# The Impact of Urban Expansion on the Livelihood of Farming Communities in Peri-Urban Area of Bahir Dar City Amahara, Ethiopia

KASSAHUN TASSIE WEGEDIE

Bahir Dar University, College of Agriculture and Environmental science, Department of Agricultural Economics

**Abstract**

In the past two decades, Bahir Dar city has been growing at a faster rate of urbanization. This is manifested by high population concentration in the city and horizontal physical expansion of the city. Using survey data from 310 randomly selected households in four peripheral areas of Bahir Dar city, both descriptive and econometric model have been used to analyze the data. Binary and multinomial logit regression models were used to investigate the effect impact of urban expansion on their livelihood and to examine the livelihood strategies pursued in the area. logit regression shows that displacement status was influenced by head education, education of working member, household size, male working member, dependent ratio, household land size, and total value of current productive asset although the propensity score matching estimation result shows, there is insignificant difference between displaced and non-displaced in terms of livelihood outcome. Nevertheless the effect of displacement on household's livelihood outcome has a negative difference -0.152 as compared to non-displaced. The multinomial logit model result shows variables include head age, head sex, head education, household size, dependency ratio, household land size, total value of current productive asset and access to credit which were determining farmers' choice of livelihood strategies.

**Keywords**: Impact; livelihood strategy; Propensity score matching; determinants; regression; Ethiopia

## 1. Background of the Study

The process of urban expansion is a worldwide phenomenon, recorded in the history of all urban centers. It started with the earliest human civilization of Babylonians' Cemea (1997) as cited in (Firew, 2010). It is the movement of people from rural to urban locations, where they hold mostly non-rural occupation, mainly move up due to natural population increase and migration from rural area, the situation may involve both horizontal and vertical expansion of the physical structure of urban areas. It can results in loss of agricultural land, natural beauties, range lands, parks and sceneries (Firew, 2010). Its process is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, changes in land use and transformation from rural to metropolitan pattern of organization and government. Hence, urbanization affects all spheres of human life of both rural and urban setting (Adem, 2010, Francis et al., 2013).

In developing countries, where urbanization rates are high, urban sprawl is a significant contributor of the land use change and this would result in numerous negative consequences, because cities are expanding horizontally with unplanned and clumsy expansion on the peripheries at the expense of agricultural lands open space and areas of natural beauty (UN 2007, Ramachandra, 2007).

Similarly, as stated by different scholars urban expansion has many positive and negative effects on farmers in the peri-urban areas. Thus, availability of market centers, facilitation of production and distribution of goods and services, and job opportunity are among the positive effects of urban expansion. The negative consequences of urban expansion also loss of prime agricultural farmland, displacement of farm communities, solid waste disposal and land degradation, enclosing surrounding rural land to urban territory, over exploitation of natural resources and conflict (Steven , 2013, Firew, 2010).

In peri-urban areas, Agricultural land is an important source of new land for industry and service sectors. Particularly in developing countries, land conversion and displacement is not critically considered in any activities taken place on it. Yet, it can have adverse effects on displaced households in terms of livelihood disruption, and social and cultural consequences (Dejene, 2011, Muluwork, 2014).

Particularly the main challenge of the urbanization process in the study area is the rapid conversion of large amount of prime agricultural land to urban land uses (mostly residential construction), in the urban periphery. It can affect the unavailability of prime agricultural land and consequently exposes for low agricultural productivity, low standard of living and food insecurity ((Shishay, 2011, Francis et al., 2013). Urbanization in Bahir Dar city is in a state of rapid horizontal expansion; it increased from 1957 to 2009 at an average growth rate of about 31% (88 ha per year) (Nigussie et.al., 2012). This will have far-reaching ecological, socio-economic and environmental consequences especially to the urban fringe areas. This trend will exacerbate further expropriation of farm households and may lead to food insecurity and social instability in the surrounding areas. Policies that ensure a just and equitable compensation for such expropriated farmers still remain necessary (Muluwork, 2014). Hence, a better understanding of the spatial and temporal dynamics of urban growth and its

effect on the small-scale farmer's life in the study area will be required. Currently, Bahir Dar expands dramatically and the demand of land for urban development program increases rapidly with non-existent urbanization process. In response to these, the government is taking large tracts from peripheral areas. As a result, large numbers of local landholders who mainly engage in agricultural activity for their livelihood have been forced to lose their land rights (Achamyeleh , 2014).

Even if, there is no training for displaced household had found to engage in various income generating activities by the responsible body after urban expansion, the communities were not given awareness and participated in planning and implementation of the process and no research had done on the specific issue in case of Bahir Dar. Therefore, these conditions forced the researcher to perform the research on effect and prospects of urban expansion on livelihood of farming communities in peri-urban areas of the city which have been trying to answer the following main questions:

➢ Does urban expansion affect the livelihood outcome of peripheral urban farming communities?
➢ What is the perception of the peri-urban community towards urban expansion?

## 2. Objective of the Study

The general objective of this study is to investigate the effect and prospects of urban expansion on the livelihood of peri-urban farming community and to examine the livelihood strategies pursued in the area of Bahir Dar city. The specific objectives of the study are:

➢ To investigate the effect of urban expansion on livelihoods outcome of peripheral farming community.
➢ To assess the perception of the displaced farming community towards urban expansion and the treatment of the local government on incenting the community.

## 3. Urbanization in Ethiopia

The history of urbanization in Ethiopia goes back to the Axumite. During this time, there were many towns where commerce had flourished with buildings and constructions of high standard. Centuries later, these urban centers began to shift to Lalibela and Gondar. Much of the urban history to Ethiopia following the Axumite period was characterized by the absence of fixed urban centers. This trend continues up to the end of the 19th c. In fact it continues until Addis Ababa was selected as a fixed political and commercial center by Minelik II (Kebede 2002).

Like most African countries on Ethiopia large scale urbanization is a fairly a recent phenomenon. However, the history of towns developing in the country extends back to the Axumite Kingdoms of 14th c, when Axum, the first political and religious center in the north of the country, was established. Despite this long urban history however, Ethiopia remains one of the least urbanized countries in sub-Saharan Africa (Tefera 2015).

Prior to 20th c, the establishment and growth of the Ethiopian cities are said to be in response to indigenous political, religious, economic as well military strategic, requirements. Despite its failure to build a well organized and large size urban settlement, the constant shift of the location capital cities of the empire during this period had accounted for the establishment and growth of a number of towns, particularly in north Ethiopia. For instance Axum, Lalibela, and Gondar found in the 4th c, 11th c and 17th c, respectively are some of the urban centers that served as capitals of nations. The factors that contribute to the growth of urbanization in Ethiopia include the establishment of central government, the introduction of modern means of transport and communication, schools, hospitals and modern business, Ethiopia's contact with the outside world and the establishment of large number of industries and organized farms as intensified process of urbanization in Ethiopia (Belay 2014).

## 4. Research methodology

### 4.1 Description of the Study Area

The study area – Bahir Dar city has a long history dated back to at least the sixteenth or seventeenth century, at this moment the capital of Amhara National Regional State which is located on the southern shore of Lake Tana, the source of Blue Nile (Abay) river, in the northwestern part of Ethiopia (Fig.1). It is located at 11∘38_N latitude and 37∘10_E longitude and has an average elevation of 1801 m above sea level. Topographically, the city lies on a flat surface with almost no slope gradient except for small increases in elevation in the eastern and western peripheries. The city is distinctly known for its wide avenues lined with palm trees and a variety of colorful flowers (Daniel , 2011, Nigussie et.al., 2012). Bahir Dar city is one of the fastest-growing urban centers in Ethiopia both demographically and spatially. The amount of land demanded for different urban development purposes is increasing every year. Based on CSA, in 1994(96,140), 2007(220, 344) (CSA , 2007) and according to ANRS bureau of finance and economic development in 2014 estimated (297,749) the data reveals that within 20 years the population of the city has increased by more than 200,000 people and interims of physical size an overlay of Bahir Dar administrative boundaries increase with an annual increment of 31%, from 279 ha in 1957 to 4830 ha in 2009 (Nigussie et.al., 2012), Built-up areas increased as a result of horizontal expansion.

**Figure 1**: Map of Bahir Dar City Administration
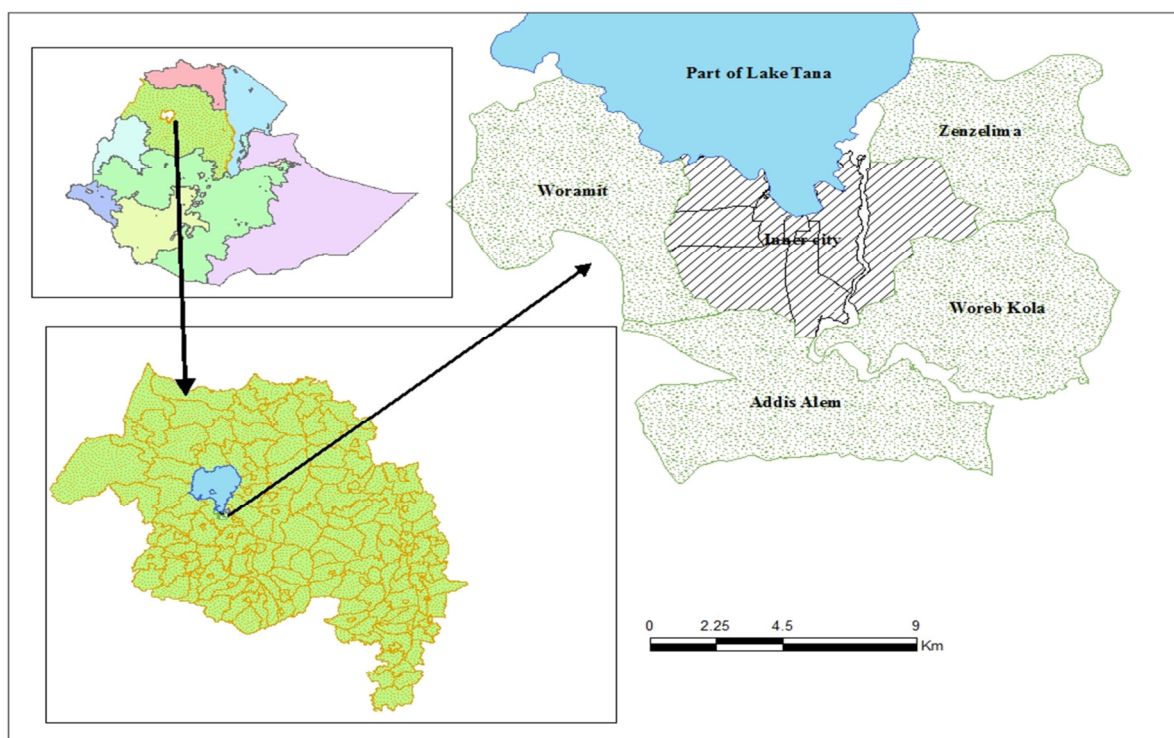


## 4.2 Data types and source

The study was relying on both primary and secondary data. Primary data were collected using a pre tested structured questionnaire through household survey. Secondary data were collected from Bahir Dar municipality administration office, land administration office, trade office, finance and economic development office of annual plan and quarterly reports, market information, research papers, land use regulation policy documents, CSA reports were used as a data source.

## 4.3 Sample Size and Sampling Techniques

The city is surrounded by four peri-urban kebeles, such as 'Weramit' 'Zenzelima', 'Addis Alem', and 'Woreb Kola'. The researcher had taken stratified random sampling technique to collect primary data. First to determine the Sample households from these surrounded peri-urban farmers using the following simplified formula adopted from (Israel, 1992).

$n = \frac{N}{1+N(e^2)}$ --------------------------------------------------------------------------------------------------1

Where, n= minimum required sample size, N=the estimated population size and e = is level of precision. By using the formula; $n = \frac{1365}{1+1365(0.05^2)} = 310$

These sample households' survey made from each selected kebeles from its representative gote. Stand on this a total sample of 310 households from which 149 displaced and the remaining 161 non-displaced (control group) were selected randomly from generated strata from roasters of the city administration proportional to the displaced sample size.

**Table 1**: population and Sample size of each peri-urban kebele

| Peri-urban Kebele | Sample gote | Total number of households estimated | Estimated displaced households | Household % share for displaced | Sample for displaced | Sample for non-displaced |
|---|---|---|---|---|---|---|
| Weramit | lumame | 338 | 115 | 19 | 29 | 37 |
| Zenzelima | sesaberet | 535 | 266 | 44 | 65 | 68 |
| Addis Alem | Qutatina | 351 | 169 | 28 | 42 | 44 |
| WorebKol | Chorqa | 141 | 54 | 9 | 13 | 12 |
| Total | 4 gotes | 1365 | 604 | 100 | 149 | 161 |

**Source**: municipality and kebele administration

### 4.4 Method of Data Analysis

After data sets are collected, the researcher encodes it in to STATA tool. In this study, both descriptive and inferential statistics and econometric analysis (propensity score matching and binary logit model) were used to analyze the effect of urban expansion on their livelihood outcome, households' perception on urban expansion on the displaced household.

#### 4.4.1    Impact Assessment

In determining the impact of an intervention; an impact assessment must estimate the counterfactual; that is, what would have happened had the intervention or program never taken place or what otherwise would have been. To determine the counterfactual, it is essential to net out the effect of the intervention from other factors. This is accomplished through the use of control groups which are compared with the treatment group. The control groups should resemble the treatment group except in program participation. The choice of a good counterfactual is therefore crucial in impact assessment. Propensity scores are an alternative method to estimate the effect of receiving treatment when random assignment of treatments to subjects is not feasible. Propensity score matching (PSM) refers to the pairing of treatment and control units with similar values on the propensity score, and possibly other covariates, and the discarding of all unmatched units. It is primarily used to compare two groups of subjects but can be applied to analyses of more than two groups. PSM works well as long as the survey instrument used for measuring outcomes is identical for treatment and control participants. Hence, the success of PSM hinges critically on the data available, as well as the variables used for matching (Diaz and Handa , 2004).

As a program evaluation technique, PSM is based on the idea of comparing the outcomes of program participants with the outcomes of "equivalent" non-participants. Since the two groups are comparable on all observed characteristics with the exception of program participation, the differences in the outcomes are attributed to the program. The estimated propensity score, for subject e (xi), (i = 1… N) is the conditional probability of being assigned to a particular treatment given a vector of observed covariates xi (Rosenbaum, 1983):

$$e\big(xi\big) = pr\big(zi = 1 \big| xi\big) \text{----------------------------------------------------------------} 2$$

$$pr\big(zi, ---, x_1, ---x_n\big) = \sum_{i=1}^{n} e\big(xi\big)^{zi} \left(1 - e\big(xi\big)^{1-zi}\right) \text{--------------------------------------------} 3$$

**Where:** $zi = 1$ for treatment; $zi = 0$ for control; $xi =$ the vector of observed covariates for the $i^{th}$ subject

The propensity score is a probability, it ranges in values from 0 to 1. Thus, if propensity score matching was used in a randomized experiment comparing two groups, then the propensity score for each participant in the study would be 0.50. This is because each participant would be randomly assigned to either the treatment or the control group with a 50% probability. In study designs where there is no randomization, such as in a quasi-experimental design, the propensity score must be estimated. Propensity score values are dependent on a vector of observed covariates that are associated with the receipt of treatment.

In this study, the propensity score matching (PSM) was used to evaluate the impact of urban expansion on livelihoods outcome of peripheral farming community. If $Y_1$ denotes the potential outcome conditional on participation and $Y_0$ denotes the potential outcome conditional on nonparticipation, the impact of program is given by:

$$\Delta = Y_1 - Y_0 \text{ ---------------------------------------------------} 4$$

#### 4.4.1.1  Estimating the Propensity Score (PS)

The propensity score is defined as the conditional probability of receiving a treatment given pretreatment characteristics (Rosenbaum, 1983). The propensity scores were computed using binary logit regression models given as:

$$P\big(X\big) = \Pr\{D = 1/X\} = E\{D/X\} \text{ --------------------------------------} 5$$

**Where:**

- D= (0, 1) is the indicator of exposure to treatment characteristics (dependent variable). That is, D=1, if exposed to treatment (displaced) and D=0 if not exposed to treatment.
- X is the multidimensional vector of observed characteristics (explanatory variables). These explanatory variables are those which are expected to jointly determine the probability to participate in the treatment and the outcome. The explanatory variables considered in this study were based on theory and from review of studies.

### 4.4.1.2 Matching the unit using the Propensity Score

After the propensity score is estimated and the score computed for each unit, the next step is the actual matching. Nearest neighbor matching method was used to match. Nearest to neighbor matching uses the propensity score of similar individuals in the treated and control group to construct the counterfactual outcome. One major advantage of this approach is the lower variance which is achieved because more information is used. The matching estimator is given as:

$$\tau^M = \frac{1}{N^T} \sum iET\left\{Y_i^T - \sum iETW_{ij}Y_j^c\right\}$$

$$= \frac{1}{N^T}\left\{\sum iETY^T - \sum iET \sum iETW_{ij}Y_j^c\right\} \text{-----------------------------------------------------------6}$$

$i, E, T, N_i^c$ Denotes the numbers of controls matched with observation and define the

weights $W_{ij} = \frac{1}{N_i^c} iff EC(i)$ and $W_{ij} = 0$ otherwise. M stands for nearest neighbor matching and the number

of units in the treated group is denoted by $N^T$. One of the major advantages of this method is that, the absolute difference between the estimated propensity scores for the control and treatment groups is minimized.

### 4.4.1.3 Estimating the impact (Average Treatment Effect on the Treated)

The matched sample was used to compute the Average Treatment Effect for the treated (impact). It is estimated as follows:

$$ATT = E\left(\Delta | D = 1, X\right)$$

$$= E\left(Y_1 - Y_0 | D = 1, X\right)$$

$$= E\left(Y_1 | D = 1, X\right) - E\left(Y_0 | D = 0, X\right)\text{-----------------------------------------------------7}$$

Where D = 1 denotes program participation (Displaced) and **X** is a set of conditioning variables on which the subjects were matched. Equation 7 would have been easy to estimate except for the equation E (Y0 | D = 1, X). This is the mean of the counterfactual and denotes what the outcome would have been among participants had they not participated in the program (non-displaced). PSM provides a way of estimating this equation. A unique advantage of PSM is that instead of matching subjects on a vector of characteristics, we only need to match on a single item, the propensity score that measures the probability of participating in the program. Given that the Conditional Independence Assumption and the common support assumption holds, then we estimate the mean effect of the treatment through the mean difference in the outcomes of the matched pairs:

$$ATT = \frac{1}{N_1}\sum_{i=1}^{N_1}\left(y_{1i} - \sum_{j=1}^{N_0}w_{ij}y_{0j}\right)\text{------------------------------------8}$$

A weighted average of all displaced outcome variables is subtracted from every non-displaced outcome variable.

**Where** $w_{ij} E[0,1] and \sum_{j=1}^{N_0} w_{ij} = 1$; $N_1 =$ Number of displaced; $N_0 =$ Number of non-displace; $i =$ Index of

displaced; $j =$ Index of non-displaced; $W_{ij} =$ Weights

### 4.4.2 Determinates of peri-urban households' urban expansion perception

The choice of econometric model depends on the nature of the dependent variable i.e. nominal, ordinal, interval and / ratio scale. Households' perception was the dependent variable of this study which takes 1 if the household support urban expansion and 0, otherwise. Therefore, linear probability, binary logit and probit model are used to express and estimate the mathematical relationships between explanatory variables and the binary dependent variable which has qualitative responses. In linear probability model, the estimated probability of the dependent variable lies out of the interval $0 \leq p \leq 1$ unlike logit and probit model. How do logit models differ from probit models? This question is answered by (Park , 2015). The core difference lies in the distribution of the error term. In the logit model, error term is assumed to follow the standard logistic distribution; whereas, probit model is assumed to follow the standard normal distribution. With this minor difference, binary logit is preferable as compared to binary probit because of its mathematical simplicity and interpretation. Following this, binary logit model was employed for this study. Mathematically, the model can be expressed as (Gujarati , 2004): The logistic function is given by:

$$pi = \frac{1}{1 + e^{-Z}} = \frac{e^z}{1 + e^z} - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 9$$

- Where, Z is the linear combination of causal variables, pi is the probability of the dependent variable equaling a success.

From the above equation it is possible to drive the probability of the dependent variable equaling failure is

$$1 - pi = \frac{1}{1 + e^z} - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 10$$

Dividing equation 9 by equation 10 gives the odds ratio (L) as,

$$Li = \frac{pi}{1 - pi} = \frac{\frac{1}{1 + e^{-z}}}{\frac{1}{1 + e^z}} = e^z - - - - - - - - - - - - - - - - - - - - - - - - -11$$

Taking the natural logarithms of the odds ratio (11), we get,

$$ln(Li) = ln\left(\frac{pi}{1 - pi}\right) = \ln(e^z) = z - - - - - - - - - - - - - - - - - - - - -12$$

$$z = \beta 0 + \beta 1 x 1 + \beta 2 x 2 + - - - + \beta n x n + U$$

That is, $Li$, the log of then odds ratio, is not only linear in $X$, but also (from the estimation viewpoint) linear in the parameters. $Li$ is called the logit, and hence the name logit model for models (18) and $\beta_0, \beta_{1----}\beta_n's$ are coefficients of regression equation, $x_1 x_2 ... x_n$ are set of causal variables which affects the dependent variable, and finally U is the error term.  Therefore, the logit model for perception on urban expansion is:

$$Ln(Li)\ Z = \beta_o + \beta_1\ Head_{age} + \beta_2\ Head_{sex} + \beta_3\ Head_{edu} + hhslan_{size}\ \beta_5\ Comp_{amo} + \beta_6\ lanlo_{ext}$$
$$+ \beta_7\ Awe_{creat} + \beta_8\ Pac_{relev}\beta_8\ Pac_{type} +\ \mu - - - - - - - 13$$

**Table 2**: Definition and measurement of independent variables in PSM, and binary logit model

| Variable | Definition | Measurement | Hypothesis |
|---|---|---|---|
| 1.  Definition and measurement of independent variables used in PSC model | | | |
| head-sex | Sex of Household Head | 1=Male, 0 otherwise | Positive |
| head_educ | Educational level of the household head | Level category | Positive |
| wor-educ | Average years of formal schooling of adult members who were employed in the last 12 months | years | Positive |
| hhs-si | House hold Family Size | Number | Positive |
| mal-wor | Number of male adult members who were employed in the last 12 month | number | Positive |
| dep-ratio | This ratio Unemployed to labor force | Ratio | Negative |
| hhslan_size | Household agricultural land holding size | Hectares | Positive |
| Lan-ada | Owned farm size per member aged 15 and over | hector | Positive |
| totvalcur-ass | Value of all productive assets | birr | Positive |
| gro-mem | Number of memberships in formal and informal groups and organizations | number | + Positive |
| 2    Definition and measurement of independent variables used in Binary logit model | | | |
| head-age | Age of Household Head | Years | -Negative |
| head-sex | Sex of Household Head | 1 if Male, 0 otherwise | -Negative |
| head-educ | Educational level of the household head | Level category | +positive |
| hhslan- size | Household agricultural land holding size | Hectares | -Negative |
| com-amo | Amount of compensation given by city administration | Ethiopian Birr | +Positive |
| Lanlos_ext | Degree of land loss/ land loss ratio | percent | -Negative |
| Awe-lev | Level of Awareness about urban expansion | 1 if aware, 0 otherwise | +Positive |
| pac-relev | Government package relevancy | 1 if relevant, 0 otherwise | +positive |
| Pack_type | Types of compensation package | number | +positive |

## 5.  Result and discussion

Propensity score matching, and multinomial logit binary logit econometric model has been also employed to analyze whether or not there is a significant difference between displaced and non-displaced in terms of livelihood outcome, livelihood strategy choice of displaced farming community measured in weighted average livelihood outcome, strategy. The result shows that statistically there is a significant difference between displaced and non-displaced in terms of education of working member, household size, male working member,

dependent ratio, household land size, and total value of current productive asset.

Accordingly, household land size, education of working member, household size and total value of current productive asset are significant at 1%, while male working member and dependency ratio are significant at 10% probability level. In addition, the result also revealed that statistically there is no significant difference between displaced and non-displaced in terms of land per adult and group membership. In contrast to the displaced sampled households, non-displaced households have large land size, on the other hand high dependency ratio. Non-displaced households on average have 57.1 percent and 16.05 percent higher in land holding size and dependency ratio than those of the displaced household respectively and in contrast to the non-displaced sampled households, displaced households have large numbers of household size, large number of male working members, better level of work education and larger value of current total productive asset.

**Table 3**: Summery statics and mean difference test on continuous variable

| Explanatory variables | Non-Displaced (N=161) | | Displaced (N=149) | | Total (N=310) | | Mean difference | | T - value |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | |
| wor_edu | 2.579 | 2.476 | 3.497 | 2.619 | 3.020 | 2.583 | -0.918 | -13.11 | 0.07 *** |
| hhs_si | 5.267 | 1.749 | 5.718 | 1.725 | 5.484 | 1.749 | -0.451 | 1.45 | -0.31*** |
| mal_wor | 1.839 | 1.012 | 1.966 | 1.093 | 1.900 | 1.052 | -0.128 | -0.14 | 0.92 * |
| dep_rat | 64.93 | 50.06 | 55.95 | 42.68 | 60.61 | 46.80 | 8.99 | 26.44 | 0.34* |
| hhslan_size | 1.769 | 0.938 | 1.126 | 0.785 | 1.460 | 0.925 | 0.643 | -1.04 | -0.62*** |
| lan_ada | 0.557 | 0.340 | 0.311 | 0.253 | 0.439 | 0.325 | 0.246 | -0.34 | -0.72 |
| totval_curpras | 75307 | 45471 | 78860 | 75377 | 77015 | 61604 | -3554 | -4442 | 0.08*** |
| gro_mem | 2.422 | 0.739 | 2.416 | 0.789 | 2.419 | 0.762 | 0.006 | 0.01 | 0.49 |

***; ** & * significant at 1%; 5% & 10% significance levels respectively. Source; survey result (2017)

The descriptive analysis of Pearson's chi-square proportion difference test between displaced and non-displaced for categorical variables (table 3) shows that, there is a significant difference between displaced and non-displaced in terms of household head education at 10% levels of significance in addition to the total sampled households, 61%, 21%, 11%and 7% are illiterate, primary, junior and Secondary & above respectively. This implies that household education has an effect on livelihood outcome difference. However, there is no significant difference between displaced and non-displaced in sex.

**Table 4**: Summery statics and proportional difference test between categorical variable

| variables | category | Non-Displaced (N=161) | | Displaced (N=149) | | Total (N=310) | | $X^2$ |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| head_sex | male | 144 | 89.44 | 123 | 82.55 | 267 | 86.13 | 0.742 |
| | Female | 17 | 10.56 | 26 | 17.45 | 43 | 13.87 | |
| head_educ | illiterate | 89 | 55.28 | 100 | 67.11 | 189 | 60.97 | 2.685* |
| | Primary | 39 | 24.22 | 27 | 18.12 | 66 | 21.29 | |
| | junior | 22 | 13.66 | 11 | 7.38 | 33 | 10.65 | |
| | Secondary and above | 11 | 6.83 | 11 | 7.38 | 22 | 7.10 | |

***; ** & * significant at 1%; 5% & 10% significance levels respectively. Source; survey result (2017)

## 5.1 Estimation of Propensity Scores

The logistic regression model was employed to estimate propensity scores for matching displaced household with control or non-displaced households. For estimating propensity scores only those variables which affect both the likelihood of displacement and the outcomes of interest were included. The logit estimate result appears to perform well for the intended matching exercise.

**Table 5**: Logistic regression model result for displacement status

| Explanatory Variable | Coefficients | Z-value |
|---|---|---|
| _cons | -.4075301 | -0.51 |
| head_sex | -.2516155 | -0.56 |
| head_educ | -.3107563 | -1.93[*] |
| wor_edu | .257916 | 3.33[***] |
| hhs_si | .5138804 | 3.01[***] |
| mal_wor | -.3722243 | -1.76[*] |
| dep_rat | -.0089635 | -1.66[*] |
| hhslan_size | -2.07851 | -4.31[***] |
| lan_ada | .7194893 | 0.58 |
| totval_cur~s | 9.11e-06 | 2.60[***] |
| gro_mem | .3051199 | 1.54 |
| Number of observations 310;          LR chi2(10) = 107.35 | | |
| Prob > chi2= 0.0000      Log likelihood= -160.9686      Pseudo R2= 0.2501 | | |

***; ** & * significant at 1%; 5% & 10% respectively; Source: survey result (2017)

The pseudo-$R^2$ value 0.2501 shows that the competing households do not have many distinct characteristics overall, so that finding a good match between the treated and non-treated households becomes easier. The maximum likelihood estimate of the logistic regression model result shows that displacement status has been significantly and negatively affected by household land size, education of household head, male working number and dependent ratio and these results are significant at 1%, and the other equally at 10% probability level respectively. Likewise, it is positively affected by working education, household size and total value current productive asset which is significant at equally 1% probability level. Meaning those peri-urban farming communities who displaced due to urban expansion, have better work educational member in the household being engage in the formal wage work employment, this would have positively influenced for sustainable livelihood outcome. Similarly, a household having larger family size this being have excess labor to participate in income generating activities. Also household still having large productive asset this being produce more for their sustainable livelihood come.

**The Impacts of Displacement on Peri-urban Household**

This section presents evidence as to whether or not the displacement has brought significant changes on the livelihood outcome of the peri-urban farming communities.

**Table 6**: Impacts of urban expansion displacement on farming community

| Outcome Variables | displaced | Controls | Difference | S.E[B] | T value |
|---|---|---|---|---|---|
| Livelihood outcome | 2.90390062 | 3.05590062 | -0.152 | .044381367 | -2.67 |

Source: Estimation result, 2017

After controlling for other characteristics, the propensity score matching model using the nearest neighbor matching estimator result (band width 4) indicates urban expansion affect from the propensity score matching estimation (table 6) shows that there is insignificant difference in livelihood outcome of displaced farming community by -0.118316729 as compared to non-displaced farming community.

**5.2 Determinant factors for Farmer Perception about urban expansion**

The results obtained from VIF test displayed show that all the continuous explanatory variables have no serious multicollinearity problem (VIF= 1.72), and similarly, contingency coefficient test were used to determine the degree of association among categorical variables.

**Table 7**: Logistic regression result for perception of displaced farming community to urban expansion

| Variable | coefficients | Std. Err. | Z | Z >IzI | M.E | Mean of X |
|---|---|---|---|---|---|---|
| head_age | -0.0111 | .0 .00523 | -0.50 | 0.618 | -0.0026 | 50.4422 |
| head_sex | 3.1433 | 0.06703 | 7.10 | 0.000 | 0.4759 | 0.8163 |
| head_educ | 0.7945 | 0.07427 | 2.52 | 0.012 | 0.1870 | 1.5374 |
| hhslan_size | -0.0838 | 0 .12314 | - 0.16 | 0.873 | -0.0197 | 1.1141 |
| comp_amo | 0.0000 | 0.00000 | 2.55 | 0.011 | 3.91e-06 | 62030.9 |
| lanlo_ext | -0.0365 | .0 .00415 | - 2.07 | 0.038 | -0.0086 | 48.8754 |
| awe_creat | 3.8633 | 0.05796 | 10.93 | 0.000 | 0 .6332 | 0.0612 |
| pac_relev | 1.7200 | 0.17756 | 2.27 | 0.023 | 0.4023 | 0.1020 |
| pack_type | 0.4720 | 0.03091 | 3.59 | 0.000 | 0.1111 | 2.3265 |
| Number of obs  = 147;       Wald chi2(9)   =    48.30;      Prob > chi2    =    0.0000 | | | | | | |
| Log likelihood =   -64.226731;   Pseudo R2     =      0.3562 | | | | | | |

\*\*\* and \*\* significant at 1%, and 5% significance levels respectively

**Sex of the household (headhead_sex)**: sex of the household head influenced the displaced farmer perception to support positively at 1% significant level, keeping all other factors constant, sex of the household head increase the probability of decision to support urban expansion by a 0.4759325 when the household head is male. This could be because male have an access to information and better awareness level about urban expansion compared to female.

**Household head Education (head_educ):** The result of the study shows that head education positively influenced farmer's perception to urban expansion at 10% significance level. The model result shows that literate of the household head will increase the probability of support urban expansion by 0.1869614. This means literate farmer shave better understanding and information about urban development program as compared to illiterate farm household.

**Amount of compensation (com_amo):** government compensation amount for displaced household was found to be a positive relation to support urban expansion at 10% significance level. The model result shows that an increase in amount of compensation for displaced household by one birr will increase the probability of support urban expansion by 3.91e-06. This means amount of compensation use to increases the perception of urban expansion program.

**Land loss extent (lanlo_ext):** result of the model indicated that there was negative association to the dependent variable and significant at 10% significant level. The model result shows that an increase land loss extent by 1% will decrease the probability of support urban expansion by 0.0085902.

**Pre-awareness level on displacement (Awe-lev):** The result of the study shows that the pre awareness of displacement negatively influenced farmer's perception about urban expansion at 1% significance level. This indicates an increase in pre awareness level of the household head will decrease the probability of support urban expansion program by 0 .6332317. This means pre awareness level for displacement increases the right of land ownership.

**Government package relevance (pac-relev):** The result of the study shows that the relevancy of government package positively influenced farmer's perception to urban expansion at 10% significance level. The model result shows that legal acceptance or appropriateness of government package by displaced farmers will increase the probability of support urban expansion by 0.402269.

**Types of compensating package (pack_type):** Types of compensating package influenced the displaced farmer perception to support positively at 10% significant level, keeping all other factors constant, beyond cash compensation house plot increase the probability of decision to support urban expansion by a 0.4759325. This means cash compensation is not garnet for their sustainable livelihood because in most case compensation spend for consumption rather investment.

## 6.   Conclusion and recommendation

Urban development is ongoing process that comes up with various types of opportunities and challenges. Development induced displacement in peri-urban area is one of the challenges. To integrate sustainable livelihood and urban development, urban development policy should take into account an interest and view peri-urban farming community in policy formulation. Based on the findings of the study, it is possible to suggest the following policy recommendations:

- The government expansion program should take in to account that displaced farmers from their land should creating best alternative means livelihood strategies and creating better economic opportunity in areas need be reconsidered because land size is the main source of livelihood outcome difference.
- The trend of urban expansion program implemented so far indicated that the peri-urban farming communities are not consulted and involved in planning and implementation program. To make

transparent, participatory and sustainable development in urban expansion all actors of development especially the peri-urban farming communities are very crucial. Therefore, consensuses in pre-awareness and participation of the farming community in the forgoing programs and decision making should be given first priority before implementation of the program.

- In principle, concerned government offices of the city administration like Micro and Small Scale Enterprise, Social Affair, Agriculture, Land Administration and Environmental protection offices are the responsible institutions that rehabilitate the displaced peri-urban farmers. These include the responsibility to identify displaced farmers and give skill development training, appropriate the place of work and made favorable condition to engage private investment activities. However, no works were done on this area by any of local government bodies. Therefore, concerned local government institution should put into practice their responsibility in rehabilitating displaced peri-urban farming communities.

## 7. Reference

Achamyeleh, G. (2014). " The Challenges of Land Rights in the Peri‐Urban Agricultural Areas of Ethiopia in the Era of Urbanization. Conference on Land Policy in Africa. Addis Abeba."

Adem (2010). " Urban Expansion and the Neighbourhoods: The Case of Bishoftu Town, East Shewa Zone, Oromia Regional State. research thesis.".

Belay, E. (2014). "Impact of urban expansion on the agricultural land use a remote sensing and GIS Approach: A Case of Gondar City, Ethiopia." International Journal of Innovative Research and Development.

CSA (2007). " (Central Statistical Authority of Ethiopia)  Summery and statistical report of the population and housing censes result of Ethiopia. .".

Daniel, W. (2011). " Informal Settlement in Ethiopia, the Case of two Kebeles in Bahir Dar City Daniel Weldegebriel Ambay, Ethiopia. research paper.".

Dejene (2011). "  Rapid Urban Expansion and its Implications On Livelihood of Farming Communities on Peri-urban Area: The Case Of Sebeta. research thesis, 30.".

Diaz and Handa (2004). " "Propensity Score Matching as a Non-Experimental Impact Estimator: Evidence from Mexico‴s PROGRESA." Mimeo, UNC-CH, Department of Public Policy (forthcoming in JHR).".

Firew, B. (2010). ". The Impact of Horizontal Urban Expansion on Sub-Urban Agricultural Community Livelihood:The Case of Tabor Sub-City, Hawassa city,. Development Studies, Food Security Studies.".

Francis et al. (2013). " Urbanization and its Impact on Agricaltural land in Growing Cities in Developing Countries: A Case Study Of Tamale in Ghana. modern social scince jornal, 257.".

Gujarati (2004). " Basic econometrics. Fourth edition. The McGraw−Hill companies.".

Israel (1992). " mpling the Evidence of Extension Program Impact Program Evaluation and Organizational Development,IFAS,. University of Florida. PEOD-5.October.".

Kebede, B. (2002). "Land tenure and common pool resources in rural Ethiopia: a study based on fifteen sites." African development review **14**(1): 113-149.

Muluwork, Z. (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).".

Nigussie et.al. (2012). " The dynamics of urban expansion and its impacts on land use/land cover change and small-scale farmers living near the urban fringe: A case study of Bahir Dar, Ethiopia. Landscape and Urban Planning, 149– 157.".

Park (2015). "  Regression models for binary dependent variables using STATA, SAS, R, LIMDEP, AND SPSS. ."

Ramachandra, S. (2007). " Characterizing Urban Sprawl from Remote Sensing Data and Using Landscape Metrics. 10th International Conference on Computers in Urban Planning and Urban Manageme.".

Rosenbaum, R. (1983). " "The Central Role of the Propensity Score in Observational Studies for Causal Effects. Biometrika, 70(1), 41-55".

Shishay, M. (2011). " The Impacts of Urban Built-Up Area Expansion on the Livelihood of Farm Households, in the Peri-Urban Areas of Mekelle City: The Capital of Tigray Regional State. research thesis.".

Steven, T. ( 2013). "Farmland and Peri-Urban Livelihoods in Hanoi, Vietnam: Evidence From Household Survey Data in Hanoi's Peri-Urban Areas. Australian Journal of Basic and Applied Sciences, 7(7): 580-590, 2013.".

Tefera, E. (2015). Developing a holistic model of evangelism for the Ethiopian Fellowship Church in Raleigh, North Carolina, Southeastern Baptist Theological Seminary.

UN (2007). "United Nations World urbanization prospects: the 1999 revision. United Nations New York.".