per the principle of PSNP, food for work beneficiary households performed different community development activities such as road construction, natural resource conservation and afforestation, ground water (locally known as *haroo*), soil conservation through soil and stone bund, and check dam. Rangeland management through area closure in Saweyna Wereda (pastoralist area) was also performed. In a similar practice, the PSNP beneficiaries of the study Woredas particularly the public work participants with the guidance of the Kebele administration and development agents highly involved in different infrastructural development activities of their identified priority activities in their respective areas. These all community-based infrastructures were helping the livelihood of the community.

According to the information obtained from key informants at Goro and Saweyna Woredas, under the public work activities/interventions like area closure, construction of dry season feeder roads, small-scale irrigation, gabion (a wire mesh structure filled with stone or earth material to protect soil erosion), soil band, stone band, soil dams, borehole, ponds, construction of schools, farmers training centers, water shade management were performed based on the priority set by the public and approval of Woreda task force.

Determinants of food security level of beneficiaries

From proposed variables as determinants of being graduated from PSNP, only three variables (age of household head, education of household head and occurrence of shock within 5 years in the household) were selected for final full-model logistic regression using a p value $\geq$0.25 (Table 13).

From the final logistic regression model, the selected variables, the age of household head, education of household head and occurrence of shock within 5 years in the household were significant determinants for graduation status with a p value of less than 0.05 (Table 13).

As the age of household heads increases by 1 year, the graduation status of the households will increase by 3% with a p value of 0.002. Households whose head were educated were 64% more likely to be graduated from the program. Those households with no experience of shock within the five consecutive years were 3.09 times more likely to be graduated (Table 13).

Challenges of PSNP implementation

According to Goro Wereda key informant experts, the management of development projects constructed

Table 11 Descriptive statistics for the total value of livestock of the HH before and after the PSNP (in Ethiopian birr). *Source*: Field survey, 2016

The total value of livestock	*N*	Minimum	Maximum	Mean	SD
Before the PSNP	420	0.00	83,400.00	6052.5065	7767.20564
After the PSNP	420	0.00	157,100.00	15,859.2947	16,472.58395

Table 12 Paired *t* test result for estimated value of livestock. *Source*: Own survey, 2016

Variable	Obs	Mean	Std. Err.	SD	[95% conf. interval]	
Q19ATo ~ I[a]	420	15,729.85	834.0329	16,172.5	14,089.88	17,369.81
Q19BTo ~ I[b]	420	6000.16	401.1064	7777.742	5211.46	6788.859
diff	420	9729.686	798.3131	15,479.87	8159.955	11,299.42
mean(diff) = mean(Q19ATotal − Q19BTotal)	$t = 12.1878$					
Ho: mean(diff) = 0	Degrees of freedom = 420					
Ha: mean(diff) < 0	Ha: mean(diff) ! = 0	Ha: mean(diff) > 0				
$Pr(T < t) = 1.0000$	$Pr(\|T\| > \|t\|) = 0.0000$	$Pr(T > t) = 0.0000$				

[a] Total estimated value of livestock after PSNP

[b] Total estimated value of livestock before PSNP

Table 13 Logistic regression result for determinants of success of beneficiaries. *Source*: Own survey, 2016

Graduated	Odds ratio	Std. Err.	*z*	$P > \|z\|$	[95% conf. interval]	
Education	0.360695	0.0889668	−4.13	0.000	0.2224272	0.5849143
Age	0.9721281	0.0086928	−3.16	0.002	0.955239	0.9893159
Shock	3.098867	0.9794122	3.58	0.000	1.667925	5.75744
_cons	0.8333807	0.458823	−0.33	0.741	0.2832755	2.451759

through public works was weak because less attention is given to the members of the community for which the infrastructure is constructed on their farm plots and area closures were not protected from damages caused by animals. In addition, the communities focused on activities that generate immediate benefit. Activities performed by the beneficiaries did not have a clear-cut standard and it resulted in the development of lower-quality infrastructures. Moreover, they were obstructed by lack of monitoring and unsustainable management. Free grazing and lack of cut-and-carry systems were also the main problems that affect the conservation processes of natural resources and endangered the newly planted trees.

It is recognized that small transfers of cash or food are more likely to be consumed than investing, while the assets constructed by the public works activities will contribute to an improved enabling environment (feeder roads will stimulate trade and integrate fragmented markets, for example) rather than directly generating additional income. One of the beneficiary respondents from Goro district argued that the level of payment was perceived by the beneficiary as low:

> *…the amount of cash payment was not enough. We have received 117 birr per individual per month. This amount of money had nothing to do to change our living. The payment also lasted only for six months. Therefore, we did not have any other source of income for the remaining six months. But the program was assisting us to fulfill our daily basic consumptions for certain months.*

Key informants of Gololcha Wereda confirmed that the main and important objective of PSNP is achieving the graduations of chronically food-insecure households through participation in public work if he/she has an estimated asset of 18,000 Birr either in cash or in kind. On the other hand, during the period of graduation households who have accumulated asset level of more than the minimum threshold, 18,000 birr may continue being the beneficiary of the program. Besides, households who do not have the minimum level of an asset for graduation (estimated 18,000 birr) will be graduated for political purpose what is called 'political graduation' (KII 2016).

Similarly, the Saweyna Woreda PSNP coordinator has pointed out that there was a false inclusion and exclusion of beneficiaries, asserting '…PSNP was helping section of the community that is affected by the high level of food insecurity. Initially, the program beneficiaries were recruited by the community themselves, Kebele administrators and Woreda task force. However, better off individuals were found to be wrongly included, particularly in pastoral areas and individuals affected worst by food insecurity may wrongly be excluded. Corrupted officials, clan politics and quota allocation (for both inclusion and graduation) of program beneficiaries were the main cause for wrong inclusion and exclusion.'

Table 14 Participation of households in rural non-farm economic activities. *Source*: Field survey, 2016

Participation	Frequency	Percent	Cumulative percent
Yes	19	2.6	3.1
No	401	82.4	100.0
Total	420	85.0	

The primacy of transfer was also challenged by a lack of necessary logistics for the program such as transportation and lack of coordination among the concerned bodies, natural resource degradation, and erratic rainfall, water stress, especially in pastoral Woredas, erosion, and population growth (KII 2016). Rainfall variability was also one among the many problems. The lowland areas were affected by the seasonal variability of rainfall and water shortage, while the highland areas such as Gololcha were affected by erosion and high rainfall during the harvesting time, lack of development agents in remote areas and low participation of the beneficiaries in off-farm activities (Table 14).

The participation of households in rural non-farm economic activities was very limited. Only 4.5% of respondents had household members engaged in activities other than crop production and animal rearing (Table 14). These small proportions of rural non-farm economic activity participants were engaged in activities like the petty trade. The main reason for meager income for the household from the non-agricultural activities were a lack of start-up capital, lack of the option of understanding for sectors that households can engage in beside agriculture and low skill of the household.

Conclusion

In this study, the effect of the Productive Safety Net Program (PSNP) on food security of the beneficiary households has been explored. PSNP was helping the local development in two ways. First, the program allocated a certain proportion of its budget for the construction of local infrastructures. Second, able-bodied beneficiaries contribute their labor for the construction of these infrastructures. Through the provision of cash, food or both, PSNP was helping households to fulfill the consumption needs of the households. The program increased the number of dining times and the amount of meal and food at each dining time. The program has also increased the food expenditure and level of consumption. By keeping the minimum level and smoothing consumption, PSNP has improved the food security status of the beneficiary households.

The participation of beneficiary households in public work activities such as soil and water conservation measures, rangeland management (in pastoral areas) and development of community infrastructures such as roads, water infrastructures, schools and clinics contributed to the improvement in livelihoods through the increasing availability of natural resources, increasing agricultural production and improved market access, strengthened disaster and risk management and climate resilience. These all community-based infrastructures were helping in improving the livelihood of the community.

Wrong targeting (wrong inclusion and exclusion of beneficiaries), poor conservation, monitoring and sustainable management of locally constructed infrastructures, lack of awareness of local people, low level of cooperation of concerned officials, absence of man power in remote areas are among the challenges. Furthermore, soil bunds constructed in the farm land of the farmers were not given due to attention by the farmer themselves. Free grazing and lack of cut-and-carry systems were also the main problems that affect the conservation processes of natural resources and endangered the newly planted trees.

From among the many variables as determinants of food insecurity (for beneficiary households being graduated or not), age of household head, education level of household head and occurrence of shock within 5 years were found significant with p value of less than 0.05. As the age of household heads increases by 1 year, the graduation status of the household will increase by 3% with a p value $= 0.002$. Households whose heads educated were 64% more likely to be graduated from the program. Those households with no experience of shock within the five consecutive years were 3.09 times more likely to be graduated.

The study also revealed that small proportions of beneficiaries were participating in rural non-farm economic activities. The participation of households in no-farm economic activities was hindered by lack of start-up capital and low understanding of options.

Recommendations

The following has been suggested as a means of improving the effectiveness of the PSNP in reducing the problem of food insecurity:

- Increase a culture of savings and accumulation of assets in addition to consumption.
- Engagement of beneficiary households in diversified and asset building livelihood strategies (off-farming income generating activities) are very important.
- Care should be taken in targeting and graduating PSNP beneficiaries minimizing wrong inclusion and exclusion.
- The management and monitoring practices of locally constructed community development infrastructures

should be enhanced, so that the long-term benefit of the structures will be promoted.

- Continuous capacity building training and awareness creation, raising participation, proper allocation of development agent at the grass root to facilitate proper planning, book keeping and reporting.

Abbreviations
ETB: Ethiopian birr; HCE: household consumption expenditure; HDI: Human Development Index; HH: household; PSN: Productive Safety Net; PSNP: Productive Safety Net Program.

Authors' contributions
DW designed and led the study, structured the concepts, reviewed much of the studies and analyzed much of the qualitative data. KM and KH further developed the manuscript, identified and developed important concepts, validated and helped design the arguments, conceived and helped design of the study, conducted quantitative study and edits the final research. All authors read and approved the final manuscript.

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Competing interests
The authors declare that they have no competing interests.

Availability of supporting data
The authors want to declare that they can submit the data at whatever time based on your request. The datasets used and/or analyzed during the current study will be available from the authors on reasonable request.

Consent for publication
All authors have read and agreed on the final manuscript. The manuscript to be submitted in the Journal of Agriculture and Food Security has been approved by the authors. In addition, the authors would like to declare that the manuscript has neither submitted nor published in the other journals. All presented case reports have consent for publication.

Ethical approval and consent to participate
Ethical clearance letters were collected from Madda Walabu University research and community service directorate and Bale Zone administrative office so as to safeguard both the study participants and the researchers. All participants of the research including survey households, case studies, enumerators, the supervisors and key informants were fully informed about the objectives of the study. They all were approached friendly and in a fraternal way. Their informed consent was obtained before their involvement in the study. The researchers were developed confidentiality with all participants, enumerators and survey households. The questionnaire was designed to collect information directly related to the research questions and objectives. As a result, privacy of the participants was ensured, and no personal data were collected. The questionnaire was free from any degrading, discriminating, or any other unacceptable words that could be offensive to the participants. Finally, any phrases or paragraphs, concepts and quotations not belonging to the researcher and used in any part of the study were fully acknowledged.

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