

Dadi, Wakitole; Mulegeta, Messay; Simie, Negussie

Article

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*Corresponding author: Wakitole Dadi, Department of Center for rural development, College of development studies, Addis Ababa University, Addis Ababa, Ethiopia
E-mail: d.wakitole@gmail.com

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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

Urbanization and its effects on income diversification of farming households in Adama district, Ethiopia

Wakitole Dadi^{1*}, Messay Mulegeta² and Negussie Simie¹

Abstract: Urbanization remains a public policy challenge in developing countries, particularly in Sub-Saharan Africa, where fast growth rates have been observed. This study aims to investigate the effect of urbanization on the income diversification of farm households in the Adama district of the Oromia regional state. We used data collected from two groups of farm households based on their distance from the urban center. Families residing close to urban areas are categorized as treated and controlled for the remaining counterpart. The study employed both descriptive and inferential data analysis. Multinomial logistic regression analysis revealed that farming households in urban areas diversify their income to farm and unskilled non-farm activities more than rural households far away from urban centers. The research shows that increasing urbanization by one unit causes a decrease in



Wakitole Dadi

ABOUT THE AUTHORS

Wakitole Dadi is a Doctoral candidate in development studies at Addis Ababa University, Ethiopia. He holds a Master of Arts in Rural Development from Indira Gandhi National Open University New Delhi, India. He is an Assistant Professor of Economics and Development at Oromia State University. His research interest includes economics, development economics, public finance, land tenure, environmental concerns.

Messay Mulegeta (Ph.D.), is an Associate Professor of Socioeconomic Development and Food Security at Addis Ababa University. His research interest includes food security & livelihoods, migration and resettlement, development policies, land use & land cover, socioeconomic development & environment, climate-smart economic activities, disaster risk reduction, and international economic development cooperation. He published over 34 articles in domestic and international journals.

Negussie Simie (Ph.D.), in Agricultural Economics at Haramaya University, Ethiopia. He is a senior researcher & project analyst at the development Bank and Commercial Bank of Ethiopia. His research interest includes investments in agriculture, industry, and services, management of natural resources, land tenure, development studies, environmental concerns, micro- and macroeconomics, banking, and insurance. He published different articles in the area of agricultural economics.

PUBLIC INTEREST STATEMENT

Urbanization remains a public policy challenge in developing countries, particularly in Sub-Saharan Africa where the growth rate has recently been rocketing. In Ethiopia, urbanization has happened rapidly over the past three decades putting pressure on rural farm households' income diversification and their consumption expenditure near an urban area. The result of this study showed that increasing urbanization by one unit causes a decrease in farming activities by 32% and an increase in farming and non-farm activities by 24%. Because of limited experience, skill, and assets they have remunerated low earning from unskilled and income transfer, resulting in low consumption expenditure of farm households. Therefore, promoting agricultural technologies and small enterprises to improve the livelihoods of farm households near urban areas is crucial.

farming activities by 32%, and farming and non-farm activities increase by 24%. The result also indicated that households with higher age and their consumption expenditure determinant factors for more likely to diversify their income to unskilled non-farm activities. The result proved that urbanization limits farming households' capacity to generate income from agriculture and pushes them to diversify to non-farming income-generating activities. Governments should therefore design robust strategies and facilitate the provision of agricultural technologies. The regional state and small financial enterprises should also assist displaced households in expanding their income-generating activities.

Subjects: Development Studies; Rural Development; Urban Development; Economics and Development

Keywords: Income diversification; marginal effect; multinomial logistic regression; Oromia Region; urbanization

1. Introduction

Agriculture has been the economic backbone and principal activity of most rural households in Ethiopia. However, recently swift urbanization is coming with enormous ramifications for farm households in major cities of Ethiopia (Terfa et al., 2019). Different theories describe the effects of urbanization on smallholder farmers' livelihoods differently. For instance, modernization theory prominently describes the positive impact of urbanization on the livelihood of farm households as it opens a pathway through transforming traditional communities into modern society (Berliner, 1977).

On the other hand, proponents of urban bias and dependency theory claim that urbanization weakens the livelihood of smallholder farmers. Urban bias theorists critically criticize government policies that favor metropolitan areas that motivate migration from rural areas, and economic performance increases for a short period; however, after a time, the economy goes bankrupt (Lipton, 1977). So, they assert that equitable development is possible only through aiding agriculture. Similarly, dependency theorists argue that foreign investors compete for land with farm households, decreasing farmers' landholding, and migration to urban areas remains indispensable. Consequently, job opportunity decreases, and economic development emaciates (Timberlake & Kentor, 1983). This controversy shows that there is no clear and commonly agreed domain of knowledge on urbanization's impact on farm households' income diversification.

It should also be noted that urbanization is an irreversible and inherent global phenomenon in human development. Similarly to the theoretical viewpoint, there are no commonly agreed empirical strands of urbanization on peri-urban households' livelihood strategies and income diversification. It is crystal clear that urbanization incorporates peri-urban farmland and limits farming households' access to farmland and natural resource-based livelihood. As a result, farm households revise their livelihood strategies and diversify their income sources. Cali and Menon (2013) evidenced that urbanization improves rural-urban linkage through consumption linkages, remittances, upward pressure on agricultural wages, and the generation of rural non-farm employment rather than merely trespassing rural areas into urban areas.

Similarly, Alaci (2010) assured that urban expansion had an unprecedented role in transforming the economy of nations as it accounted for 50–80% of the Gross Domestic Product (GDP) of nations. It spurs the economic growth of peri-urban farmers by facilitating access to markets, education, employment opportunities, technology, and health services (Akkoyunlu 2015; Aberra & King, 2005; Ashong et al., 2004). Arouri et al. (2014) also substantiated that urbanization increases the non-farm income of rural households, especially those living close to cities. As firms are

concentrated in cities, they attract not only urban workers but also nearby rural workers. As a result, urbanization increases the wages of rural workers.

Studies conducted in Kenya and Malaysia showed that it creates decent jobs for those previously working as farmers and laborers in farming (Samat et al., 2014; Thuo, 2013). They also add that it provides a better working environment for formal work like small-scale business and construction where such activities were absent. Consequently, their income was increased, and their livelihoods were improved. Another study in Kenya showed that farmers had improved their income sources, mainly when low agricultural produce prices were (Tacoli, 2001). Besides, it helped to decrease vulnerability to seasonal drought and shocks and normalized income variation unless it varies seasonally. It benefited by renting houses to compensate for the reduction of food grains from their farmland. Accordingly, all these extensive domains of studies advocate its role in transforming and improving the national economy and the community's well-being.

Contrarily, Abdissa (2005) and Zasada (2011) stated that urban expansion shrinks green open areas, vanishes landscapes, and increases environmental degradation. Urbanization changes land use and cropping patterns, decreasing fertile agricultural land. Therefore, increasing unemployment in farm sectors causing higher prices of food, poor quality, scarcity of water, rural-urban migration, and increasing competition between agricultural and residential uses of natural resources. The reduction in farmland sizes has cumulated in a reduction in the number of farm households engaged in farming and increased their livelihood strategies and income diversification in a peripheral urban area. For instance, a study conducted in Ghana evidenced that farming communities decreased from 89.3% to 40%, whereas non-farming increased from 10.7% to 60% between 1986 and 2007 (Abass et al., 2013). Another study in Kenya also revealed that the number of farmers decreased from 90% in 1970 to 49%. The income generated from agriculture declined due to the reduced economic value of agriculture and decreased the number of households engaged in farming as full-time economic (Mandere et al., 2010).

Consequently, a study conducted in Tigray, Ethiopia, by Mezgebo (2014) and (Weldearegay et al., 2021) reveals that urban expansion diminishes the economic performance of smallholder peri-urban farmers. Another study in Addis Ababa also evidenced that regardless of compensation, dispossessed farming households have low-income-generating opportunities (Leulseged et al., 2012). Another study in Addis Ababa underscored that dislocated farmers were engaged in low-income-generating activities like selling local beverages and water (Abdissa, 2005). He adds that this economic opportunity was for survival rather than a choice of economic activity to improve and change their lives permanently.

Both theoretical and empirical reviews of the literature have long-established that in the course of rural-urban livelihood transitions, farm households might reorient their income diversification to secure their families' livelihoods in the peri-urban. The outcome of such a livelihood transition can be positive or negative. Negative livelihood adaptation likely occurs when the household shifts from relatively rewarding agricultural employment (e.g., producing cash crops) to less-paying (unskilled) non-farm employment that results in social and economic costs (Ellis, 2000; Mezgebo & Shaughnessy, 2014). Therefore, urbanization is a double-edged sword; if well managed, essential for development and can lift societies by promoting diverse urban environments. It stimulates creativity and innovation to diversify their livelihood strategies and improve their well-being. Conversely, rapid urbanization challenges livelihoods and threatens the security of life and property of farm households surrounding urban areas. It consumes more of the rural households' farmland, and transforming agricultural land into other development activities as farmland in peripheral urban areas is a potential sector where many stakeholders compete to satisfy their fundamental economic and social interests (Mohammed, Kosa, and Juhar, 2020).

Oromia region farm households are a top victim of urbanization in Ethiopia. The region is where most factories and processing plants are found, and residential areas are unprecedentedly

increasing due to their proximity to the capital city of Ethiopia. Every year—peri-urban smallholder farmers are displaced. So far, studies (Abdissa, 2005; Mengistu, 2016; Mezgebo, 2014; Terfa et al., 2019; Weldearegay et al., 2021) have been conducted in different parts of Ethiopia. However, no single cross-national study has tested the hypotheses advanced by the three theories via; the theory of modernization, dependency theory, and the rural-urban linkage; instead, they tested either of the theories. In addition, various empirical studies in different countries conducted so far did not give clear evidence of urbanization's effect on smallholder peri-urban farmers in Ethiopia. Therefore, this study in Adama town and the surrounding district was conducted in Oromia to address the effect of urbanization on income diversification among farm households close to urban areas and far away from urban areas. In addition, the study explores factors that affect the income diversification of farm households in the study area.

1.1. Literature review

Urbanization's effects on farms surrounding urban areas are examined in a comparative empirical literature review guided by theoretical principles. The study considers four theoretical perspectives: modernization, urban bias theory, dependency, rural-urban linkage, and theory related to household income diversification. Modernization proponents perceive urbanization as part of a natural and inevitable process (Berliner, 1977). The theory asserts that through this inevitable and irreversible process, traditional or agrarian society has become a modern industrialized nation and improved the way of life in society. He presents the modern methods of production like the use of advanced technology of industry under-developed countries will experience a strengthening in their economies, which will lead them to development. Accordingly, the theory prominently describes the positive impact of urbanization following the development of the urban sector on the livelihood of farm households as it opens a pathway through transforming traditional communities into modern society.

There are also empirical strands supporting the modernization theory of urbanization as sources of modernity and development both in urban and rural areas. Arguably, urbanization is an engine for development that transforms cities through knowledge innovation, contributes to rural poverty reduction, and improves rural living standards (Coulibaly & Li, 2020; Tian et al., 2016). In this case, urbanization is a means of transition from poverty to a higher level of productivity. It is a means to enhance job opportunities and a better quality of life through improved education, health care, improved infrastructure, and services (Bruin, 2021; Cali & Menon, 2013; Coulibaly & Li, 2020; Dorosh & Schmidt, 2010; Sharma, 2016; Youssef et al., 2016). Moreover, urbanization improves the movement of people from rural areas to urban and access to markets and job opportunities, hence generating higher income in the form of remittance to support their livelihoods (Cali & Menon, 2012). From all these perspectives, urbanization has positive implications for societal and national development and must therefore be encouraged.

On the other hand, urban bias theorists, first developed by Michael Lipton (1977), do not subscribe to and highly contested the notion of urbanization as a natural process and its positive implications for societal and national development. He contends that rather than a natural process, it is a product of government policies that systematically channel the most valuable national resources to urban areas. This results in “pulling” rural residents to urban areas, thereby increasing the size of these metropolitan areas (Lipton, 1977). He presented his paper by comparing the data collected from developed and developing countries to conceptualize the rural-urban disparities in developing countries. The theory he developed shifts the emphasis of urbanization from an economic perspective to a political viewpoint. He pointed out both developing and developed countries' government intervention in the market, but the way the two intervened was contradictory. In developing countries, the government intervenes in the market by imposing a tax on agriculture to subsidize urban livelihoods. At the same time, the governments of the more affluent nation were doing the reverse by intervening in ways that confer subsidies on farmers (Lipton, 1977). Thus, he ascertains that while investments in urban areas and the associated rural-to-urban migration may result in short-term economic growth, this strategy is incapable of

promoting equitable and sustainable development in the long term. Since the government policies favor urban areas at the expense of rural areas, the result cumulated higher poverty incidence and inequalities in rural farm households. To revise the challenges, this type of development is possible only through investment in agriculture.

The dependency school pioneered by Firebaugh (1979) was similarly concerned with the effect of urbanization on the availability of land and other vital resources for farmers and other rural-based entities. They contend that urbanization tends to dispossess rural dwellers of their land and consequently force them to migrate to cities. The theory indicates that developed countries use developing countries as raw materials suppliers for their factories, resulting in foreign investment in large-scale agricultural production and displacing farmers in rural areas. The displaced farmers then move to urban areas to seek employment at a lower return because of limited experience. Furthermore, dependency theorists contend that rapid urbanization, such as in sub-Saharan Africa, causes severe distortions in urban labor markets (Bradshaw & Noonan, 1997).

Contrary to modernization theory, there has been considerable empirical evidence that the urbanization process is without development (Voigtländer et al., 2008 Tsegaye, 2010). For instance, the urban physical growth rate in Ethiopian cities has been faster than the rise in infrastructure and service delivery. As a result, the rural areas surrounding cities are institutional insecurity, disorder, under-production of economic growth, and incompatibility with modernity (Coulibaly & Li, 2020; Sargeson, 2013). Thus, non-agricultural activities fail to develop at the same rate as urbanization (Coulibaly & Li, 2020). To be sure, a decrease in the rural population and a corresponding increase in the urban population are not, on their own, sufficient to cause development. Instead, they must be complemented by increased industries and other city activities (Njoh, 2003).

The rural-urban linkage developed by the central concepts of Douglass (1998) again states that rural structural changes and development are linked to urban functions and roles through a set of flows between rural and urban areas. The theory indicates the pattern of flows and their combined impacts on fostering rural and regional development both in the town and countryside (Douglass, 1998). He emphasized developing the network concept based on clustering many different settlements, each with specialization and localized hinterland relationships, rather than making a single large city into a center for a vast region. The network model of Douglass (1998) was analyzed by (Tacoli, 1998b: from Evans, 1990 and UNDP/UNCHS, 1995) using the virtuous circle model of rural-urban development. It is based on an efficient interaction of rural-urban linkages and flows, allowed by the proximity of urban markets to bring rural production to domestic and external markets. Its phases have been described as rural households earning higher incomes from producing agricultural goods for non-local markets and increasing their demand for consumer goods. This leads to the creation of non-farm jobs and employment diversification, especially in small towns near agricultural production areas. Finally, this, in turn, absorbs surplus rural labor and raises demands for agricultural produce.

During urban expansion to rural farm households surrounding urban areas, rural to urban livelihood transition is foreseeable due to the expropriation of their farmland. Hence, farm households might reorient their income sources to sustain their living in the urban and peri-urban labor market. The outcome of changes in livelihood activities might be positive or negative depending on the demand for the labor market in the area. Theoretical and empirical literature explored the rural farm households' livelihood diversity and why households adopt multiple livelihood strategies. According to Simon et al. (2004), as natural resource-based livelihoods gradually disappear, they are replaced by cash-based enterprises, forcing peri-urban farm households. Based on this, the distinction between the diversification of necessity and the diversification of choice is made (Ellis, 2000). The diversification due to necessity is a push factor of fewer opportunities in the socioeconomic situation, pushing them to move away from that endeavor. The diversification of choice is also because of pull factors that attract one to another area or activity (Thet, 2014). Therefore, income diversification to the non-farm

sector could be crucial for the farm households proximate to an urban area to replace the lost farm income due to urbanization, and the diversification should be beyond necessity.

In the course of urbanization, the result indicates that farm households in peripheral urban areas must diversify into the non-farm sector (Binswanger-mkhize et al., 2016; Mezgebo & Shaughnessy, 2014; Tassie Wegedie & Duan, 2018). Arguably, the decision to diversify to unqualified income sources of farm households near urban areas is more likely for necessity or survival than choice. Accordingly, access to rewarding non-farm activities is restricted due to experiences in farm households' area, skills, and asset ownership, which resulted in low-return activities or unskilled employment. Such entry barriers to high-return non-farm livelihood income diversification can cumulate differential livelihood outcomes during rural to urban livelihood transition (Mezgebo & Shaughnessy, 2014; Weldearegay et al., 2021).

In conclusion, urbanization is a complex and diversified process, endlessly taking place with different intensities and speeds with different effects in different countries and regions (Biłozor & Cieślak, 2021). On the other hand, a controversy shows no clear and commonly agreed domain of knowledge of urbanization's impact on farm households' income diversification. However, the theory's results underscore that urbanization is a double-edged sword as if well managed, essential for development, and can lift societies by promoting diverse urban environments that stimulate creativity and innovation. Conversely, rapid urbanization without appropriate policy responses challenges livelihoods and threatens the security of life and property of rural farm households surrounding urban areas. So, we need a well-designed government policy that integrates urban and rural areas.

2. Material and method

The land is a priceless resource for farm households in Ethiopia. In recent years urbanization has been increasing at an alarming rate in rural areas integrating peri-urban farmland into urban areas that make households landless or possess small landholdings. Both quantitative and qualitative data were employed to investigate the effect of urbanization and differences in income diversification of farm households between proximate and rural farm households in the peripheral area of Adama city. We used data collected from two groups of farm households based on their distance from the urban center of the same district and adjacent kebeles with comparable agro-climatic and socioeconomic circumstances. The average distance of households in the control group was 27 km, and that of the treatment group was 9 km.

Data were gathered mainly from primary sources using a cross-sectional design to simultaneously estimate the outcome and farm households' engagement; the study also employed descriptive statistics (chi-square test, T-test, and ANOVA) for data analysis. Multinomial logistic regression was used to analyze the determining factors that affect the income diversification of households. The data for the study was collected from four samples of rural kebeles in the Adama district, in which two were proximate to the Adama City Administration and the remaining two were nearly far from the city administration to compare their difference. Three hundred ninety-seven rural households were selected using a simple random sampling technique from the total sampled kebeles. 140, 109, 78, and 70 households from Roge, Goro, Adulala, and Boku of rural kebeles were sampled, respectively.

Multinomial logistic regression was used to analyze urbanization's effect on farm households' income diversification. The model is applicable when the outcome variable is a discrete and unordered category. Therefore, the probability of association in other categories is compared to the probability of association in the reference category. Income diversification is the dependent variable and is categorized into three via household heads' major activities: farming, farming, unskilled non-farm income, and farming and transfer income activities. Therefore, demographic, socioeconomic, and institutional factors that affect the outcome variable are defined precisely.

Let Y_i be a random variable that indicates the individual i 's choice, then the probability of choice j in the multinomial logit model is given as follows (Greene, 2003; Maddala, 1993).

$$\Pr(Y_i = j) = \frac{e^{\beta_j' X_i}}{\sum_{k=0}^n e^{\beta_k' X_i}} \quad (1)$$

Where j indexes the choice, X is a vector of individual characteristics; I index the individuals, index the independent variables, e indicate the natural base of logarithms, and β a vector of unknown parameters. The model provides a set of probabilities for the $j + 1$ choice of a decision-maker with characteristics X_i . However, the model in equation (1) above is indeterminate and needs to be normalized by assuming $\beta = 0$. The reason is that probabilities sum to 1, so only j parameter vectors are needed to determine the $j + 1$ probability. Therefore, the probabilities are:

$$\Pr(Y_i = j|X_i) = \frac{e^{\beta_j' X_i}}{1 + \sum_{k=0}^j e^{\beta_k' X_i}} \text{ for } j = 1, 2, 3 \quad (2)$$

The magnitude of the coefficient estimates of the independent variables in the multinomial choice models describes the relative probability of a choice to a base—choice. However, this gives limited information; only their signs and significance level are relevant (Kopko, 2007). On the other hand, the influence of an independent variable on the choice decision can be assessed by the size of its marginal effect. The marginal effect measures the instantaneous effect that a change in a particular explanatory variable has on the predicted probability of the dependent variable. The larger the marginal effect, the more significant the impact of an independent variable on the probability of an individual choosing an income diversification alternative in response to a change in the independent variable (Ntembe, 2009). They are differentiating (2) to determine the marginal effects of the repressors on the probabilities.

$$\delta_j = \frac{\partial P_j}{\partial X_i} = P_j \left[\beta_j - \sum_{k=0}^j P_k \beta_k \right] = P_j [\beta_j - \beta] \quad (3)$$

3. Results and discussion

3.1. Descriptive results

Table 2 shows the descriptive statistics on the sampled farmers of continuous data. It revealed that the average total family size of the households was 4.3, which is less than the national average family size of 4.6 (Ethiopia Demographic and Health Survey [EDHS], 2016). Similarly, since age was measured in years, the average years of the household heads were 45.2 years. The average total household land holding size was 1.2. Distance to the Adama city market from the household residence is a critical determinant factor in measuring urbanization effects on rural livelihoods. Hence, the average distance from a residence to the nearest urban market is 20.3 km. In this study, many independent and dependent variables was included (Tabel 1).

Distance to the urban center from average sample kebeles of household heads was essential in analyzing the difference between the two groups. To this effect, the average kebeles far from the urban center (Control) was 27 km, and that of the nearest kebele was 9 km, with their standard deviation of 5.714 and 4.065, respectively. The average annual consumption expenditure per adult equivalence of the households in the study area was 7015, with st. dev 2607.

Table 1. Dependent and independent variables used in the multinomial logistic regression

Variables	Description of variables	Expect sign
INDCV (DV)	Income diversification categorical variable	
SEX	Sex of HH head (binary) 1 = Male, 0 = Female	+
AGE	Age of HH. Head in years (Continuous)	-+
EDU	Educational Status of HH. head in the year (binary) 1 = literate 0 = illiterate,	+
FSIZE	Family size of HH in number (discrete)	+
MIRAGE	Marital status of HH head (categorical) 1 = married, 0 = Others,	+
LSIZE	Land size in hectares (continuous)	-
TLU	Tropical livestock unit in number (continuous)	+
ACCREDIT	Access to credit habit of HH head (binary) 1 = yes, 0 = no,	+
ASAVE	Access to Saving habit of HH heads (binary) 1 = yes, 0 = no,	+
MKTDIST	Distance to market in kilometers (continuous)	-
REMITTANCE	Access to remittance of HH head (binary) 1 = yes, 0 = no,	+
TREATMENT	Catagories of Kebele based on distance from urban center (binary) 1 = treated, 0 = control,	-
EXPENDITURE	Annual consumption expenditure of HH in birr (Continuous)	+

Sources: Compiled from own field survey data (2021)

Table 2. Summary statistics for continuous variables

Variables	Obs	Mean	Std. Dev.	Min	Max
Age of Households in years	397	45.2	9.9	25	71
Family Size in number	397	4.3	1.2	3	7
Land Holding Size in hectares	397	1.2	0.6	0.2	2.8
Distance to market in km	397	20.3	10.2	2	37
Annual Consumption Exp in birr	397	7015.8	2607	735.8	18,788.7

Sources: Compiled from own field survey data (2021)

The income sources of rural farming households are diversified via the farm, farm, and unskilled livelihood activities and farm and transfer payment. Farm income is the income generated from crop production, animal production, rents of farm durability, and even the by-products of crops and animals. Income sources from farm and unskilled activities include all incomes from wages earned from

Table 3. T-test distribution of consumption expenditure per adult equivalence between groups

Explanatory variable	Obs	Mean value			P-value	Mean value			p-value
		Male	Female	Combined		Control	Treated	Combined	
Annual Consumption Exp in birr	397	7000	7113	7016	0.7638	8092	5207	7016	0.000***

Sources: Compiled from own field survey data (2021)

different businesses and other related non-farm activities in the farmer's village or neighboring urban area.

However, for quantitative analysis of households' poverty, the most common approach to measure rural household welfare in developing countries like Ethiopia is based on household consumption expenditure than income, as it can be a better indicator of lifetime welfare than income (Eyasu, 2020). He pointed out that using the consumption expenditure of households is relatively stable, and households may be more able or willing to recall what they have spent than what they earned. Hence, for this study, household consumption expenditure per adult equivalency was used to compare the welfare of the two groups. The consumption expenditure includes both food and non-food-related expenditure in the year. Food expenditures are purchased and provided from products such as cereals, vegetables, fruits, and others, whereas non-food-related expenditures via health, education, and other durable and non-durable expenditures in the year.

As shown in Table 3, the t-test distribution of the mean consumption expenditure of households was 7016 birr per year. The analysis indicates that households' mean consumption expenditure proxy to urban areas is 5,207 birrs and lower than that of families in distant areas by 8,092 birrs. The result indicates that urbanization not only changes livelihood strategies and income diversification activities but also affects the income and overall welfare of farm households near the urban area in the study sites.

3.1.1. Chi-square test results

The basis of the classification depends on the effective livelihood strategies of households. Accordingly, the primary income for most of the households at the district level comes from farming, followed by farm and unskilled non-farm income activities (Table 4). Like other parts of Ethiopia, it is clear that the farm households in this district predominantly engaged in farm activities to sustain food and non-food necessities. The reason is low marketable skills to compete in fewer non-farm activities requiring a skilled workforce. Both female and male-headed farm households' livelihood depends on subsistence agriculture. Besides, many female and male farm households are engaged in unskilled non-farm income-generating activities. Though the quantities of farm households are low, farm households still generate income from a combination of farm and transfer income activities. In general, no statistically significant association was found between the sex of farm households and income diversification activities in the study area.

Since peri-urban smallholder farmers mainly depend on agriculture, the result showed a similar output. More than 80% of the control groups who are apart from the urban areas sustain their livelihood from agriculture. While most treated groups are close to urban settings, their livelihood is mainly driven by farm and unskilled income-generating activities. However, a few controlled and treated households are getting income from farm and transfer income activities. The overall chi-square test result showed a significant statistical correlation in income diversification at $p < 0.01$ between the control and treated groups.

Table 4. Percentage distribution of household income diversification by sex and treatment

Livelihood diversification	Sex			P-value	Treatment			P-value
	Female	Male	Total		Control	treated	Total	
Farm activities	32 (13.1%)	212 (86.9%)	244 (100%)	0.218	202 (82.8%)	42 (17.2%)	244 (100%)	0.000***
Farm & unskilled activities	21 (18.3%)	94 (87.6%)	107 (100%)		35 (30.4%)	80 (69.6%)	115 (100%)	
Farm & transfer activities	3(7.9%)	35 (92.11%)	38 (100%)		12 (31.6%)	26 (68.4%)	38 (100%)	
Total			397 (100%)		249 (100%)	148 (100%)	397 (100%)	

*** indicates a 1% significant level.

Source: Compiled from own field survey data (2021)

3.2. Determinants of income diversification of farm households

3.2.1. Econometric results of income diversification

Initially, multicollinearity and heteroscedasticity tests were conducted. The result showed that there is no multicollinearity and heteroscedasticity problem. Moreover, the overall model is statistically significant at $P < 0.01$. Therefore, the model is robust. Income diversification increases smallholder farmers' agricultural productivity and production by investing in agricultural technologies. However, in most agrarian countries, income diversification is a coping strategy where poor farmers are forced to migrate in search of wages to compensate for crop wilt (Samson et al., 2010). Table 5, the multinomial logistic regression result shows that the household head's age increases the likelihood of households participating in farm and unskilled income activities relative to the farm activities. The result implies that household of higher ages more strongly participates in farm and unskilled income activities than participating in the farm only farm and transfer income activities as means of income sources. The result might be the continuous shrinking of farmland size resulting from urbanization, forcing older people to participate in lower-wage activities like local brewing and petty trading and renting their land. The result agreed with (Adem et al., 2018). He evidenced that older people are less productive in farming because farm activities are labor-intensive. Perversely this finding contradicts (Demissie & Belaine, 2013; Mezgebo, 2014). They stated that employers prefer younger workers over older workers regarding non-farm activities. Thus, older households engage in farming activities. Hence, younger households rely on non/off-farm employment to support their livelihoods, while the older ones concentrate on farming instead of non/off-farm activities.

Surprisingly, farm households being close and away from urban settings significantly impact choosing income diversification. Compared to the base outcome variable, treated groups are likelier to engage in farm, unskilled, and transfer income activities. Therefore, households close to urban settings are more likely to engage in farm and unskilled income and farm and transfer income activities than diversifying their income into only farm income activities. Since the treated group are close to urban centers, the probability of access to non-farm activities is better than their counterpart control group. Hence, urbanization increases households' income by diversifying their livelihood activities from farm to non-farm to increase their income and consumption expenditure (Cali & Menon, 2013; Youssef et al., 2016). In addition, this finding is in line with (Etea et al., 2019). They stated that peri-urban households diversify their income strategies more than households in rural areas.

Consumption expenditure has significant effects on farm households to income diversification. The result shows that household consumption expenditure is higher among households whose livelihood strategies depends on the farm and transfer income activities compared to the base

outcome of farm activities. Therefore, households near urban areas diversify their income activities from farm to farm and transfer income activities to increase their annual consumption expenditure than employed in farm income activities only. The result is in line with (Kokeb & Molla, 2014). They found that remittance and other transfer income substantially reduce the level, depth, and severity of poverty among remittance-recipient households.

3.2.2. Result of marginal effects of multinomial logistic regression estimation

The marginal effect measures outcome variables or dependent variables, which we will analyze the relationship with independent variables. Age of household is an essential demographic characteristic that can affect positively or negatively household income diversification. A unit increase in the age of the household head decreases the probability of households' income diversification to farming by 0.5 percent. It -increases the likelihood of households' income diversification to farming and unskilled income activities by 0.4 percent, keeping other variables constant. This is because farming is labor-intensive and demands more young labor to manage agronomic practices and livestock rearing whereas unskilled non-farm activities can be easily managed by elders. This result is in line with (Ibrahim et al., 2010). They evidenced that larger households with older household members are less effective in farm activities and access to other income-generating activities.

Table 5. The multinomial logistic regression estimation result

Multinomial logistic regression	Number of obs = 397			
	LR chi2(26) = 139.21			
	Prob > chi2 = 0.0000			
Log-likelihood = -280.8116	Pseudo R2 = 0.1986			
Farm activities	(Base outcome)			
Variables	Farming and Unskilled income activities		Farming and Transfer income activities	
	RR.	Std. err	RR.	Std. err
SEX of HH. head	0.834	0.348	2.301	1.816
AGE of HH. head	1.034**	0.016	1.033	0.024
EDU of HH. head	1.231	0.385	1.345	0.592
FSIZE HH. of head	0.867	0.138	1.228	0.267
LSIZE HH. f head	0.670	0.459	0.786	0.795
MRAGE HH. of head	0.637	0.345	0.472	0.394
TLU	0.901	0.074	0.911	0.121
CREDIT of HH head	0.767	0.349	1.271	1.040
ASAVE of HH head	1.173	0.375	1.761	0.816
MKTDISTANCE	0.993	0.032	0.957	0.048
REMITANCE of HH head	0.679	0.293	1.742	1.244
TREATMENT	7.111***	4.66	8.207**	8.102
EXPENDITURE of HH head	1.000	0.000	1.000**	0.000
_cons	0.348	0.579	0.001***	0.003

***, **, and * indicates $P < 0.01$, $P < 0.05$, and $P < 0.1$ significant level, respectively.

Source: Compiled from own field survey data (2021)

Table 6. Marginal multinomial logistic regression estimation

Variables	Farming activities		Farming & unskilled income activities		Farming & transfer income activities	
	Dy/dx	Std. Err.	Dy/dx	Std. Err.	Dy/dx	Std. Err.
SEX of HH.	−0.0112	0.0676	−0.0620	0.0658	0.0732	0.0603
AGE of HH.	−0.0055**	0.0024	0.0042*	0.0024	0.0013	0.0017
EDU HH	−0.0376	0.0478	0.0222	0.0474	0.0154	0.0326
FSIZE HH.	0.0093	0.0242	−0.0311	0.0237	0.0218	0.0159
LSIZE HH	0.0591	0.1040	−0.0556	0.1063	−0.0036	0.0766
MRAGEHH.	0.0860	0.0843	−0.0441	0.0826	−0.0419	0.0622
TLU HH.	0.0166	0.0125	−0.0133	0.0133	−0.0034	0.0103
ACREDIT HH.	0.0232	0.0721	−0.0525	0.0726	0.0294	0.0628
ASAVE HH.	−0.0425	0.0486	0.0038	0.0491	0.0387	0.0349
MKTDISTAN HH	0.0027	0.0049	0.0005	0.0052	−0.0032	0.0039
REMITTANCE HH.	0.0253	0.0694	−0.0844	0.0639	0.0591	0.0523
TREATMENT	−0.3269***	0.0936	0.2365**	0.1005	0.0905	0.0747
EXPENDITURE	−0.0001*	0.0001	1.74e-01	0.0001	0.0001**	8.06e-1

***, **, and * indicates $P < 0.01$, $P < 0.05$, and $P < 0.1$ significant level, respectively.

Source: Compiled from own field survey data (2021)

The marginal multinomial logistic regression estimation (Table 6) showed that a unit increase in the number of households in the treated group decreased the probability of households diversifying their income to farm activities by 32 percent, keeping other factors constant. Households in the treated group are close to urban settings, so owing to urbanization, the government takes part of their farming land for development purposes, and the farming community remains with a small landholding. This limits farming households from generating income from farm activities. Instead, they diversify their income sources to non-farm activities. Contrarily, a unit increase in the number of under-treated households increased the likelihood of households being in the category of farm and unskilled income activities by 24 percent, holding other variables constant. This result agreed with (Lay et al., 2008). They explained that decreasing landholding of farming households is the main driving force behind to rising of non-farm activities in Sub-Saharan Africa.

The marginal multinomial logistic regression shows urbanization decreased household annual consumption expenditure by 0.002 percent, keeping other variables constant. Rural subsistence farmers' consumption and production patterns change due to urban expansion. Having limited farmland due to urbanization decreases the farming activities of households and affects their annual consumption expenditures. Families diversify their income-generating activities from farming to non-farming activities because of the decreasing annual consumption expenditure. Thus, a unit decrease in annual consumption expenditure of households near urban areas increased their income diversification to farming and transfer income activities by 0.002 percent, holding other factors constant. Households near urban areas are declining in their full-time farming activities due to rapidly shrinking farmland for built-up and other development purposes. The process is fueled by rural-urban migration associated with remittance flows back to the rural place of origin based on their earnings (Cali & Menon, 2013). However, diversifying into low-productivity and low-return non-farm activities. The result agreed with (Mandere et al., 2010). As farmland declined in peri-urban areas, households engaged in low-income productive activities.

4. Conclusion and recommendation

The study examined the effect of urbanization on income diversification of farming households' decisions near urban areas. The study result shows that urbanization has a statistically significant effect on the income diversification decision of farming households. The finding proved that farming households near urban areas diversify their income to farming and unskilled non-farm activities more than households far from urban centers. The result also indicated that households with higher age, consumption expenditure, and living close to urban areas were more likely to diversify their income to farming and unskilled non-farm activities, farm and transfer income activities than participating only in farming. However, their diversification to non-farm activities adversely affects their income, shifting from relatively rewarding farm activities and better income to less-paying unskilled non-farm activities. Therefore, the result of the study disproves modernization theories, where households proximate to urban areas are better off than those far from urban centers. Conversely, the result converges with dependency theory as displaced labor from farming due to urbanization migrates to urban areas to participate in unskilled and low-paying activities. Therefore, the government should design deliverable strategies to improve the livelihood of farming households near urban areas. The strategies should strengthen urban agriculture and facilitate mechanisms to enable farmers to get agricultural technologies that increase agricultural productivity. Moreover, micro and small enterprises should work hand in hand with the farmers who lost part of their farmland for development purposes to create job opportunities. Lastly, the Oromia Regional State should apply additional efforts to create a favorable working environment for displaced households to generate income from non-farm activities.

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Author details

Wakitole Dadi¹
 E-mail: d.wakitole@gmail.com
 Messay Mulegeta²
 Negussie Simie¹

¹ Department of Center for rural development, College of development studies, Addis Ababa University, Addis Ababa, Ethiopia.

² Center for Food Security, College of Development Studies, Addis Ababa University, Addis Ababa, Ethiopia.

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Author Contributions

Conceptualization, WD and MM; methodology, WD, M. M., and NS; formal analysis, WD; investigation, NS; resources, WD; writing—original draft preparation, WD; writing—review and editing, WD; visualization, NS; supervision, MM, and NS. All authors have read and agreed to the published version of the manuscript.

Data availability statement

The data presented in this study are available on request from the author.

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Appendix

Figure A1. Multicollinearity test.

Variable	VIF	1/VIF
MKTDIS	6.01	0.166388
Kebele_s	5.24	0.190912
LSIZE	2.51	0.398405
TLU	1.83	0.546236
AGE	1.66	0.601482
Annual_i_01	1.44	0.693501
SEX	1.42	0.706258
MARAGE	1.36	0.737663
Saving	1.35	0.740530
EDU	1.30	0.769050
Acredit	1.23	0.809955
FSIZE	1.23	0.813587
NFarmA	1.18	0.851003
Remittance	1.04	0.962815
Mean VIF	2.06	



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