

Ethiopia's Urban Productive Safety Net Programme: Its Impact on Households' Food Insecurity

Yibrah Hagos Gebresilassie

Department of Economics, Adigrat University, Ethiopia. Email: yibhag@gmail.com, cell phone: +251913139174

Abstract

Background: *In Ethiopia, a large number of urban people are vulnerable to food insecurity, poverty, unemployed and underemployed. To address these problems, the Ethiopian government established an urban productive safety net programme, however, less is known about its impact on households' food insecurity. Thus, this study aims to examine the impact of urban productive safety net programme on households' food insecurity in Mekelle, Tigray, Ethiopia.*

Methods: *The study employs primary cross-sectional household data collected in March 2019 from a randomly selected 398 urban households in Mekelle, Tigray-Ethiopia (230 programme participants versus 168 were non-participants). The households' level of food insecurity was estimated using Foster-Greer-Thorbecke (FGT) technique while the impact of urban productive safety net programme on the households' food insecurity was evaluated using a Propensity Score Matching (PSM) estimation technique.*

Results: *The food insecurity (headcount ratio) of programme participants (22 percent) was lower than the non-participants (36 percent). The urban productive safety net programme has a significant impact on programme participant households' consumption expenditure (measured in per adult equivalent). Furthermore, the impact evaluation finds that the programme has a strong effect on programme participant households' income earnings.*

Conclusion: *The urban productive safety net programme helps maintain food consumption adequacy and enhance the food security of the urban poor people.*

Keywords: Food insecurity; impact; Mekelle; productive safety net programme; urban

Background

In Ethiopia, despite the substantial reduction, poverty remains high at 23 percent at a national level, with significant differences between rural and urban areas as well as across regions of the country [35]. The level of poverty remains higher in urban areas; the rate of urbanisation increased at a 4.63 percent rate due to the high rate of rural to urban migration and the number of urban centres has been increased [10]. In urban Ethiopia, the root causes of food insecurity are disorganised rural-urban migration, inadequate employment opportunities, poor market exchange system, poor service delivery, poor working environment, absence of organised social protection for deprived people, among others [30]. Consequently, a large number of urban people are vulnerable to food price inflation, food insecurity, unemployed and underemployed [9; 30; 33]. Thus, to address food insecurity, poverty, and vulnerability of the urban poor, the Ethiopian government established an Urban Productive Safety Net Programme (UPSNP) as an extension of the rural Productive Safety Net Programme (PSNP). The UPSNP has started its implementation in 2016 in 11 major urban cities of the country (Adama, Assaita, Assosa, Dessie, Gambella, Hawassa, Harari, Jijjiga, and Mekelle) [28; 30].

The UPSNP has three components, namely safety net support (public works and direct support schemes), livelihood services, and institutional and project management, intending to reduce poverty of the urban societies and vulnerable to poverty or who are facing food insecurity. The activities performed under the safety net support mainly the public work scheme of the programme include solid waste management, integrated watershed management development, urban agriculture, urban greenery and beautification development, and social infrastructure and services. The programme provides support for beneficiaries for a maximum of three years but some UPSNP beneficiaries may choose to graduate earlier [9; 12; 35-36].

The government of Ethiopia employed different measures to overwhelm the problems of food insecurity and poverty of the poor people of the country. Accordingly, since 2005, the well-publicised rural productive safety net programme provided social protection support for rural households who participated in the programme. This is, also reflected in the national social protection policy as important pillars to generate employment and livelihoods of the poor people [35]. Though Ethiopia remains predominantly rural, urbanisation is highly taking place in the country, the problem of urban food insecurity and poverty become more salient [30]. Most importantly, given the high number of poor and vulnerable people in many urban areas of the

country, the coverage of the existing pro-poor support is very limited and insufficient to bring about the required impact at scale [35]. To address these problems, the government of Ethiopia established a social protection programme for urban poor people in 2016 [30]. The programme is a wide-ranging national social protection programme, which is intended to augment the income of the urban poor people as well as reduce poverty level and vulnerability of the urban poor people through achieving food security of the urban poor households [9].

There are many empirical studies on the impact of rural productive safety net programme on various outcome variables of interest in Ethiopia [3; 13; 16-18; 27; 37; 39]. However, researches on the impact of the UPSNP have been inadequately studied. Some few local studies [1; 25-26; 38] have focused on the assessment of challenges and practices of the UPSNP. Most importantly, these studies were conducted at a micro-district level of the capital city of the country (Addis Ababa) at an early stage of the programme intervention, which might not show the actual effect of the programme. Overall, although the urban PSNP is a recently implemented social safety net programme, yet there is relatively scant empirical evidence as to the benefit of such intervention for the poor urban households in Ethiopia. Most importantly, evaluating the impact of the urban PSNP on household's food security might help to understand whether the urban PSNP has helped urban households in enhancing their food security or not and to scale up to other urban cities of the country. Therefore, this paper analysed the impact of the urban productive safety net programme on households' food insecurity in Mekelle, Tigray, Ethiopia.

The paper is organised as follows: Section 2 presents the literature review. Section 3 presents the data source and methods. Section 4 present findings of the study and their comparison discussions followed by the conclusion of the results in Section 5.

Review of literature

In 1974, heads of states and governments held a meeting known as “The World Food Conference” in Rome to discuss the sustained global problem of food production and food consumption. The conference proclaimed that "every man, woman and child has the inalienable right to be free from hunger and malnutrition to develop their physical and mental faculties"[11]. The goal of the conference was to eliminate the problem of food insecurity, deprivation, and malnutrition within 10 years, however, it was not achieved due to mainly insufficient socioeconomic structures, inadequate investment funds, and lack of trained manpower among others [11]. Food security is defined as “food security exists when all people at all times have physical and economic access to

sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” [11]. Access, security, sufficiency, and time are the four indicators in the definition of food insecurity. Access to food refers to entitlement to produce, exchange or purchase food or receive food as a gift while security is the balance between vulnerability, risk, and insurance. Sufficiency of food comprises of the calories needed for an active and healthy life. Time in food insecurity refers to the temporal situation of food insecurity whereby food insecurity can be either chronic/permanent or temporal/transitory [11].

A study by Amede [2] evaluated the impact of productive safety net programme on household food security in Kutaber district, Amhara national regional state, Ethiopia. Data were analysed using a propensity score matching (PSM) technique. The results reveal that on average the programme participants have increased their calorie intake by 233.04 Kcal compared to the non-participants, with significant differences in calorie intake. Similarly, Gebresilassie [16] examined the impact of productive safety net programme on households' poverty reduction in Tigray, Ethiopia, using a PSM, and Foster-Greer-Thorbecke (FGT) techniques. The poverty rate was lower for programme beneficiaries (27 percent) than non-beneficiaries (30 percent). The poverty rate for female-headed households was higher (32 percent) than their counterparts (25 percent). The total consumption expenditure per adult equivalent for non-participants was lower than the programme participants. Furthermore, the productive safety net programme played a significant role in reducing households' poverty level and able to reach the poorest households. Hence, to reduce the overall poverty level of the region as well as the country, due attention has to be given to reducing gender disparity in poverty and sustained effort is needed to government-administered productive safety net programme districts (woredas) to accelerate the rate of poverty reduction.

In Kenya, a study by Song and Imai [34] examined the impact of “Kenya's Hunger Safety Net Programme (HSNP)” using the double-difference estimation technique. The findings of the analysis reveal that the HSNP enable the programme beneficiaries to reduce significantly their multidimensional poverty level. The reduction in the level of poverty was mainly due to the reduction in the headcounts and poverty intensity level among the poorest people. The study also indicates that the short-term focused on impact evaluation, lack of adequate finance and poor implementation of the programme could underestimate the potential role of the programme in reducing the level of poverty. Likewise, Hidrobo et al. [21] assessed the impact of social protection

on food security and asset creation using meta-analysis. Findings of the analysis reveal that the social protection programme participants augment their calories intake from animal source foods and value of food consumption expenditure by 8 and 13 percent, respectively. Furthermore, results indicate that social protection programme increases households' asset holdings such as farm and non-farm productive assets, livestock, savings.

In Ethiopia, a study by Lukas & Mandado [24] examined the impact of productive safety net programme on food security using a logit regression model. The results of the analysis indicated that being a programme participant enable the household to improve food consumption, increasing job opportunity, accumulate asset, and enhance livelihoods. The age and education of the household heads and households' frequency of shocks affected the performance of PSNP. The study concluded that to enhance the role of PSNP, household targeting, monitoring and evaluation of the programme should be reassessed. Similarly, a review by [8] assessed the impact of PSNP on households' food insecurity in Ethiopia. The findings of the review reveal that the programme (PSNP) helped in transforming the humanitarian response system of addressing food insecurity to a development-oriented system. Furthermore, the review indicates that livelihoods of the households were enhanced and the incidence of food insecurity was reduced significantly. Also, the public work's components of the PSNP enhanced the natural environment through soil and water conservation practices. Moreover, Mohamed [27] evaluated rural PSNP and its impact on households' food security using a PSM technique. The results indicate that the programme beneficiaries increased their calorie intake by about 17 percent as a result of programme participation. The study concludes that programme beneficiary households are less likely to be food insecure than non-programme participant households.

Devereux [7] examined the role of social protection in improving households' food security in sub-Saharan Africa. Results indicate that there is a positive association between social protection programme and the outcomes of food security. The results further indicate that the introduction of social justice in designing and delivering social protection programmes can enhance the food security of the poor. Likewise, a study by Schmidt et al. [30] evaluated the impact of safety net programme on households' food insecurity using data on the years 2001-2009. Data were analysed using descriptive statistics. Results indicate that low-income, single-parent families, and food benefits minimises significantly the incidence of food insecurity. Most importantly, this study's findings reveal that the safety net programme reduces significantly the households'

incidence of food insecurity. Furthermore, Gilligan et al. [18] evaluated the impact of PSNP in Ethiopia using a PSM technique. The findings of the study reveal that the programme has little impact on program participants in improving food security. Also, households who have access to agricultural support packages and PSNP were less likely to be food insecure, use unimproved agricultural technologies, and participate in non-farm business activities. However, they indicate that programme beneficiaries could not able them to grow their asset holdings.

The reviewed literature indicates that the social safety net programme has a significant effect on households' asset holdings, reducing the incidence of food insecurity and poverty levels of the rural poor households. However, empirical researches on the impact of urban PSNP on households' food insecurity are relatively scant in Ethiopia as to the benefit of such intervention for poor urban households. Thus, to address this knowledge gap, this study attempts to evaluate the impact of the urban productive safety net programme on households' food insecurity.

Data source and methods

Data source

This paper employed primary data collected from urban households. A multistage sampling procedure was employed to pin down the household survey. In the first stage, Mekelle city was purposively selected due to the fact Mekelle is among the eleven major cities of the country (Addis Ababa, Adama, Asosa, Dessie, Dire-Dawa, Gambela, Harar, Hawassa, Jigjiga, Mekelle, and Semera), which implemented the urban productive safety net programme [1]. In the second stage, four sub-cities were randomly selected using a lottery method. In the third stage, two 'Kebelles' (counties) from each selected sub-cities were selected randomly using a lottery method. Finally, 398 households (230 UPSNP beneficiary and 168 non-beneficiary households) were selected systematically based on the proportional sampling procedure technique using Cochran [5] formula, which was computed as follows:

$$n_0 = \frac{N}{1+N(e)^2} = \frac{95,000}{1+95,000(.05)^2} = \frac{95,000}{238.5} = 398 \text{ Households}$$

Where: N is the population size or eligible households (95,000), n is the sample size, and e is the level of acceptable margin of error for proportion at 5 percent.

Description of variables

To examine the impact of the urban PSNP participation on households' food insecurity, initially, the relationship between UPSNP status and the outcome variables have been examined, the food

insecurity. This study employed two dependent variables. The first dependent variable is the total consumption expenditure of households (the sum of total non-food consumption expenditure) spent over the last 12 months. The second dependent variable is the average annual income of the households measured in the Ethiopian Birr. The sum of the households' average annual income obtained from public works of urban productive safety net programme, non-public works labour income, as well as other sources of income (such as interest, pensions, remittances, and transfers). The urban productive safety net programme status is a dummy variable capturing households' participation in public works of urban productive safety net programme, which takes a value of 1 for the programme participants (treated group) and 0 for the non-participants (controlled group).

The independent variables (covariates) were chosen based on the existing literature and objective of the UPSNP. They include continuous such as the age of the household head; dependency ratio (obtained by dividing the number of working-age group (15 - 64) to the number of dependant age group (children under 15 years of age and over 64 years of age); income of the household; and household size (per adult equivalent). The categorical (dummy) variables such as household head's marital status (0 for single, 1 for married, 2 for divorced/separated, & 3 for widowed; the gender of the household head (1 for male; 0 otherwise); education level of the household head (1 for primary school; 2 for secondary or more; 0 for no education); household's head employment status (1 for employed; 0 otherwise); and homeownership (1 if the respondent owned home; 0 otherwise).

Estimation methods

Food security estimation

Computing the needed food items for an active and healthy life remains to be addressed in a food security analysis. However, there is no single indicator to compute food security. To measure food security, different indicators are required to obtain the various dimensions at the country, household and individual levels. Food security is computed using food demand (requirements) and supply indicators using the most commonly employed a Foster, Greer, and Thorbecke [15] known as FGT Index. The provision of the food supply could be from the present production, previous production, and stocks. However, the biological (nutritional) requirement of a certain people has to decide ahead time commonly within a day or a year [15]. The indicators employed to compute households' food security are “availability”, “food access”, and “utilization”. Universally, therefore, there is no unique and best acceptable measure of food security. The selection of

indicators that suits the purpose of the study rests upon the researcher considering the level of combination and specific conditions of the study. Hence, 2200 Kcal per adult equivalent (a minimum calorie requirement to sustain life as declared by the Ethiopian government) was used as a benchmark (or food security line) to categorise the food secure and food-insecure households.

Therefore, the food security status of the households (the UPSNP beneficiary and non-beneficiary households) was computed using the FGT index as follows:

$$P_{\alpha}(C_k, C_i) = \frac{1}{n} \sum_{i=1}^q \left[\frac{C_k - C_i}{C_k} \right]^{\alpha} \quad (1)$$

Where: ' P_{α} ' measures households' food security status (food secure versus food insecure); ' C_k ' is the minimum calorie required to sustain a healthy life as per the Ethiopian government's standard (2200 Kcal per adult equivalent); ' C_i ' is the actual energy of the i^{th} household; 'n' is the total sample size; 'q' is the individuals living below the minimum calorie requirement and ' α ' is the parameter used to measure the dispersion of food insecurity. When the value of $\alpha = 0$, measures the percentage of food-insecure households (P_0), $\alpha = 1$, the food insecurity gap (P_1) that measures the existing gap to reach the level of the minimum calorie requirement, and $\alpha = 2$, the squared food insecurity gap or severity index (P_2) that measures not only the food insecurity gap but also the disparity among the food insecure households.

Impact evaluation estimation

Most of the time, data might not be obtained from randomised trials rather from non-randomised observational studies. In observational studies, assignment of subjects to the treated (participants) and controlled (non-participants) groups is not random, thus, the estimation of the effect of treatment may be biased by the existence of confounding factors [4]. Thus, to minimise the bias while estimating the treatment effects with such observational datasets, Rosenbaum and Rubin [31] proposed a propensity score matching technique. The PSM is the best estimation technique of treatment effects of an intervention or a programme evaluation where programme participation is non-random [23; 31]. Thus, to evaluate the impact of any programme requires making an inference about the outcome variables that would have been observed for programme participants had they not have been participated in the programme. Analysing the impact a programme requires identifying the average treatment effect on the treated (ATT), which is defined as the difference in the outcome variables between the programme participants and their counterfactual.

Counterfactual refers to what would have happened to the outcome of programme participants had they not have been participated in the programme [4; 23; 31].

In the PSM technique, matching is not on every single relevant observable characteristic of the treated and controlled groups but based on the propensity score. The first step in computing the Average effect of Treatment on the Treated (ATT) is to estimate the propensity score. The propensity score is the estimated likelihood of households taking part in the programme intervention given their observable characteristics from a regression model of participation. Its main role is to minimise the dimesions of conditioning [23; 31]. Accordingly, the propensity score is computed using a logit regression of D_i on X_i s vector (giving β coefficients and error term ε) and predicting the probability of $\hat{P}_i$ (P -hat) for each individual [19; 22; 31].

The logit regression model is specified as follows:

$$\text{logit}P_r(D_i = 1|X_i) = \beta X_i + \varepsilon, \text{ or } \hat{P}_i = e(X_i, \hat{\beta}) \quad (2)$$

Hence, the UPSNP beneficiary households and non-beneficiary are matched based on their estimated propensity scores using participation Equation (2). The second step is to estimate the Average effect of Treatment on the Treated (ATT) to evaluate the effect of participating in the programme intervention (UPSNP).

Thus, the ATT using a PSM technique based on the estimated propensity score in participation Equation (2) is computed as follows:

$$ATT_{PSM} = E[(Y_i^{UPSNP} | D = 1, P_r(D_i = 1|X_i)) - (Y_i^{Non-UPSNP} | D = 0, P_r(D_i = 1|X_i))] \quad (3)$$

Where: ATT_{PSM} refers to the expected effect of the treatment on individuals with the relevant observed characteristics X_i s who participate in the programme. Y_i^{UPSNP} and $Y_i^{Non-UPSNP}$ are the potential outcomes of the UPSNP beneficiary and non-beneficiary households, respectively. X_i s denotes the vector of relevant observed individual characteristics (covariates). D_i is the treatments status that takes a value 1 for UPSNP participants (UPSNP beneficiary households) and 0 for non-participants (non-beneficiary households).

The statistical computation of the analysis was performed using Stata version 14,

The total food consumption expenditure for commonly consumed food items inside and outside the house for the last seven days was collected from the sample households and then, converted to yearly values. The total non-food expenditure for rent, transport, utilities, fuel, etc. was also collected for the last month before the survey conducted and then, converted to yearly

values. Also, the total long-term consumption expenditure for clothing, durable goods, education, and health expenditure among other items for the last 12 months were collected from the total sample households and then, converted to yearly values. The total consumption expenditure was computed by summing up the total food and non-food consumption expenditures per adult equivalent.

Results and discussion

Descriptive statistics analysis

Of the total sample respondents, about 58 percent of them were the UPSNP beneficiary households (participants), with an average age of 53 years while the remaining 42 percent of them were the non-beneficiary households (non-participants), with an average age of 48 years. Among the UPSNP beneficiaries, about 65 of them were female-headed households, with an average household size of five while the remaining 35 percent of them were male-headed households, with an average household size of three. Similarly, about 71 percent of the non-beneficiaries were male-headed households while the remaining 29 percent of them were female-headed households.

Regarding the educational background of the UPSNP beneficiary households, about 36 percent of them had no education; 55 percent of them achieved primary school education; and 10 percent of them achieved the secondary and above level of school education, respectively. For the non-beneficiary households, about 13 percent of them had no education; 38 percent of them achieved primary school education; and 49 percent of them achieved the secondary and above level of school education, respectively. Moreover, there was a significant difference among the sample respondents (UPSNP beneficiary and non-beneficiary households) in terms of the number of dependants and homeownership. On average, three out of five household members (60 percent) were dependant for the UPSNP beneficiary households, with 99 percent of them did not own any type of house while on average one out of three household members (33 percent) were dependant for the non-beneficiary households, with 98 percent of them did not own any type of house.

Empirical results

Food security analysis

The levels of food insecurity analysis of the sub-cities under consideration are presented in Table 1. Overall, about 39 percent of the sample households were living below the food security line (2200 Kcal per adult per day), with calorie shortfall of 17.13 percent and squared insecurity gap

3.1 percent. Thus, about 376.86 Kcal per adult per day is required to support the food insecure households to get the minimum required energy to sustain their life.

The regression analysis indicates that the households' level of food insecurity varied across the sub-cities. The highest level of food insecurity headcount ratio was found in Quiha (.317) while the lowest food insecurity headcount ratio was observed in the Ayder (.1873). In Quiha, the food insecure households were far away from the food security line (2200 Kcal per adult per day) by 10.71 percent, with food insecurity severity index of 3.46 percent. Accordingly, to sustain the life of the food insecure households of Quiha, about 235.62 Kcal per adult per day is required. Likewise, in Ayder, the food insecure households were far away from the food security line by 1.72 percent, with food insecurity severity index of 1.51 percent. Thus, about 38 Kcal per adult per day is needed to lift them from the food insecurity status. Furthermore, about 23.71 percent of the households in Qedamai Woyane were living below the minimum calorie requirement, with food insecurity gap of 1.91 percent and food insecurity severity level of 1.62 percent. Similarly, about 20.56 percent of households in Hawelti sus-city were leading their life under food insecurity situation, with 5.23 and 1.82 percent of food insecurity gap and severity index, respectively. Thus, about 115.06 Kcal per adult per day is required to sustain the life of these food-insecure households in Hawelti district (Table 1).

Table 1. Level of food insecurity analysis by sub-cities

Sub-cities	Food insecurity estimate (2200 Kcal per adult per day)		
	P_0	P_1	P_2
Ayder	.1873 (.0254)	.0172 (.0071)	.0151 (.0033)
Qedamai Woyane	.2371 (.0143)	.0191 (.0062)	.0162 (.0043)
Hawelti	.2056 (.0262)	.0523 (.0073)	.0182 (.0052)
Quiha	.3173 (.0181)	.1071 (.0074)	.0346 (.0057)
Full sample	.3687 (.0072)	.1713 (.0034)	.0313 (.0032)

Source: Author's computation, 2020

Note: Values in parenthesis are standard deviation

Furthermore, as indicated in Table 2, results indicated that there was a statistically significant difference in the level of food insecurity between UPSNP beneficiary and non-beneficiary households. Accordingly, the findings of the regression analysis revealed that

about 36 percent of the non-beneficiary households were food insecure, with 28 percent of food insecurity gap and food insecurity severity gap of 3.36 percent (614.24 Kcal per adult per day). While about 22 percent of the UPSNP beneficiary households were food insecure households, with 13.83 and 17.13 percent (304.26 Kcal per adult per day) of food insecurity gap and severity gap, respectively. The findings of this study are in line other studies [2; 7; 8; 15; 18-19; 27; 32]. Amend [2] indicates that on average the PSNP beneficiaries have increased their calorie intake by 233.04 Kcal. Gebresilassie [15] reveals that the total consumption per adult equivalent PSNP beneficiaries was higher than the non-beneficiary households. Furthermore, a study by Hidrobo et al. [19] reveals that the social protection programme beneficiaries augment their calories consumption from their animal source foods and value of food consumption expenditure by 8 and 13 percent, respectively. The social protection programme also increases households' asset holdings (such as farm and non-farm productive assets, livestock, and savings). Moreover, Mohamed [27] indicate that the rural productive safety net programme beneficiary households have increased their calorie intake by about 17 percent.

Table 2. Results of food insecurity estimates of UPSNP by participation

Participation	P_0	P_1	P_2	P-value
UPSNP beneficiaries (participants)	.2182 (.0083)	.1383 (.0021)	.0117 (.0033)	
UPSNP non-beneficiaries (non-participants)	.3593 (.0122)	.2792 (.0052)	.0336 (.0054)	.013**
Full sample	.3687 (.0072)	.1713 (.0034)	.0313 (.0032)	
Pearson chi2(1) = 3.124 Pr = 0.011**				

Source: Author's computation, 2020

Notes: (Asterisk) ** represents a level of significance at the 5 percent; Values in parenthesis are standard deviation; values in parenthesis are standard deviation

Impact analysis

The computed propensity scores for households in the treated group lie between 0.2843523 and 0.736722, with an average of 0.6527183 while for households in the controlled group the estimated propensity scores lie between 0.3012547 and 0.87238348, with an average 0.7047287. Thus, the region of common support would be then between 0.28436523 and 0.87238348, which is the minimum and maximum estimated propensity scores for the treated and controlled groups, respectively. Households whose estimated propensity scores are less than 0.2843523 and larger than 0.87238348 were dropped in matching estimation. Furthermore, a balancing test was

performed by comparing the average observable characteristics of the treated and controlled groups. This is because to estimate the average treatment effect on the treated (ATT), the observed characteristics of the two groups have to be overlapped. Accordingly, the balancing test was satisfied, which indicates that there are no significant differences in the average P-scores for the two groups, implying that the UPSNP beneficiary and non-beneficiary households are more likely to have similar relative observable characteristics and fall in the region of common support [20].

The impact of urban productive safety net programme on households' food insecurity can be estimated using the four matching algorithms (kernel, radius, stratification, and nearest neighbour) since none of them is superior to the others [29]. This study applied the matching algorithms selection criteria proposed by Deheia and Wahba [6]. A matching algorithm with the lowest pseudo- R^2 value along and with the largest matched sample size is preferred [6]. Accordingly, the nearest neighbour matching estimator was selected as it provides better matching estimates, implying a good level of covariate balancing.

To compute the impact of the urban productive safety net programme, the average annual consumption expenditure per adult equivalent was employed as outcome variable because it gives us much information about the households' welfare. Also, the households' average annual income was employed as the outcome variable as an alternative approach to analysing the impact analysis of the programme using a similar set of covariates as for consumption expenditure per adult equivalent. Thus, the estimates of the impact of the UPSNP are presented in Table 3.

Based on the households' average annual consumption expenditure per adult equivalent, the average annual total consumption expenditure per adult equivalent of the UPSNP beneficiary households was 3879 ETH Birr while the average annual total consumption expenditure per adult equivalent of the non-beneficiaries was 2898 ETH Birr. Thus, the impact of the UPSNP on households' average annual total consumption expenditure per adult equivalent was 986 ETH Birr, implying that UPSNP beneficiary households were relatively consuming food and non-food items more than the non-beneficiaries. The finding of this study is similar to the findings of other studies [7; 15; 21; 24; 30; 34]. Similarly, the impact of the UPSNP on households' average annual food consumption expenditure per adult equivalent was 1193 ETH Birr, implying that UPSNP beneficiary households were relatively consuming more food items than the UPSNP non-beneficiary households. The results of this study are similar to the findings of other previous studies [7; 16; 21; 24; 30; 34]. Moreover, the impact of the UPSNP on households' average annual

non-food consumption expenditure per adult equivalent was 436 ETH Birr. This implying that UPSNP beneficiary households were relatively consuming more non-food items than the UPSNP non-beneficiary households.

Furthermore, using households' average annual income as an outcome variable, the findings of the analysis reveal that the average annual income of the UPSNP beneficiary households was 3389 ETH Birr while the average annual income of the non-beneficiary households was 2198 ETH Birr. Using households' average annual income, the impact of the UPSNP was 2293 ETH Birr. This figure implying that UPSNP beneficiary households were relatively earnings more income than the non-beneficiary households. The findings of this study is in line with other previous study documented [34], the social safety net programme enhances significantly the annual earnings of programme beneficiaries. Overall, the increase in the urban productive safety net programme beneficiary households' earnings due to participation in the public works component of the UPSNP results in consuming a higher quantity of total food, food, and non-food (measured in per adult equivalent) than the non-beneficiary households (Table 3).

Table 3. ATT estimation of the impact of UPSNP on households' income/consumption

Outcome variable	Matching	Number of participants	Number of non-participants	ATT	t-value
Total consumption per adult equivalent	Nearest Neighbour Matching	215	134	986	3.456*** (11.102)
Food consumption per adult equivalent		215	136	1193	3.357*** (11.782)
Non-food consumption per adult equivalent		215	131	436	2.206** (16.213)
Average annual income		215	123	2293	1.987* (19.632)

Source: Author's computation, 2020

Notes: (Asterisks) ***, **, & * represent, respectively levels of significance at the 1, 5, & 10 percent; values in parenthesis are standard deviation

Conclusion

Evaluating the impact of a programme is a central component of establishing evidence-based development policies and strategies. Ethiopia has made progress in reducing the national poverty, however, the urban poverty rate remains high, mainly in the large cities of the country. Thus, to

reduce poverty and enhance the income of the urban poor people, the Ethiopian government established urban productive safety net programme in 2016 in eleven major cities of the country, intending to reduce poverty and vulnerable urban poor people or who are facing food insecurity. Thus, this paper evaluates the impact of Ethiopia's urban productive safety net programme on households' food insecurity using a propensity score matching. The findings of this study reveal that about 37 percent of the sample households were living below the food security line (2200 Kcal per adult per day), with calorie shortfall of 17.13 percent and food insecurity severity gap of 3.1 percent. Furthermore, the UPSNP had a strong significant impact on households' average annual consumption expenditure and households' average annual income for programme beneficiaries. The programme beneficiaries were relatively better-off than their counterparts in consumption expenditure and income earnings. Thus, the urban productive safety net programme helps the urban poor people be protected against livelihoods risks, improve the level of food consumption and enhance their food security status.

Abbreviations

ETH: Ethiopia; PSNP: Productive Safety Net Programme; UPSNP: Urban Productive Safety Net Programme; FGT: Foster-Greer-Thorbecke; PSM: Propensity Score Matching; WFP: World Food Programme; ATT: Average Treatment Effect on the Treated.

Authors' contributions

YH initiated the research work, data collection, wrote and produce the article. The author read and approved the final article.

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Availability of data and materials

The author declares to attach the data upon request

Ethics approval and consent to participate

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Consent for publication

Not applicable

Competing interests

The author declares that there is no competing interest

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