DOI No.: http://doi.org/10.53550/EEC.2022.v28i01.005

Urban Expansion Impact on Peri-urban Farm Households Welfare in Metropolitan Cities of Amhara National Regional State, Ethiopia

Zelalem Gebeyehu^{1*}, Jema Haji², Tefera Berihun¹ and Adisu Molla³

¹College of Business and Economics, School of Economics, University of Gondar, Ethiopia ²School of Agricultural Economics and Agribusiness, Haramaya University, Ethiopia ³College of Business and Economics, Department of Economics, Wollo University, Ethiopia

(Received 5 June, 2021; Accepted 27 June, 2021)

ABSTRACT

The purpose of this study was to examine the impacts of urban expansion on welfare of peri-urban farmers in Metropolitan Cities of Amhara National Regional State, Ethiopia. A total of 430 sample households were selected through multi-stage sampling technique. Out of the total samples, 183 (42.56%) were displaced while 247 (57.44%) were non-displaced farm households. Propensity score matching model was used to estimate the impact of urban expansion on peri-urban farm households' welfare. Outcome variable to estimate the impact was welfare of household which was measured by a combined asset index and household consumption expenditure per adult equivalent. The result of the average treatment effect on the treated revealed that the displaced farm households' consumption expenditure per adult equivalent was reduced by 6688.03 Ethiopian Birr and a combined asset index of the displaced farm households' diminished by 0.022 as result of urban induce expansion.

Keywords: Displaced, Non-displaced, Welfare, Impact

Introduction

Ethiopia has long history of urbanization and has urban settlement like Aksume, Lalibela and Gondar. According to United Nations (2015), currently the country has recorded a relatively high growth rate of urban population (4% annually), double that of rural areas. Some estimates indicate that Ethiopia's urban population will increase three times in the next 20+ years, achieving an extreme urban growth rate of over 5% per year. Furthermore, the country's urban population is expected to grow on average by 3.98%, and by 2050, about 42.1% of the total population is expected to be inhabited in urban center. However, the country is characterized by low level of urbanization even by African standard, where around 19% of populations live in urban area (Tessema, 2017; UN-Habitat, 2017; Addisyihun, 2019).

Urban expansion process in the peri-urban area has affected the agricultural sector which is a stepping stone for Ethiopian Economy. This urban expansion process in the peri urban area is mainly caused by population pressure. In Ethiopia, growth of urban population required an enormous amount of land resources necessary for government investment in infrastructure, cooperative housing program and real estate by public and private sectors (Nigusie, 2011; Leulseged *et al.*, 2011; Giovana, 2013; Teketel, 2015; Adam, 2016; Belete, 2017; Indris *et al.*, 2020; Abubeker, 2018; Kassahun, 2018). Rapid urban expansion process is demanding a transformation of land use in surrounding peri-urban area to cater the needs of urban areas. Changes in land use from rural to urban activities increase landlessness of farm households and reduce their farm income as well as private asset holdings (Addisu, 2015; Ahlam, 2017; Fenta *et al.*, 2017; Eniyew, 2018; Worku, 2019).

In Ethiopia, land acquisition and delivery for urban expansion and development purposes is completely state-controlled, on the rationale that all land belongs to the state and peoples of Ethiopia (FDRE, 1995). However, the decision on type and amount of land compensation is vested in the hands of the respective city administrations (Achamyeleh, 2014). Land is a very important and scarce asset to farm households. This land is partially or fully gone forever as a result of urban driven development processes (DFDI, 2013). If urban expansion causes agricultural land loss, it can have a negative impact on income of peri-urban farm households (Satterthwaite et al., 2010; Muluwork, 2014; Kasahun, 2018). Rapid urban growth and building new urban houses each year put continual pressure on indigenous peri-urban farm household livelihood (UNPFA, 2007; UN-Habitat, 2011; Nigusie, 2011; Leulseged et al., 2011; Muluwork, 2014; Addisu, 2015; Belete, 2017).

Other studies, on the contrary, have indicated that urban expansion can have a positive impact on welfare of peri-urban farm households in different ways. For example, urban expansion increased income and consumption of peri-urban farm households mainly through remittances (Mohamed et al., 2014); high economic growth and high population density in urban areas create more demand for commodities from rural areas, especially agricultural and labor-intensive commodities (Nguyen et al., 2016). Besides, in the study of Haggblade et al. (2010) stated that urban expansion can increase non-farm income of rural households, especially those living close to cities. Allen (2014) also indicated that urban expansion can have positive effects on human capital formation of rural areas through transfers of information and advanced knowledge about production-related skills and technology.

Unprecedented growths of urban population in metropolitan cities of Amhara National Regional State of the country have resulted in high demands of urban land for residential housing, service provision and infrastructure development. For instance, the population of Bahir Dar increased from 54,800 in 1984 to 96,140 in 1994 with an average growth rate of 5.6%, and in 2007 the population increased to 155,428 with average growth rate of 3.7% and it reached 226,713 in 2014 and 350,000 in 2017. Likewise, Gondar city population increased from 80,886 in the year 1984 to112, 249 in 1994 with an average growth rate of 3.3%; and it reached to 207,044 in 2007 with an average growth rate of 4.7%. The other metropolitan city, Dessie, has also experienced fast growing urban population. For example, in the year 1984 the city's population was 68,848 and in 1994 it turned to 97,314 with an average growth rate of 3.5; and in 2007 it reached 120,095 with an average growth rate of 1.6 (CSA, 2013; BoFED, 2014; MUDHCo and ECSU, 2015; Besfat and Melaku, 2019). Hence, these population pressures caused horizontal expansion of cities.

To satisfy huge demand of urban land, metropolitan cities of the region has been incorporating the pre-existing rural villages into urban areas. As a result, indigenous farmers of these rural villages are dispossessed from their farmlands. According to Amhara National Regional State Urban Development, Housing and Construction Bureau (2017), about 3,053.12 hectare of agricultural land was expropriated from above 1500 peri-urban farmers and transferred to 129,594 urban residents through the lease system. Nevertheless, the rehabilitation mechanisms used by the city administration mainly an arrangement of cash compensation was found to be inadequate to replace their resource base, which is land (Gashaw, 2015; Indris *et al.*, 2020).

On the side of displaced farm households, they may not buy another plot of land to continue their farming activities as a result of the country's land policy, and they are forced to look for alternative employment opportunities other than crop and livestock production. However, the non-farm sector has heterogeneous set of activities and requires the displaced farm households' capable skill to adapt and integrate into the urban life styles. This process affects the farm households' welfare. That is why this study aims to estimate urban expansion impact on peri-urban farm household welfare in metropolitan Cities of Amhara National Regional State, Ethiopia.

Methodology

Description of the Study Area

The study was conducted in Metropolitan Cities of

GEBEYEHU ET AL

Amhara National Regional State (Gondar, Bahir Dar and Dessie). Bahir Dar city, which is located on the southern shore of Lake Tana, the source of Blue Nile (Abay) river, has a long history dated back to at least the sixteenth or seventeenth century and at this moment it is the capital of Amhara National Regional State which is in the north western part of Ethiopia (BoFED, 2014). The city is located at 11° 36' north latitude and 37° 23' east longitudes, at the southern shores of Lake Tana, the largest lake in Ethiopia (Ethiopian Mapping Agency, 1981). On the other hand, Dessie city is located on the Addis Ababa-Mekelle highway, at about 401 km distance from Addis Ababa, in the northern part of the country in South Wollo administrative Zone of the Amhara National Region state. This city is located at 11' 8° north latitude and 39' 38° east longitude (Ethiopian Mapping Agency, 1981). The other metropolitan city, Gondar, which is the capital city of central Gondar zone, is 738 km far from Addis Ababa and 182 km from Bahir Dar. It is located at 12°30' north and 37°20' east and with an elevation of 2133 meters above sea level (Ethiopian Mapping Agency, 1981).



Fig. 1. Map of the study areas

Sampling Technique and Sample Size

Multistage sampling procedures were employed to draw representative sample households of the study. In the first stage, three cities in Amhara National Regional state (Bahir Dar, Dessie and Gondar) were purposely selected. The cities represent the major urban expansion features and are metropolitan cities of Amhara National Regional state. In the second stage, peri-urban kebeles were identified from the respective city administrations. There are 14, 6 and 11 peri-urban kebeles in Bahir Dar, Dessie and Gondar cities, respectively. Therefore, a total of 7 pre-urban kebeles (3, 2 and 2 from Bahir Dar, Dessie and Gondar cities) were selected based on the mean value of the number of displaced farmers in all metropolitan cities. Those kebeles which have high displacement above the mean value were selected purposively. This is because to consider peri-urban kebeles with high number of displacement. In the third stage, households' lists in the selected kebeles were obtained from each kebeles' administration. The list is stratified in to displaced and non-displaced farmers. Final sampling procedure was to select displaced and non-displaced farm households' head. From 7 peri-urban kebeles, a total of 430 households (183 displaced and 247 non-displaced) farm households were selected randomly based on the proportions in the population.

The total required sample size is determined using Kothari (2004) formula;

$$n = \frac{z^2 \times p \times q \times N}{z^2 \times p \times q + (N-1)e^2} \qquad \dots (1)$$

Where, *n* is the desired sample size; Z is the standard cumulative distribution (z = 1.96 for 95% confidence level); *e* is the desired level of precision (e=5% or 0.05); *p* proportion of target population to total population of *kebeles*; *q*=1-*p*; and *N* is the total number of households from which the sample is drawn.

Methods of Data Analysis

Propensity score matching model was used to estimate the impact of urban expansion on peri-urban farm households' welfare. PSM constructs a statistical comparison group by modeling the probability of participating in the program on the basis of observed characteristics unaffected by the program. Participants are then matched on the basis of this probability, or propensity score, to non-participants, using different methods. The first step in estimating the treatment effect is to estimate the propensity score. To get this propensity scores any standard probability model can be used. Hence, in this study logit model has been employed. The dependent variable in this case is a dummy variable, which takes a value of one if the household belongs to displaced, and zero if the household belongs to nondisplaced. The independent variables are the factors thought to influence displacement and outcome variables.

After obtaining the predicted probability values conditional on the observable covariates (the propensity scores) from the binary estimation, matching was done using a matching algorithm that is selected based on the data at hand. Then the effect of household's displacement as result of urban expansion on a given outcome variable (outcome in this study is welfare of household which is measured by a composite asset index and household consumption expenditure per adult equivalent). The combined standardized asset index (D_j) is derived using Filmer and Pritchett (2001) approach:

$$D_j = \sum_{i=1}^{k} W_i \left(\frac{a_{ij} - m_i}{s_i} \right) \qquad \dots (2)$$

Where: D_j is the composite asset index of each household j; W_i is weights assigned to each principal component (PC); a_{ij} is the value of each household on each PC; m_i is the mean of each PC; s_1 is the standard deviation of each PC; k is the number of PC; and i & j represents each PC and household respectively

The average treatment effect of the program is then calculated as the mean difference in outcomes across these two groups. Households for which no match is found are dropped because no basis exists for comparison (Caliendo and Kopeinig, 2008). The propensity score is defined by Rosenbaum and Rubin (1983) as the conditional probability of receiving a treatment given outcome variable (Y) is specified as:

$$\tau_{ATT} = Y_i (D_i = 1) - Y_i (D_i = 0)$$
 ... (3)

Where τ_i is treatment effect (displacement due to urban expansion), Y_i is the outcome on household i,

 D_i is whether household i has got the treatment or not (displaced or non- displaced). However, one should notice that Y_i (D_i =1) and Y_i (D_i =0) cannot be observed for the same household at the same time. Depending on the position of the household in the treatment (displacement due to urban expansion), either Y_i (D_i =1) or Y_i (D_i =0) is unobserved outcome (counterfactual outcome). Due to this fact, estimating individual treatment effect \hat{o}_i is not possible and one has to shift to estimate the average treatment effects of the population than the individual one. Most commonly used average treatment effect estimation is the 'average treatment effect on the treated (τ_{ATT}), and specified as:

$$\tau_{ATT} = E(\tau/D=l) = E(Y_1/D=l) - E(Y_0/D=l) \qquad ... (4)$$

This answers the question, how much households in displacement benefit is compared to what they experienced without displacement as a result of urban expansion. Data on E $(Y_1/D=1)$ are available from displaced households. An evaluator's classic problem is to find E ($Y_0/D=1$). So the difference between E ($Y_1/D=1$) - E ($Y_0/D=1$) cannot be observed for the same household. Due to this problem, one has to choose a proper substitute for it in order to estimate ATT. The possible solution for this is to use the mean outcome of the comparison individuals, E $(Y_0/D=0)$, as a substitute to the counterfactual mean for those being treated, $E(Y_0/D=1)$ after correcting the difference between treated and untreated households arising from selection effect. Thus, by rearranging and subtracting E ($Y_0/D=0$) from both sides of equation (4), one can get the following specification for ATT:

$$E(Y_1 / D = 1) - E(Y_0 / D = 0) = \tau_{ATT} + E(Y_0 / D = 1) - E(Y_0 / D = 0)$$
..(5)

Both terms in the lift hand side are observables and ATT can be identified, if and only if $E(Y_0/D=1)$ -

Table 1. Number of sample households from each peri-urban kebeles

City	Peri-urban Kebeles	Population	Displaced	Sampled Displaced	households Non-displaced	Total
Bahir Dar	Zenzelima	9,282	1338	27	34	61
	Meshenti	8,219	1193	24	30	54
	Adisalem	7,510	1047	21	28	49
Dessie	Boru	3,319	512	10	12	22
	Tita	4,727	680	14	17	31
Gondar	Blajig	7,909	945	19	33	52
	Azezo T/haymanot	24,419	3345	68	93	161
Total		65,385	9060	183	247	430

GEBEYEHU ET AL

E ($Y_0/D=0$) =0. i.e., when there is no self-selection bias. This condition can be ensured only in social experiments where treatments are assigned to units randomly (i.e., when there is no self-selection bias). In non-experimental studies one has to introduce some identifying assumptions to solve the selection problem. The following are two assumptions to solve the selection problem.

Conditional Independence Assumption

There is a set X of covariates, observable to the researcher, such that after controlling for these covariates, the potential outcomes are independent of the treatment status.

$$(Y_1, Y_0) \perp D / X$$

This property is also known as *unconfoundedness* or *selection on observables*. i.e. there is "selection on observables" and participation is independent of outcomes once we control for observable characteristics (X).

Common support (Overlap)

This assumption rules out perfect predictability of D given X. That is

$$0 < P(D = 1 | X) < 1$$

This equation implies that the probability of receiving treatment for each value of X lies between 0 and 1. By the rules of probability, this means that the probability of not receiving treatment lies between the same values. This means this assumption refers to comparing comparable individuals.

$$\tau_{ATT} = \mathrm{E}(Y_1 - \mathrm{Y}_0 / D = 0, P(X)) = \mathrm{E}(\mathrm{Y}_1 / D = 1, P(X)) - \mathrm{E}(\mathrm{Y}_0 / D = 0, P(X))$$
... (6)

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

Where P(X) is the propensity score computed on the covariates X. Equation (6) is explained as the PSM estimator is the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants.

Results and Discussion

Demographic, Socioeconomic and institutional characteristics of sample households

As indicated in Table 2, the average age of displaced and non-displaced farm households were 47.2 and 47.38 years respectively. The youngest and oldest respondents are respectively, 32 and 78 years old. The survey result also indicates that the average years of schooling of the sample households was 3.51 with minimum and maximum schooling years of 0 and 12 respectively. The average education levels of displaced and non-displaced farmers were 3.40 and 3.60 years respectively. The test statistics shows that there were no significant differences among displaced and non-displaced farm households in terms of age and education level (Table 2). The average family size of the sampled peri-urban farm households was 5.19 with dependency ratio of 0.79. In reference to the groups, the average family sizes were 5.34 and 5.08 for displaced and non- displaced farm households respectively. The survey result showed that there were statistically significant mean difference between the displaced and non-displaced groups in terms of family size and depen-

As shown in Table 2, the mean landholding sizes for the non-displaced and displaced sample households were found to be 0.83 and 0.22 hectare per head respectively. The statistical analysis showed that there was significant difference at 1 percent probability level in the mean landholding size among displaced and non- displaced farm households. This indicates that displaced farm households landholding size has been significantly reduced as compared to non-displaced farm households as result of urban induced expansion.

dency ratio at 10% and 1% probability level respec-

tively (Table 2).

Similarly, the mean livestock holding of non-displaced and displaced farm households in the study area were 4.85 and 1.24 tropical livestock unit (TLU) respectively. The survey result demonstrated that the mean differences between livestock holding among non-displaced and displaced farmers were statistically significant at 1% level of probability (Table 2). The implication is that displaced farm household's livestock holding reduced as compared to their counterfactuals. This is because of the grazing land of the area has been decreased as result of urban induced displacement.

The survey result in Table 3 shows that out of the total 183 samples displaced farm households, 133(72.68%) critically criticized the amount compensation given from the respective city administrations. The rationale behind their criticism is that the amount of compensation does not much with the current value of land for the fact that the lease price of same plot land in the city administration is quite

far apart from their respective compensation amount, and they believe that it is too much subjective. Similarly, the survey result in Table 3 shows that, the majority (71.5 %) of displaced farm households were not satisfied by the city administrations' rehabilitation mechanism (intervention) in order to transit from rural to urban life styles.

Average total consumption expenditure per adult equivalent for displaced farm household was 5936.92 Ethiopian Birr which was lower than the average total consumption expenditure of non-displaced farm households' Ethiopian Birr 12665.96 with mean difference significant at 1% probability level (Table 4). This implies that relatively lower consumption expenditure per adult equivalent was evident from displaced farm households as compared to non-displaced farm households as result of urban expansion program.

Combined asset index measure of welfare

A combined asset index generated from aggregate peri-urban farm household private assets by attaching weights was derived using principal component analysis. In this study assets refer to the resource base of peri-urban farm households and consisting of the following categories i.e. membership (Idir/ Ekub), social network (relationship), handcraft skill or knowledge, good health and ability to labour, housing, livestock, farm and grazing land, firewood; saving; financial assistance(remittance); collecting sand or stone mining and eucalyptus or everlasting trees.

Bartlett's test for testing appropriateness of the principal component analysis and the Kaiser-Meyer-

Table 2. Demographic and Socio-economic characteristic of the households

Variables	Displaced (N=183)		Non-displaced (N=247)		t-value	Total (N=430)			
	Mean	St.dev	Mean	St.dev		Mean	St.dev	Minimum	Maximum
Age	47.20	10.04	47.38	10.45	0.178	47.3	10.27	32	78
Education	3.40	3.085	3.60	3.19	0.652	3.51	3.14	0	12
Family size	5.34	1.53	5.08	1.68	-1.67*	5.19	1.62	1	9
Dependency ratio	1.18	0.55	0.50	0.51	-13.11***	0.79	0.63	0	2
Landholding size	0.22	0.14	0.83	0.29	26.37***	0.57	0.38	0	1.75
Livestock(TLU)	1.24	1.28	4.85	1.98	21.47***	3.31	2.48	0	13

***,* Significant at 1% and 10% respectively

Source: Own survey computation 2019/20

Table 3. The attitude of displaced farm households on land compensation

Variables		Displaced fa	arm household =183)
		No	%
Satisfied city administration follow up and support	no	131	71.58
	yes	52	28.42
Un-Fair & in-adequate monetary compensation	no	50	27.32
	yes	133	72.68

Source: Own survey computation 2019/20

Table 4. Descriptive statistics of consumption expenditure by displacement status

Variable	Disp (N=	laced 183)	Non-dis (N=2	placed 247)	t-value	Diff (N:	erence =430)
	Mean	St.dev	Mean	St.dev		Mean	Std. Err.
Consumption expenditure per adult equivalent	5936.92	4250.28	12665.96	5021.88	14.65***	6729.04	459.32

*** Significant at 1%

Olkin (KOM) for a measure of sampling adequacy have been used in this study. From Table 5 Kaiser-Meyer-Olkin (KOM) measure of sampling adequacy was 0.535, which is greater than the required 0.5 for a satisfactory factor analysis to proceed since the KOM test tells one whether or not enough items are predicted by each factor. The approximate chisquare value was 766.719 with 66 degree of freedom which was also high. So it can be said that the principal component analysis is appropriate as it fulfill the requirement to proceed. Bartlett's test of sphericity should be significant (that is a significant value of less than 0.05). This means that the variables are correlated highly enough to provide a reasonable basis for factor analysis. So, based on this information, the observed significance level is 0.000, which means the relationship among variables is strong. Hence, the data set complies with the requirements of the principal component analysis.

The result as indicated in Table 6 below, only those principal components with an Eigen value greater than one were considered from 12 potential peri-urban farm household resources. Eigen values are scalars that give the variance of the principal components and Eigen value greater than one criteria (Kaiser's criteria) is the default criteria used to determine the number of principal components that are retained.

As the result in Table 7 exhibits, each principal component was formed based on the loadings of the variables (peri-urban farm household resources). This was done by rotating the components using orthogonal varimax rotation method. A factor loading of 0.40 or above should be used as a cutoff point. This shows that a given variable is influential in the formation of a principal component. With this framework, 5 variables have been identified with the highest factor loadings which are contributing to the critical factors which influence a combined asset index of peri-urban farm households. These variables were social capitals (membership such as Idir or Ekub and social network or relationship), human capital (handcraft skills or knowledge, good health and ability to labour), physical capital (housing, livestock, farm and grazing land, firewood), financial capital (saving, financial assistance or remittance)

Table 5. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of sampling adequacy	0.535	
Bartlett's Test of Sphericity	Approx. Chi-Square Df Sig.	766.719 66 .000

Source: Own survey computation 2019/20

Tal	ole	6.	Eigen	values	of t	he	comp	onents
-----	-----	----	-------	--------	------	----	------	--------

Total Variance Explained										
Component	Init	tial Eigen v	alues	Extract	Extraction Sums of Squared			Rotation Sums of Squared		
	Total	% of	Cumulative		Loadings		Loadings			
		Variance	%	Total	% of	Cumulative	Total	% of	Cumulative	
					Variance	%		Variance	%	
1	2.026	16.884	16.884	2.026	16.884	16.884	1.812	15.099	15.099	
2	1.759	14.656	31.540	1.759	14.656	31.540	1.598	13.319	28.418	
3	1.251	10.425	41.965	1.251	10.425	41.965	1.496	12.468	40.887	
4	1.065	8.879	50.844	1.065	8.879	50.844	1.112	9.269	50.156	
5	1.027	8.557	59.401	1.027	8.557	59.401	1.109	9.245	59.401	
6	0.976	8.131	67.532							
7	0.909	7.573	75.105							
8	0.870	7.254	82.359							
9	0.799	6.662	89.021							
10	0.753	6.274	95.295							
11	0.368	3.065	98.359							
12	0.197	1.641	100.000							

and natural capital (collecting sand or stone mining, eucalyptus or everlasting trees).

Hence, the Filmer and Pritchett (2001) approach was employed to derive combined standardized asset index using the identified variables. The result in Table 8 indicates that there was a mean significance difference between displaced and non-displaced farm households in terms of combined asset index at 1% probability level.

Estimation of the propensity scores

The propensity score matching method helps to control pre-intervention difference on the covariates. Displacement status is a dependent variable, which takes a value of one if the household belongs to displaced, and zero if the household belongs to nondisplaced. The propensity score or the likelihood of displacement for a given household is estimated using logit model and taking different covariates as independent variables. The maximum likelihood estimate of the logistic regression model result in Table 9 shows that displacement was influenced by 5 variables. Family size, dependency ratio, distance from urban center, household shock experienced in the previous year and electric power access are significant variables which affect urban expansion induced displacement. As the logit model regression result (Table 9) shows, majority households who were involved in urban expansion induced displacement had more family size, relatively more dependency ratio, low distance from urban center, no shock experienced in the previous year and had no electric power access.

Figure 2 portrays the distribution of the treatment and control households with respect to estimated propensity before matching. In case of treatment households, most of them were found in the left side of the distribution. On the other hand, most of the control households were partly found in the right side of the distribution.

A common support condition should be imposed on the propensity score distributions of treatment and control households based on the minima and maxima approach of common support region identification. As shown in Table 10, the estimated propensity scores vary between 0.036 and 0.988 (mean

Table 7. Rotated component loading matrix of to generate a combined asset index

Rotated Component Matrix									
	Component								
	1	2	3	4	5				
Membership(Idir/ Ekub)	.945								
Social network (Relationship)	.936								
handcraft skill or knowledge	1	.859							
Good health and ability to labour		.793							
housing			.676						
Livestock			.603						
farm and grazing land			.544						
Firewood			.404						
Saving				.670					
financial assistance(remittance)				.650					
collecting sand or stone mining					.798				
Eucalyptus or everlasting trees					.637				

Source: Own survey computation 2019/20

Table 8. Combined asset index by displacement status

Variables	Displ (N=1	aced 183)	Non-di (N=	isplaced =247)	t-value	Difference (N=430)	
	Mean	St.dev	Mean	St.dev		Mean	Std. Err.
Combined Asset index	0.7437	0.0543	0.7651	0.0145	6.19***	0.0224	0.0036

*** Significant at 1%

= 0.641) for displaced or treatment households and between 0.001 and 0.958 (mean = 0.266) for non-displaced (control) households. The common support region would then lie between 0.036 and 0.958. In other words, households, whose estimated propensity scores were less than 0.036 and larger than



Source: Own survey computation 2019/2020

Fig. 2. Kernel density of propensity score distribution before matching

0.958, were not considered for the matching exercise. As a result of this restriction, 22 households (4 treatment and 18 control households) were discarded from the analysis by kernel bandwidth (0.1) matching. This shows that the study did not drop many displaced households from the sample in computing the impact estimator.





Table 9. Logit results of households displaced by urban expansio	Table 9.	Logit	results	of l	househol	ds dis	placed	by	urban	exp	oansic
---	----------	-------	---------	------	----------	--------	--------	----	-------	-----	--------

DIS_PRIU	Coefficient.	Robust Standard error	t-value	p-value
Sex	0.429	0.359	0.91	0.361
Age	0.006	0.011	0.50	0.619
Education	0.035	0.038	0.88	0.381
Marital status	0.214	0.175	1.19	0.236
Family Size	0.143	0.079	1.72*	0.085
Dependency ratio	2.310	0.282	8.97***	0.000
Migration to other place	-0.137	0.529	-0.25	0.801
Distance from urban center	-0.322	0.068	-4.51***	0.000
Access to extension service	0.212	0.257	0.81	0.416
Distance from Market	-0.058	0.040	-1.28	0.200
Shock experience	-0.501	0.260	-1.85*	0.065
Access to credit	0.347	0.296	1.11	0.268
Source of drinking water	-0.129	0.082	-1.60	0.109
Health service access	-0.303	0.409	-0.69	0.488
Access to electricity	-0.568	0.277	-2.14**	0.032

***, **, * Significant at 1%, 5% and 10% respectively Source: Own survey computation 2019/2020

Group	Observation	Mean	Standard division	Min	Max
Total	430	0.426	0.299	0.001	0.988
Treatment	183	0.641	0.252	0.036	0.988
Control	247	0.266	0.222	0.001	0.958

Figures 3 and 4 portray the distribution of estimated propensity scores displaced and non-displaced farm households in the common support condition after matching respectively.

After controlling for the differences in covariates of displaced and non-displaced farm households, average treatment effect on the treated (ATT) estimation result in Table 11 revealed that urban induced expansion brings significant and negative impact on the displaced farm households' welfare. It was found that on average, the displaced farm households' consumption expenditure per adult equivalent was reduced by 6688.03 Ethiopian Birr and a combined asset index of the displaced farm households' diminished by 0.022. The implication is that when the peri-urban land is needed for urban expansion purposes, local indigenous smallholder farmers were dispossessed of from their land and properties with inadequate compensation. Hence, the various asset bases of displaced farm households that were important for their livelihood diminished drastically over time which implied that their consumption expenditure also reduced. This would result in lower welfare of displaced farm households as compared to non-displaced farm households.



Source: Own survey computation 2019/2020 Fig. 4. Kernel density of propensity scores of non-displaced HHs in common support after matching

Table 11.	Average	treatment	effect	on	the	treated
-----------	---------	-----------	--------	----	-----	---------

Conclusion and policy implications

The result of the average treatment effect on the treated revealed that farm households who had been dispossessed from their farm land or properties as result of urban induced expansion gained significantly lower welfare than their counterfactuals (non-displaced farm households). Therefore, concerned bodies like city administrations should design sustainable displacement rehabilitation packages or revise land compensation schemes. In addition, the government should secure Ethiopian farmers the right to own land that in turn could improve the income of displaced farm households through paving the farmers the way to negotiate and sell their land at market price as they do for other assets such as cattle. Similarly, the government should forecast and conduct deep socioeconomic and demographic analysis before displacing indigenous farmers. More importantly, city administrations and other stakeholders ought to adopt appropriate urban expansion models such as vertical urban expansion model than horizontal. Therefore, thinking of these measures in advance might improve displaced farm households' welfare.

Acknowledgments

I would like to extend thanks to my organization, Wollo University, for allowed to pursue my PhD fellowship and I would like to express my thanks to University of Gondar for research grant.

Conflict of interest

This article has not been submitted to any other journals anywhere and no any conflict of interests among Authors that are directly or indirectly related to the work submitted for publication.

References

Abubeker Mohammed, 2018. Land expropriation for co-

0					
Variable	Treated	Controls	difference bootstrap	t-value	standard error
consumption expenditure per adult equivalent combined asset index	5984.17 0.742	12672.2 0.764	-6688.03 -0.022	747.17 0. 0042	-8.98*** -4.87***

*** Significant at 1%

operative housing in Amhara Region, Ethiopia. *Process and impacts on the peri-urban farming communities.* 9-12 May, Conference Paper, FIG Congress.

- Achamyeleh Gashu, 2014. Peri-urban land rights in the era of urbanization in Ethiopia: Aproperty rights approach. *African Review of Economics and Finance*. 6(1): 120–138.
- Adam, A. 2016. Urbanization and the struggle for land in the peri-urban areas of Ethiopia. 10-12 May, In *Annual Bank Conference on Africa.*
- Addisu, M. 2015. Effects of urban sprawl on the livelihood of suburban agricultural community: The case of Sara Ampol, Yeka Tafo and chorizo Area, Yeka Sub City, Addis Ababa, Ethiopia, Doctoral dissertation, Addis Ababa University.
- Addisyihun, A. 2019. Housing and settlement transformations in the surrounding peri-urban areas of Hosanna town: the cases of Ambicho and Kidigisa, Hadiya zone, Ethiopia, MSc.Thesis, the Ethiopian Institute of Architecture, Building Construction, and city, Addis ababa, Ethiopia.
- Ahlam, Y. 2017. Urban expansion and its impact on the livelihood of peripheral farming communities: The case of Kutaber town. Amhara region, Ethiopia, MSc Thesis, Addis Ababa University, Addis Ababa.
- Allen, R.C. 2014. *The British industrial revolution in global* perspective. Six edition, Cambridge University Press.
- Amhara National Regional State, Urban Development, Housing and Construction Bureau, 2017. Expropriated peri-urban agricultural land for cooperative housing in Amhara region. September, 2017, Bahirdar, Ethiopia.
- Belete Debebe, 2017. Projecting the implication of urban popopulation growth on urban facilities in Amhara Region: An application of spectrum model, national consultation meeting, Addias Ababa, Ethiopia.
- Besfat Engdaw and Melaku Kebede, 2019. The impact of urbanization on food (in) security in Amhara Regional State Metropolitan cities: Monitoring income generating capacity limitation as a mediating variable. *International Journal of Advanced Scientific Research and Management.* 4(9) : 42-57.
- BOFED. 2014. The impact of urbanization on food (in) security in Amhara Regional State metropolitan cities, budget year annual statistical bulletin, Bahir Dar, Ethiopia.
- Central Statistical Agency, 2013. Population projection of Ethiopia for all regions at district level, Addis Ababa, Ethiopia.
- DFDI, 2013. Who can Help the peri-urban poor? adoption and impact of livelihood, evidences from Africa.
- Eniyew, S., 2018. Mapping urban expansion and its effect on the surrounding land uses using GIS and remote sensing. A case study in Debre Tabor Town, Ethiopia. *Journal of Degraded and Mining Lands Management.* 6(1) : 14-27.

- Ethiopian Map Agency, 1981. A Geo-referenced Database and Digital Terrain Model of Ethiopian Spatial Information Prepared in Ethiopian Map Agency.
- FDRE, 1995. The constitution of the Federal Democratic Republic of Ethiopia. Federal Negarit Gazeta, Proclimation No. 1. Addis Ababa, Ethiopia.
- Fenta, A.A., Yasuda, H., Haregeweyn, N., Belay, A.S., Hadush, Z., Gebremedhin, M.A. and Mekonnen, G. 2017. The dynamics of urban expansion and land use/land cover changes using remote sensing and spatial metrics: the case of Mekelle City of northern Ethiopia. *International Journal of Remote Sensing* 38(14) : 4107-4129.
- Filmer, D. and Pritchett, L. 2001. Estimating wealth effects without expenditure Data or Tear: Educational enrolment in India. *Annals of Mathematical Statistics* (14): 436-440.
- Gashaw Tena, 2015. Land Expropriation and compensation payment in Ethiopia review. *Journal of Economics and Sustainable Development*. 6(13).
- Giovana Beltrao, 2013. Urban planning and land management for promoting inclusive cities, technical assistance consultant's report, for ministry of housing and urban poverty alleviation, India.
- Haggblade, S., Hazell, P. and Reardon, T. 2010. The rural non-farm economy: Prospects for growth and poverty reduction. *World Development*. 38(10) : 1429-1441.
- Idris Mohammed, Abdella Kosa and Nuredin Juhar, 2020. Economic linkage between urban development and livelihood of peri-urban farming communities in Ethiopia (policies and practices). *Agricultural and Food Economics*. 8(1) : 1-17.
- Kassahun Tassie, 2018. Determinants of peri-urban households' livelihood strategy choices: An empirical study of Bahir Dar city, Ethiopia. Cogent Social Sciences 4(1): 1562508.
- Kothari, C.R. 2004. Research Methodology: Methods and Techniques, 2nd Edition. New Age International, New Delhi, India.
- Leulseged Kasa, Zeleke, G., Alemu, D., Hagos, F. and Heinimann, A. 2011. Impact of urbanization of Addis Abeba city on peri-urban environment and livelihoods. Sekota Dry land Agricultural Research Centre of Amhara Regional Agricultural Research Institute: Addis Ababa, Ethiopia.
- Lives, E. and Nations, R, 2015. Accelerating Inclusive Growth for Sustainable Human Development in Ethiopia. United Nations Development Program, Addis Ababa, Ethiopia.
- Ministry of Urban Development, Housing and Construction (MUDHCo) and Ethiopian Civil Service University (ECSU), 2015. State of Ethiopian Cities Report, Addis Ababa, Ethiopia.
- Mohamed, A., Adel, Y. and Cuong, N. 2014. Does Urbanization Help Poverty Reduction in Rural Areas?

Evidence from Vietnam. Working Paper No. 115.

- Muluwork Zebu, 2014. An assessment of livelihood and food security of farmers displaced due to urban expansion: The case of Kombolcha town in Amhara National Regional State, Ethiopia, Doctoral dissertation, Mekelle University, Mekelle, Ethiopia.
- Nguyen Thi, D., Lebailly, P. and Vu Dinh, T. 2016. Land conversion to industrialization and its impacts on household food security in Red River Delta, Vietnam.
- Nigusie, D. 2011. Rapid urban expansion and its implications on livelihood of farming communities on periurban area: the case of sebeta town. Unpublished MA Thesis: Addia Ababa University, Ethiopia.
- Satterthwaite, D., McGranahan, G. and Tacoli, C. 2010. Urbanization and its implications for food and farming. *Philosophical transactions of the royal society B: Biological Sciences*. 365(1554) : 2809-2820.
- Sharma, S, 1996. Applied Multivariate Techniques, University of South Carolina, John Wiley and Sons, Inc, New York.

- Teketel Fekadu, 2015. Urban expansion and its effects on peripheral farming community: The case of Hossana town of Hadiya Zone, SNNPR –Ethiopia, MA Thesis, Haramaya University. Ethiopia.
- Tessema, M.W., 2017. Impact of urban expansion on surrounding peasant land the case of Boloso Sore Woreda, Areka Town, SNNPR, Ethiopia. *Global Journal of Human-Social Science Research*. 17(2): 53-65.
- UN-Habitat (United Nations Human Settlements Programme), 2011. *State of the world's cities: Bridging the urban divide*. Earth scan.
- UN-Habitat, 2017. The state of Addis Ababa: The Addis Ababa we want. UN-Habitat, Nirobi, Kenya.
- United Nation Population Fund Agency (UNFPA), 2007. State of world population: unleashing the potential of urban Growth. United Nations Population Fund, New York.
- Worku, G. 2019. Assessment of the effects of urban expansion on the surrounding rural agricultural land and livelihoods of the peri-urban farmers: the case of Tefki town, Oromia region, Ethiopia, Doctoral Dissertation. Addis Ababa, Ethiopia.