

# Probit Analysis of Attitudes of Surrounding Farming Communities Towards Urban Expansion: Bishoftu Town, East Shewa Zone, Oromia Regional State

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## Abstract:

The general objective of the study was; to investigate the attitudes of surrounding farming community towards urban expansion and to assess whether they would accept this form of expansion close to their farming land in Bishoftu town. 303 farmers around bishoftu town was interviewed using systematic random sampling method. Yeman's formula was used to get the appropriate sample. To analyse the data descriptive and econometric method were used. From descriptive percentage and frequency, was employed and probit econometric model was used to analyse determinant factors which affect the perception for urbanization as opportunity or treat. From these six variables where significantly affected the perception of the farmers at different significant level. This are age, level of education housing type, total agricultural produce income, religion, ethnicity and land holding. From this research result it is recommended to provide training for farmers about the importance of urbanization. We must give due attention in the process of urbanization for not affecting the major farm land. And the government of Ethiopia should focus on non-farmable areas in the process of urbanization and urban expansion.

**Keyword:** Bishoftu, Farmer, Perception Probit, Urbanization

**DOI:** 10.7176/DCS/9-1-01

**Publication date:** March 31<sup>st</sup> 2024

## 1. Introduction

### 1.1. Background of the Study

Landowners play a key role in LUCC, triggered by various drivers [12]. In peri-urban contexts, the three main actors play a prominent role in a complex process: 1) Investors or developers waiting to take advantage of urban development to achieve the highest profit margin. They rely on population growth, housing demand, and spatial planning strategies [13, 14], 2) Farmers who are affected by urban development and intend to capitalize on their investment [13, 15], or farmers who own property for reasons of amenities [16] and; 3) and more broadly, land use planners [17]. Farmers are important decision makers in land use [15].

Nowadays, urban expansion is a widespread phenomenon in the modern world in both developed and developing countries. Urbanization is a set of powerful practices that respond to changing values and perceptions of the fundamental characteristics of urban and rural areas. Urbanization is a natural process that increases from time to time in parallel with human settlement and has a detrimental effect on the agricultural population of the world in general and agriculture in urban areas in particular.

Despite this challenging food insecurity in Africa, urbanization in Africa is expected to continue unabated. Population growth necessitates the creation of informal employment opportunities for the poor, particularly in urban areas. Increasing demand for land requires effective strategies to balance competing claims to the use of limited urban space, particularly for purposes that do not have the highest and best use value. Urban and peri-urban areas are under enormous pressure due to population growth. This led to the development of new markets for land and the transformation of property rights under customary land rights into various forms of private rights. If the Landmark is allowed to allocate land resources, it will broadly bias in favor of the politically powerful, resource-rich, and for the greatest and best possible use [11].

Melese M further examined the urban expansion process, which includes both the internal reform and external expansion of the physical layout of urban areas [7]. However, such a process of urban expansion, which has occurred in the history of all urban centers, is a universal phenomenon. Thus, the loss of primary agricultural land and natural beauty is the result of the horizontal outward expansion of urban centers.

UN-Habitat, (2010:2), state that the process of urban expansion in most developing countries in the contemporary world is generally a mixed blessing, having both positive and negative impacts on farming communities. The dramatic increase in attention to poverty, displacement, food insecurity and environmental degradation in emerging urban areas is the result of urbanization, which can lead to this.

As described by Muluwork, B Uncontrolled urbanization, which has a detrimental effect on peri-urban areas'

natural environment and means of subsistence, is the outcome of urban expansion in the majority of Ethiopian cities. This has an impact on social phenomena, the economy, and how locations are organized. But these effects transcend national borders and have wide-ranging effects, especially for the nearby rural communities [8].

As described by Bhatta, B, Alemu A. and Amare G The downsizing of agricultural holdings or the complete expropriation of agricultural land from surrounding households on the outskirts of the city is the result of uninhibited urban expansion [2,1]. Johnson, R. B., & Onwuegbuzie, A. J. discuss that urban expansion in developing countries is known to have negative impacts. In Ethiopia, the main effects contributing to rapid urban expansion are higher natural population growth, rural-urban migration and also spatial urban development. Farmers surrounding urban areas are affected by this type of expansion and have negative impacts on their livelihoods, which consist of various components [4].

According to Hailu, T. Since there is no scientific understanding of the displaced farmers or the loss of their farmland, most of them engage in lower-paying and time-consuming jobs that may only meet their daily needs. Therefore, the removal of marginal urban households exacerbates poverty, destroys communities and negatively impacts people's future sustainable livelihoods [10].

Currently, Ethiopia has 12 nationally recognized regional states; each of them having its own capital. The Oromia region is one of these regional states, which is part of another regional state of Ethiopia. The town of Bishoftu (its rich historical, cultural and natural heritage as well as its socio-economic and political center) in Oromia Regional State is currently experiencing rapid urban expansion and population growth. According to the Bishoftu Municipality (2001), the town of Bishoftu was founded around 1902 as a postal center for the Ethiopia-Djibouti railway line. The city is located 47 kilometers southeast of Addis Ababa.

The first master plan for the city was drafted in 1954 and revised in 1978, 1992, and 2009. Along with Adama, Jimma, and Shashemene, it is one of the topographically pleasing and fastest-growing cities in Oromia Regional State. Urban growth affects the local farming community's livelihoods in both positive and negative ways. Numerous studies on the effects of urbanization—both inside and outside of Ethiopia—have been carried out at various points in time, but one of them neglected to consider how farming communities feel about the growth of cities and how they see it overall.

The researcher believes that the detail of these attitudes and perceptions deserves thorough investigation. Furthermore, there is a research gap in examining and reporting the existence of such attitudes and perceptions of the farming community surrounding urban areas.

## **2. Objective of the Study**

### **2.1. General Objective**

The general objective of the proposal study was: to examine the surrounding farming community's attitudes towards urban expansion and assess whether they would accept this form of expansion near their farmland: the case of Bishoftu town.

### **Specific Objective**

- 1) To assess the level of household income after urban expansion in peri-urban areas of Bishoftu city
- 2) Examining the determinants of agricultural communities' attitudes toward urban expansion

## **3. Research Methodology**

### **3.1. Description of the Study**

This research study was conducted in Oromia Regional State, East Shewa Zone, Bishoftu Town. According to the Physical and Socio-Economic Profile of Bishoftu Municipality (2021), Bishoftu town is located in East Shewa Zonal Municipality and was founded in 1917 with the introduction of the Ethio-Djibouti Railway. The area of the present city of Bishoftu and its surroundings was known as Ada'a. According to Tulama tradition, there are different views on the ethnography of the region. Existing sources suggest that Tulama, known as Handa, Ilu and Liban, were the three clans predominantly inhabiting the area. Towards the end of the 19th century there was a long conflict between the two. When the conflict between them was resolved according to traditional Oromo conflict resolution, the area that later became Ada'a was handed over to Handa.

It is located 47 km southeast of Addis Ababa, the capital of the country of Ethiopia, and 52 km from Adama. The city lies between the towns of Dukem and Mojo. It lies between 80451-80471 north latitude and 380561-390 east longitude. To the north the city borders Yerer Silassie, to the south by Wedo and Keta Jara, to the east by Kaliti and to the west by the town and farmers' association Dire with a geographical area of 20,574 hectares. Kasa, L., et al state that Bishoftu is the fourth largest urban center in the Oromia region in terms of population, alongside Adama, Jimma and Shashemene [6].

The name Bishoftu comes from the Afan Oromo language called "Bishaan" which refers to "water". From the existing of volcanic crater lakes named as, Hora Arsade, Babogaya. Bishoftu, Cheleleka /seasonal/, Kilole, Kuriftu and Green lake. Despite the fact that the historical name of the town linked with the aforementioned reality, post the Italian aggression around 1947 the monarchy had given the name Debre Zeit to the town by

changing original name and ignoring the cultural heritage of the society up to the Derge regime. However, the name Bishoftu had been thriving among Oromos in the place of DebreZeit so that it renamed as former beginning from the eruption of the new revolution i.e. 1984/1985 E.C.

As for its growth from 1983 to 1994 E.C. As far as it is concerned, it was the political center of the Adea district. Beginning in 1995, the city was renamed a first-level city with a mayor, municipal manager, city council, and city cabinet members. Gradually the city had developed from a train station center into a large city. The town's municipality was founded around 1943. It has expanded its horizons to reach out to the people and provide diverse socio-economic services, including the provision of infrastructure development, affordable housing and sanitation, development of public parks, and fire and emergency services. For ease of administration in real circumstances, the city is currently divided into 14 kebeles. The city also houses major institutions such as the Grand Ethiopian Air Force, various higher institutions, agricultural research centers, galleries and the like.

Bishoftu town was selected purposively because of their geographical proximity to Addis Ababa. Bishoftu and the surrounding area is one of the attractive areas of the countries in a number of ways. The town is located in one of the country's highlands that are a fertile zone. Bishoftu and the surrounding area are known not only for its fertility but also for its beautiful scenery and topography and more attractive natural lakes. It is a rapidly growing town both in terms of population and economy, in the country for its comfortable topography and weather condition and attractive natural beauty of the Town to invest, work and settlements.

Therefore, the motive of this study was to investigate the attitudes of the farming community towards urban expansion. Currently, Bishoftu town is one of the fast-growing towns in Oromia regional state. It is one of the cities that has experienced a strong population increase over the years due to migration. According to the 2007 census, the town of Bishoftu had a population of 100,114 (CSA 2007). However, according to the 2021 physical and socio-economic profile of the city government, which is based on a household survey conducted by the city government in 2020, the city's current population is estimated to be about 234,971, of which 118,346 are men and 116,626 women, and the average growth rate is 4% per year. In urban environments, migration (rural to urban) or urban to urban plays a predominant role in changing population characteristics and reflects the urbanization rate. Much of the population growth was the result of internal migration and the expansion of various attractors.

### **3.2. Data Sources**

In this study, the researcher has collected/obtained the necessary data or information from both primary and secondary sources to investigate the attitudes of the surrounding farming community towards urbanization.

The primary data was collected from household surveys and a participatory approach that included focus group discussions, key informant interviews, and open-ended and closed-ended questionnaires. Secondary data was collected and used from relevant document review and various publications (such as books, journals, research reports and working papers, and other documents accessible on the Internet).

### **3.3. Design of the Study**

In this study to investigate the attitudes of the surrounding farming community towards urban expansion, descriptive (used to generate the necessary information) and personal interviews were also conducted. Why the researcher uses this descriptive design provides this design to describe variables based on field data and literature review and also various studies were not considered and did not examine the attitude and perceptions of the farming community towards urbanization. Therefore, the researcher used this to investigate in the study.

### **3.4. Population and Sampling Procedure**

The city of Bishoftu has expanded its horizons to reach out to the people and provide diverse socio-economic services, including the provision of infrastructure development, affordable housing and sanitation, development of public parks, and fire and rescue services. For ease of administration in real circumstances, the city is currently divided into 14 kebeles. In a special case, the five surrounding rural areas were recently placed under the city administration. The city has nine kebeles and has achieved its size by incorporating surrounding urban areas such as: B. "Lemlem Sefer", formerly called "Shibo Gibbi", expands "Gabore", "Qajima" (now divided into "Kurkura" 01 and "Kurkura" 02), "Ettebe Sefer" and "Ayer Hail". However, from here, the city's rapid urban expansion extends extremely west of the city to the southwest, all the way to "Qajima" Sefer ("Kurkura" 01 and "Kurkura" 02) and Lemlem Sefer, which is currently considered 01 Kebele.

The researcher attempted to draw a representative sample of households from these far-reaching urban expansions. On this basis, the researcher specifically selected two kebeles of the surrounding urban areas, such as Lemlem Sefer and "Qajima" Sefer ("Kurkura" 01 and "Kurkura" 02). Finally, a systematic sampling technique was used to select the households for the study area.

The sample size was determined using the statistical formula of Taro Yemani (1964) because it is easy to use and has a confidence level of 95%. To determine the sample size of all household heads, the researcher used

the following statistical formula

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

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

Where N= Total population (population size)

n=sample size

e= level of precision

l=constant value

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

### 3.5. Methods of Data Collection

Based on Kadir, A, both qualitative and quantitative approaches are chosen due to the flexibility of the problem under study. Mixed method is a technique that combines quantitative and qualitative research techniques, methods, approaches, concepts, or language in a single study [5]. Creswell, J. W points out that conducting mixed methods research is not easy. Mixed methods studies are challenging because they are expected to require more work and financial resources and take more time. A key feature of mixed method is its methodological pluralism, which often results in research that offers broader perspectives than those offered by monomethod designs. Furthermore, this approach contributes to capturing the awareness, thoughts and perspective of informants regarding the current social, cultural and economic changes in the study area. The overarching purpose and central premise of mixed methods is that using quantitative and qualitative approaches in combination can provide a better understanding of research problems and complex phenomena than either approach alone [3].

In this study, the researcher used a mixed methods research design. The quantitative approach was collected to generate data in quantitative form that can be subjected to accurate, objective and generalizable quantitative analysis in a formal and inflexible manner through the interview schedule. Furthermore, qualitative data involved the subjective assessment of attitudes, opinions and perceptions, where in such situations the researcher's insights and impressions are important in generating results. According to Polit, D., & Hungler, B., this type of research describes what exists and can help uncover new facts and meanings. On this basis, the researcher collected facts about the farming community's perceptions and attitudes towards urbanization aspects of a situation as they naturally occur. Data collection included a household survey, key informants and a focus group discussion (FGD). Survey method [9].

In survey method, the researcher was used questionnaires to obtain refined responses from the selected respondents. The content of survey focused on surrounding farming communities' attitudes and opinions on the negative and positive effects or pros and cons of urban expansions.

### 3.6. Methods of Data Analysis

*Descriptive and inferential analysis was used to analyze descriptive study*

*Econometrics analysis*

According to this study, the Probit model is essentially used to examine the surrounding farming community's attitude toward urban expansion, regardless of whether local communities view it as a threat or an opportunity. A normal probit model is best suited for analysis to assess the attitudes of agricultural communities that they perceive as threats or opportunities to urban expansion in the study area. The Probit model assumes a standard normal distribution. The probit regression model can be written as follows:

$$Pr. (y=1 | x_1, x_2, \dots, x_k) = \Phi(B_0 + B_1x_1 + B_2x_2 + \dots + B_kx_k) + U$$

$$X_i = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, e)$$

Where: U= standard normal distribution

Where: X = Effect of urban expansion on the livelihood of peri-urban communi

X1= Sex of household head (SEXHHH)

X2= Age of household head (AGEHHH)

X3= Marital status (MS)

X4= Education level of HHH

X5= professional status (PS)

X6= Experience (EXP)

X7= Family size (FS)

X8= Income (INCOME)

X9= Land holding size (LHSIZ)

X10= Households farmers perception of the urban expansion (HHFUE)

$$Pr = \beta_0 + \beta_1SEXHH + \beta_2AGEHH + \beta_3MS + \beta_4EDUCLV + \beta_5PS + \beta_6EXP + \beta_7FS + \beta_8INCOME + \beta_9LHSIZ + \beta_{10}HHFUE$$

$\beta$  is vector of parameters to be estimated,  $\beta_0$  is the intercept term; and  $\varepsilon_i$  are the disturbance term.

### Definition of Variables and Working Hypothesis

#### Dependent variable

Attitudes of farming community who's see urban expansion as opportunity: The dependent variable is of dichotomous nature representing attitudes' of farming community. It is dummy that takes value of 1 for those see as opportunity and 0 otherwise.

Attitudes of farming community who's see urban expansion as threat: The dependent variable is of dichotomous nature representing those who see as a threat. It is dummy that takes value of 1 for those see as threats and 0 otherwise.

Age of household (Age): In contrary to what is hypothesized, the age of household head has negative relationship with urban expansion effect on peri-urban community. It is a continuous variable and measured in years. Aged household heads were believed to be wise in resource use, on the other hand, young household heads have long investment horizon and it is expected to have either positive or negative effect on urban expansion.

Sex of the household (Sex): A dummy variable that takes "0" if the head is female and "1" if the head is male. No influence sign could be assigned to the variable.

Family size: The continuous variable is expressed in terms of man equivalents, or i. e. H. the presence of active labor within the family. This represents the total number of people residing in the household. The size of the household can have an impact in both directions.

Experience of the HH: This is a continuous variable measured in number of years.

Education of the household head (HEEDU): This is a continuous variable measured by the formal schooling of the household head and is expected to have a positive impact on income diversification and food security.

Professional status (PS): Agriculture-related activities carried out by farming communities are used to measure this variable.

Marital Status (MS): In the study area, household farmers who are married or single have this variable measured.

Land holding size (LHS): This is the total land area in hectares that an agricultural household owned. Land size is the other variable that showed a positive and significant association with the livelihoods of peri-urban communities due to urban expansion. In agriculture, land is one of the most important production factors. Therefore, it is expected that there is a direct relationship between land ownership and livelihood improvement.

Income (INCOME): is the continuous variable representing smallholder income in Birr. This variable was expected to have a positive impact on improving household livelihoods.

## 4. Result and discussion

### 4.1. Descriptive Statistics of Categorical variables

The proportion of male farmers (95.71%) was higher than female ones 83.83% where married. Most farmers (89.29%) were owned greter than 0.5 ha. Regarding house possessions 67.66 percent of farmers owned corrugated iron and 32.34 percent possess both types of housing.

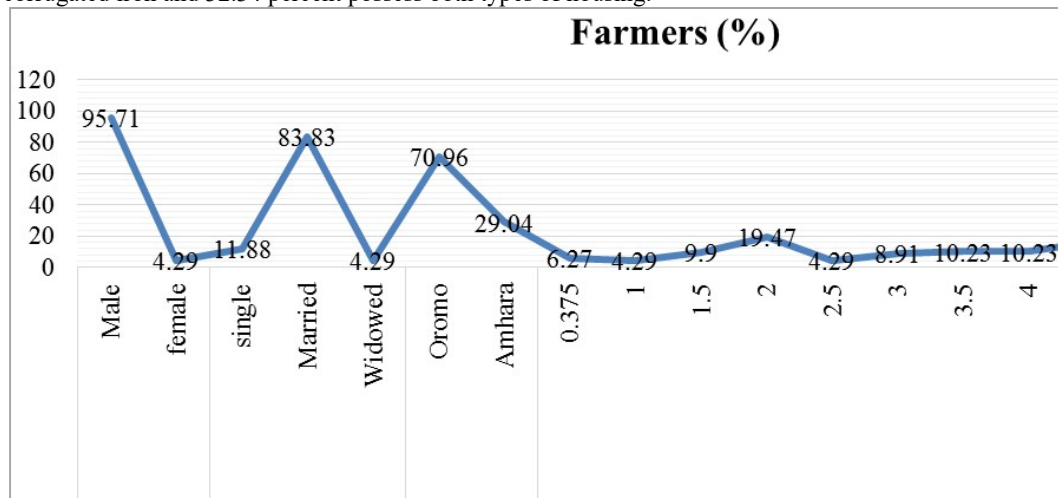


Figure 1. Descriptive study of categorical variables  
 Source Owen survey 2023

From the given continuous explanatory variables, the important variable was total income from agricultural practice which helps to decide urban expansion as opportunity or treat. The income level was ranged from 1000 to 400000 birr/year. Which indicates higher income inequality between the sample households. But most of the farmers 38% lies between 60000-80000 birr/year.

Table 1. total agricultural annual income gains from crop and tree plantation

total agricultural annual income gain from crop and tree plantation	Freq.	Percent	Cum.
10000	18	5.94	5.94
30000	13	4.29	10.23
40000	19	6.27	16.50
45000	13	4.29	20.79
50000	13	4.29	25.08
55000	18	5.94	31.02
60000	31	10.23	41.25
64000	13	4.29	45.54
65000	42	13.86	59.41
80000	31	10.23	69.64
90000	18	5.94	75.58
130000	14	4.62	80.20
140000	17	5.61	85.81
180000	13	4.29	90.10
200000	17	5.61	95.71
400000	13	4.29	100.00
Total	303	100.00	

Source Owen survey, 2023

#### 4.2. Econometric Analysis

Before running the probit model all the hypothesized explanatory variables were checked for the existence of correlation problem. The existence of outliers was also checked by box plot. The model was statistically significant at 1% level indicating the goodness of fit of the model to estimate at least one of the explanatory variables. Based on the above test, both the hypothesized continuous and dummy/categorical variables were included into the model.

A total of eight explanatory variables were included into the econometric model out of which seven variables were found to significantly influence the decision to urban expansion is opportunity or treat. These are Age of household head, level of education, house posse type, total agricultural income, Religion, Ethnicity, family size and land holding.

Age of the household head: the age of the household head was found to have a positive and significant association with the decision to take urbanization as opportunity or treat at a 1% level of significance. As the age of the household head increases by one year, the probability of the decision increased by 319%. This means the older household head family was likely to decide than the young household head family.

Education level (EDUC): The education level of the household head was found to positively and significantly influenced the probability of deciding to take urbanization as opportunity at a 1% level of significance. The household head education increases by one grade increasing the probability of decision to be urban by 10%. This implies that literate farmers are more probably to be urban than those who are illiterate. This might be due to educated farmers having relatively more information access and becoming aware of new information than illiterate farmers.

Religion of households: Based this analysis result region of the household head was negatively and significantly correlated with decision to be urban or they consider urbanization as a treat. This was significant at 1% significant level.

The other significant variable was ethnicity of the household head. This variable was significant and negatively correlated at 1% significant level. This means those farmers who are homogenous does not support urbanization. The last variable where farm size these variables also negatively correlated and significant at 5% significant level. Which implies those farmers who have higher farm size considers urbanization may take their farm land for construction of different houses and industries. Because of this reason they consider it as a treat.

Table 2. probit regression analysis

Dousuurezaxr	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
Age	3.19	.632	5.05	0	1.951 4.428	***

LoEducation	1.031	.313	3.29	.001	.417	1.645	***
Hposstype	1.109	.876	1.27	.206	-.608	2.826	
Toanuinctree	0000	000	2.84	.004	000	000	***
Religion	-.532	.146	-3.65	000	-.818	-.246	***
Ethnicity	-1.601	.410	-3.90	000	-2.406	-.797	***
Fasize	-.922	.389	-2.37	.018	-1.684	-.159	**
Landholding	-.309	.214	-1.44	.149	-.7300	.111	
Constant	-8.072	3.875	-2.08	.037	-15.667	-.476	**
Mean dependent var	0.848		SD dependent var		0.369		
Pseudo r-squared	0.502		Number of obs		303		
Chi-square	131.213		Prob > chi2		0.000		
Akaike crit. (AIC)	148.265		Bayesian crit. (BIC)		181.688		
*** $p < .01$ , ** $p < .05$ , * $p < .1$							

## 5. Conclusion and Recommendation

This research study was conducted in the Oromia Regional State, East Shewa Zone, Bishoftu town. The objective of the research was to analyse the perception of farmers for urbanization and urban expansion. 303 farmers were interviewed in primary data collection and key informant discussion and focus group discussion was also used to collect qualitative research data. Different inferential and statistical methods were used to analyse the study. Probit econometric model was used to analyse the data.

Different factors affect the farmers urbanization. From this age, level of education, housing type, total agricultural income religion ethnicity and land holding where the important variables which affect the farmers perception on urbanization.

It is recommended that providing training for farmers is very important for understanding of the benefit of urbanization without affecting their farm land. On the other hand, we must give due attention in the process of urbanization for not affecting the major farm land in the process of urbanization. And the government of Ethiopia should focus on non-farmable areas in the process of urbanization and urban expansion.

## Conflicts of Interest

The authors declare no conflicts of interest

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