



Determining Factors of Farm Income in Surrounding Farm Areas of Bishoftu Town, Ethiopia

Musba Kedir Mohammed, Alemayehu Keba Beyene

Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia

Email address:

Kedirmusba44@gmail.com (M. K. Mohammed), alemayehukeba@gmail.com (A. K. Beyene)

To cite this article:

Musba Kedir Mohammed, Alemayehu Keba Beyene. Determining Factors of Farm Income in Surrounding Farm Areas of Bishoftu Town, Ethiopia. *Science Frontiers*. Vol. 2, No. 3, 2021, pp. 33-38. doi: 10.11648/j.sf.20210203.11

Received: September 1, 2021; **Accepted:** October 5, 2021; **Published:** October 19, 2021

Abstract: The precise demographic definition of urbanization is the increasing share of a nation's population living in urban areas (and thus a declining share living in rural areas). Most urbanization is the result of net rural to urban migration. any change to the agricultural land use in these countries requires thoughtful planning to both conserve the land and reduce the risks of undermining the livelihoods of the people. The general objective of this study is to analyse the income effect of farm households in surrounding areas of Bishoftu town. Focusing on to describe socioeconomic characteristics of the farm household in the study area and assess the level of income of household after urban expansion in peri- urban areas of Bishoftu town. Two stage sampling procedure was employed to take sample households in the study area. To analyze the data descriptive statistics such as frequency and percentage was used and OLS model was employed to analyze factors determining income level of farm households. The result reveals that family size, TLU, level of education, Marital status, land holding and size were significant variables that affect the income level of households. It is recommended to strengthen education quality, increase yield of land, rearing more productive animals which supposed to increase farmers income.

Keywords: Bishoftu, Farm Income, OLS Model, Urbanization

1. Introduction

1.1. Background of the Study

The precise demographic definition of urbanization is the increasing share of a nation's population living in urban areas (and thus a declining share living in rural areas). Most urbanization is the result of net rural to urban migration. The level of urbanization is the share itself, and the rate of urbanization is the rate at which that share is changing. This definition makes the implications of urbanization distinct from those of urban population growth or those of the physical expansion of urban areas, both of which are often treated as synonymous with urbanization [1].

Ethiopia is the second most populous nation in Africa (more than 109 million people) with a total area of 1.1 million km² and lies in the north eastern part of the Horn of Africa [2]. Agriculture is the backbone of the Ethiopian economy, of which 80.5% of the rural population relies on agriculture for their livelihoods. This particular sector determines the growth of all other sectors and consequently the whole national economy. It constitutes over 50% of the

gross domestic product (GDP), accounts for over 85% of the labour force, and generates over 90% of the foreign exchange [3].

In economic theory, land is regarded as a special asset providing space for locating economic activities, infrastructure, and dwellings, as well as amenity services and aesthetic value [4-6]. In developing countries, most people rely on agricultural production, making land an important asset [7]. Yet, this valuable and scarce resource is in fixed supply [8], requiring sustainable utilization. Therefore, any change to the agricultural land use in these countries requires thoughtful planning to both conserve the land and reduce the risks of undermining the livelihoods of the people. However, existing literature shows that economic growth and persistent urbanization is an unavoidable global phenomenon that initiates urban encroachment into agricultural land [9]. While some studies state positive outcomes from the conversion of agricultural land in local communities since urbanization transforms a backward and agricultural country to become

modern and industrial. As a result of an increase in non-food producers and their average incomes, it often provides growing demands for agricultural products and for higher value products that bring benefits to farmers [12]. However, others argue against positive impact and report negative consequences because in most urban areas in low- and middle-income nations, the absence of land-use planning or a strategic planning framework to guide land-use changes leads to urban areas expanding haphazardly [13-16].

Ethiopia is among the poorest and least urbanized countries in sub-Saharan Africa. However, recently, Ethiopia has achieved remarkable economic growth accompanied with rapid urban expansion. For instance, the economy is growing on average by 10% [10] and urban population is growing by about 4% [11]. Urban areas are home to one fifth of its people then the growth rate is expected to continue in the near future. Consequently, to meet the growing demands of urban land, urban areas are going to redraw their boundaries by incorporating the nearby rural villages.

Due to urbanization the farm land is in the process of replacement for industrialization and residential activities. The owners of the farm land, that is the farmers are losing their land. This study focuses on factors determine the level of income due to urbanization in the study area.

1.2. Objective of the Study

1.2.1. General Objective

The general objective of the study was be; to investigate factors that determine level of income variation due to urbanization in the study area.

1.2.2. Specific Objective

- 1) To describe socioeconomic characteristics of the farm household in the study area.
- 2) To assess the level of income of household after urban expansion in peri- urban areas of Bishoftu town.

2. Research Methodology

2.1. Description of the Study

This research study will conduct in the Oromia Regional State, East Shewa Zone, Bishoftu town. According to Bishoftu City Administration Physical and Socio Economi profile, (2021).

Bishoftu city is found in east shewa zonal administration and it was found in 1917 with the coming of Ethio –Djibouti railway. The area of present day Bishoftu town and its surroundings was known as *Ada'a*. According to Tulama tradition there are different views on the ethnography of the area. Existing sources indicate that Tulama known as *Handa*, *Ilu*, and *Liban* where the three clans had been predominantly inhabited in the area. Around the late nineteenth century, a long conflict took place between the two. When the conflict was resolved between them, according to traditional Oromo conflict resolution, the area which later came to be *Ada'a* was given to *Handa*.

Bishoftu city is the largest and the most highly populated city and is characterized by deferent unique features. It is located at 47 km southeast of Addis Ababa, which is the capital city of the country, Ethiopia and 52 Km from Adama. The town is situated between Dukem and Mojo towns. It is located between 8°45'-8°47' North latitudes and 38°56'-39° East longitudes. In the North the city is bordered with Yerer Silassie, in the south with Wedo and Keta Jara, in East with Kaliti and in the West with Dire town and peasant association covering a geographical area of 20,574 hectares. [12] State that the population size of Bishoftu, in terms of population size, is the fourth largest urban center in Oromia Region sit next to Adama, Jimma and Shashemene.

2.2. Data Sources

The primary data was collected from house hold surveys and through participatory approach, which included focus group discussions, key informants' interviews and both open and closed ended questionnaires was used. Secondary data was collected and used from the relevant document review, and different publications (like books, journals, research reports and work papers and other internet accessible documents).

2.3. Description of the Study

Bishoftu town has expanded its horizon to reach out to the people and provide diversified socio-Economic services including the provision of infrastructure development, affordable housing and sanitation, public parks development, fire and emergency services. For administrative simplicity in real circumstances the city is currently divided in to 14 Kebeles. To the special case, the five surrounding rural vicinities recently included under the city administration.

The Town has nine Kebeles and it is has been stretching its size by including the surrounding urban areas, such as 'Lemlem Sefer', 'Shibo Gibbi' previously called 'Gabore', 'Qajima', (now divided into 'Kurkura' 01 and 'Kurkura' 02), 'Ettebe Sefer', and 'Ayer Hail'. However, from these the town's rapid urban expansion is extremely expanded to the west of the Town to the south west direction to 'Qajima' Sefer ('Kurkura' 01 and 'Kurkura' 02) and to Lemlem Sefer which is currently included as 01 kebele.

2.4. Sampling Techniques

The sample was taken from representative sample of households which were highly surrounding urban expansion occurred. Two sample *kebeles* were selected from surrounding urban areas, this were, "*Lemlem Sefer*" and "*Qajima*" Sefer ('Kurkura' 01 and 'Kurkura' 02). Finally, systematic Sampling technique was used to select the sample households.

Due to known population and uniform attribute of sample households, the sample size was determined using Taro Yemani's (1964) statistical formula. So, in order to determine the sample size from the entire household heads, we have used the following statistical formula.

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

$$= \frac{N}{1 + N(0.05)^2}$$

$$n = \frac{1254}{1 + 1254(0.05)^2} = 303$$

Where N=Total population (population size)

n=sample size

e=level of precision

1=constant value

To accomplish the objectives and make the study clearer the data for the research will be collected from farming community who settled surrounding Bishoftu town. In order to gather adequate sampling techniques was utilized.

2.5. Methods of Data Analysis

The collected data from different sources was organized into meaningful facts and made detail explanation. The raw data was analyzed using descriptive analytical methods, such as frequency, percentage, t-test for continuous variables and chi2 test for categorical variables.

2.5.1. Econometrics Analysis

In statistics, ordinary least square (OLS) is a type of linear least squares method for estimating the unknown parameters in a linear regression model. Under these conditions, the method of OLS provides minimum-variance mean-unbiased estimation when the errors have finite variances. According to different literatures, relative to other models ordinary list square model is best fit to investigate the level of income of surrounding farming communities.

2.5.2. The Seven Classical OLS Assumptions

Like many statistical analyses, ordinary least squares (OLS) regression has underlying assumptions. When these classical assumptions for linear regression are true, ordinary least squares produces the best estimates. However, if some of these assumptions are not true, you might need to employ remedial measures or use other estimation methods to improve the results.

Many of these assumptions describe properties of the error term. Unfortunately, the error term is a population value that we'll never know. Instead, we'll use the next best thing that is available the residuals. Residuals are the sample estimate of the error for each observation.

OLS Assumption 1: The regression model is linear in the coefficients and the error term

OLS Assumption 2: The error term has a population mean of zero

OLS Assumption 3: All independent variables are uncorrelated with the error term

OLS Assumption 4: Observations of the error term are uncorrelated with each other

OLS Assumption 5: The error term has a constant variance (no heteroscedasticity)

OLS Assumption 6: No independent variable is a perfect

linear function of other explanatory variables.

OLS Assumption 7: The error term is normally distributed.

2.5.3. Model Description

Estimation with OLS Ordinary least squares (OLS) minimizes the squared distances between the observed and the predicted dependent variable y:

$$S(\beta) = \sum_{i=1}^N (y_i - x_i \beta)^2 = (y - X\beta)'(y - X\beta) \rightarrow \min \beta$$

The resulting OLS estimator of β is:

$$\beta = (X'X)^{-1} X'y$$

Given the OLS estimator, we can predict the dependent variable by $\hat{y}_i = x_i' \hat{\beta}$ and the error term by $u_i = y_i - \hat{y}_i$. u_i is called the residual.

2.5.4. Goodness-of-fit

The goodness-of-fit of an OLS regression can be measured as $R^2 = 1 - \frac{SSR}{SST} = \frac{SSE}{SST}$ where $SST = \sum_{i=1}^N (y_i - \bar{y})^2$ is the total sum of squares and $SSR = \sum_{i=1}^N u_i^2$ is the residual sum of squares. $SSE = \sum_{i=1}^N (y_i - \hat{y}_i)^2$ is called the explained sum of squares.

3. Result and Discussion

3.1. Descriptive Statistics

To describe socioeconomic and demographic data we have used frequency and percentage. The result of this analysis is discussed below:

3.2. Socioeconomic Profile of Respondents

Socio economic contextual and features of the respondents have a crucial role in farm and non-farm doings to a excessive amount. In addition, these characteristics can be used as vital indicators in making comparison among different groups of the respondents. A number of socioeconomic parts of the sample households were examined. These were, family size, age, farm size, occupation, educational attainment for the members of selected households, farm and non-farm income, these characteristics are presented in Table 1.

It was originated from the investigation that 35% of the farmers were mid aged (aged between 30- 41 years) and had primary level of education (40.26%). 51.82% of the household's family size holds 4-6 number of family size and the male female ratio was 2.29 or 69.4% of households were male headed. Besides farming boating (8.33%), and non-farm labor (8.33%) were the main subsidiary professions for the farmers. About 63% of the agriculturalists were small whereas large farmers stood only 3.33% of total. The average farm size per home was 2.20 ha. Farm revenue of the respondents was higher which occupied 64.66% of the total home income than the non-farm income which occupied only 35.34% of their total domestic income.

Table 1. Descriptive statistics of socio-economic variables.

Age	Freq.	Percent
18-29	19	6.27
30-41	108	35.64
42-53	71	23.43
above 53	105	34.65
Sex of households		
male	211	69.64
Female	92	30.36
Marital status		
single	36	11.88
Married	254	83.83
Widowed	13	4.29
Religion of house holds		
Orthodox	159	52.48
Protestant	113	37.29
Muslim	18	5.94
Others	13	4.29
Level of Education		
Illiterate	17	5.61
Read and write	27	8.91
Primary school (1-6)	122	40.26
Junior secondary school (7-8)	54	17.82
Secondary school (9-12)	46	15.18
tertiary (college and university)	37	12.21
family size		
1-3	32	10.56
4-6	157	51.82
7-9	83	27.39
Above 9	31	10.23

Source: own computation, 2021

3.3. Econometric Analysis

In order to identify the impact of variables on farm income, a regression model was used. In the farm income, the model estimated the values of both crop and livestock income. Some basic assumption tests were carried out and are attached in the appendices section.

3.4. Factors Affecting the Level of Farm Income

The advantages of selected factors on farm income can be examined from the distinct regression co-efficient of each model. The outcomes have been offered in Table 2 and explanations have been demonstrated accordingly which is discussed below.

Family size: -Family size was measured by taking into attention all the existing family members of the respondent households. In this study, family size was expected to affect the households' farm income. The regression factors of family size show that rise in family size would lead to increase in the farming status of the household. That means 1% increase in family size will increase the household's farm revenue by 15244%. The results are expected because households in the study area have a perception that the addition of one working member in a family help to perform their farm operations better, hence, increase the farm production as well as farm income.

Marital Status: Marital status is one of significant variable that affect farm income. Compared to unmarried, widowed or

divorced households, married household's annual income is more by Birr 49859. This is due to diversified source of income. That is cost of production has been decreased by using family labor, the family can produce more compared to other categories.

Level of Education: Level of education was one the significant variable that affect level of farmers income. A unit increase in level of education can increase farmers income by birr 34,088.565. This is due to those farmers who are literate can adopt new varieties which can increase productivity. This variable in some rural areas may not have such effect but here the children of farmers who found around urban areas has the chance to get quality education and better information which is important to increase farm income and also price detection in more in urban areas.

TLU: The number of tropical livestock units per capita has a negative and significant effect for farm income. This is because as livestock management needs intensive labor it may compete for the scarce family labor that can allocate to off-farm wage work, hence lowers off-farm wage income and affects the overall farm income indirectly. Around urban areas most of the family engaged on non-farm income and it exposed to reduce farm income.

Land holding: Land is the most important fixed asset which used to produce any other farm and non-farm products. From this research we have also observed this scenario. Compared to land owners, those farmers without land their income is less by birr 5,8451. Their land was used for urbanization activity and the only get land for residence.

Because of that, their income is less by mentioned amount.

Farm size: This independent variable was significant at 1% significant level and it was positively correlated with farm income. One hectare increase in land will increase the farm income by birr 16,058.39. As we have discussed in land holding part, farm is very important variable to produce

different outputs. Therefore, this variable should be maintained in a wise manner. Expansion of urban areas should be focused on vertical expansion not horizontal which demand more land. This will replace the farm land and expose the farmer for poverty.

Table 2. OLS regression of farm income.

Farm income	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	24353.754	16150.343	1.51	.133	-7440.262	56147.769	
Sex	-10292.777	9545.974	-1.08	.282	-29085.246	8499.693	
Marital status	49859.624	12154.84	4.10	0	25931.267	73787.981	***
Level of Education	34088.565	12505.619	2.73	.007	9469.654	58707.475	***
Family size	15244.228	7204.725	2.12	.035	1060.805	29427.651	**
Oxen	7260.912	5747.663	1.26	.208	-4054.097	18575.921	
TLU	-19584.963	6367.331	-3.08	.002	-32119.868	-7050.059	***
Land holding	-58451.748	9526.513	-6.14	0	-77205.907	-39697.588	***
Farm size	16058.39	22518.478	7.37	0	121727.88	210388.89	***
Constant	-389357.38	119230.15	-3.27	.001	-624077.18	-154637.58	***
Mean dependent var		95533.333	SD dependent var			82631.392	
R-squared		0.295	Number of obs			285.000	
F-test		12.782	Prob > F			0.000	
Akaike crit. (AIC)		7181.814	Bayesian crit. (BIC)			7218.339	

*** p<.01, ** p<.05, * p<.1

4. Conclusion

The stabilization of farm income and family income is a major objective of agricultural and public policy. The purpose of this research was to examine the factors affecting the farm income to the farm and the farm family.

This study was conducted surrounding farm areas Bishoftu town. The household data was taken from CSA survey undertaken in 2020. The major objective of the study was to analyze factors that affect farm income in the household level. Two stage sampling procedure was employed and to analyze the result descriptive statistics like frequency and percentage was used. To analyze factors affecting the farm income OLS regression was used.

Based on the result 6 variables were significantly affect farmers income. This is family size, TLU (Tropical Livestock Unit), level of education, Marital status, land holding and size. The result implies to strengthen education quality, increasing productivity of land, rearing more productive animals to increase farmers income and the livelihood of the communities.

References

- [1] Urbanization and its implications for food and farming (2010) David Satterthwaite, Gordon McGranahan, Cecilia Tacoli.
- [2] World Health Organization. (2019). Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.
- [3] Welteji, D. (2018). A critical review of rural development policy of Ethiopia: access, utilization and coverage. Agriculture & Food Security, 7 (1), 1-6.
- [4] Van der Veen, A., & Otter, H. S. (2001). Land use changes in regional economic theory. *Environmental Modeling & Assessment*, 6 (2), 145-150.
- [5] Hubacek, K., & Van den Bergh, J. C. (2002). The role of land in economic theory.
- [6] Aribigbola, A. (2008). Improving urban land use planning and management in Nigeria: the case of Akure. *Cercetări practice și teoretice în managementul urban*, 3 (9), 1-14.
- [7] Tuyen, Q. T. (2014). A review on the link between nonfarm employment, land and rural livelihoods in developing countries and Vietnam. *Ekonomski horizonti*, 16 (2), 113-123.
- [8] Azadi, H., Ho, P., & Hasfiati, L. (2011). Agricultural land conversion drivers: A comparison between less developed, developing and developed countries. *Land Degradation & Development*, 22 (6), 596-604.
- [9] Andrady, A. L., Aucamp, P. J., Austin, A. T., Bais, A. F., Ballare, C. L., Bjorn, L. O.,... & Zepp, R. G. (2012). Environmental effects of ozone depletion and its interactions with climate change: progress report, 2011.
- [10] Walker, R., McKenzie, P., Liddell, C., & Morris, C. (2012). Area-based targeting of fuel poverty in Northern Ireland: *An evidenced-based approach. Applied Geography*, 34, 639-649.
- [11] Dadi, D., Azadi, H., Senbeta, F., Abebe, K., Taheri, F., & Stellmacher, T. (2016). Urban sprawl and its impacts on land use change in Central Ethiopia. *Urban Forestry & Urban Greening*, 16, 132-141.
- [12] Kedir, M. (2019). Impact of Improved Soybean (Belessa-95) Variety on Income among Smallholder Farmers in Bambasi Woreda, Benishangul Gumuz Regional State.
- [13] Melese, M. (2004). City expansion, squatter settlements and policy implications in Addis Ababa: The case of Kolfe Keranio sub-city. *Ethiopian Journal of the Social Sciences and Humanities*, 2 (2), 50-79.

- [13] Nguyen, V., Vu, D., & Philippe, L. (2011). Peasant response to agricultural land conversion and mechanisms of social differentiation in Hung Yen province, Northern Vietnam. In *7th ASAE International conference, Hanoi, Vietnam*. <http://orbi.ulg.ac.be/handle/2268/100469> (accessed on 15/11/2013).
- [14] Pribadi, D. O., & Pauleit, S. (2015). The dynamics of peri-urban agriculture during rapid urbanization of Jabodetabek Metropolitan Area. *Land use policy*, 48, 13-24.
- [15] Fenta, A. A., Yasuda, H., Haregeweyn, N., Belay, A. S., Hadush, Z., Gebremedhin, M. A., & 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.
- [16] 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), 1427.