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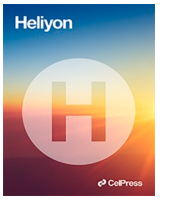

Impact of urbanization on the welfare of farm households: Evidence from Adama Rural District in Oromia regional state, Ethiopia

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ABSTRACT

Urbanization is a widespread phenomenon with varying causes, patterns, and effects across countries. However, existing studies have overlooked the specific impact of urbanization on households near urban areas by failing to compare them with households in more distant regions. This study examines the impact of urbanization on rural household welfare in the Adama Rural District of the Oromia Region, Ethiopia. A multi-stage sampling technique was employed, selecting a sample of 397 households from two distinct categories. Of these households, 148 were located near the urban center, while 249 were far away. The study utilized descriptive and inferential data analysis methods and employed the propensity score matching technique to investigate the impact on farm households. Data was collected through questionnaires to gather cross-sectional information, supplemented by qualitative insights from Key Informant Interviews. The findings revealed that households near urban areas had a significantly lower mean annual consumer expenditure of 5207 ETB compared to 8092 ETB spent by families in distant areas. The results from propensity score matching further indicated that households near urban centers experienced lower annual consumption expenditures than those located further away. These results highlight the influence of urbanization on the welfare of rural farming households near urban areas. To address the negative effects of urbanization on these households, city administrations, and regional governments need to prioritize the development and implementation of alternative livelihood support strategies. Additionally, the study emphasizes the necessity of implementing policies that mitigate farmland loss while considering the socioeconomic factors impacting farmers in the region.

1. Introduction

The world has witnessed an unprecedented trend of urbanization, with developing countries experiencing the highest growth rates [1,2]. The world's population is expected to experience significant changes within the next thirty years, with 60–70 % of its [3–5] habitants living in urban areas [3–6]. In Ethiopia, urbanization is rapidly increasing and transforming fertile agricultural land owned by smallholder farmers [7–10]. This increases pressure on farm production and competition for fertile land for development and profoundly impacts peri-urban farmland and farmers' livelihoods [11,12]. Agriculture is a crucial sector in Ethiopia, employing 79 %

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of the population and contributing 34.1 % to the country's GDP, accounting for 34.1 % of foreign currency earnings [13,14]. Smallholder farmers, who utilize 90 % of the land for food production, are responsible for producing 85 % of all crops, as reported by the [15,16]. Inadequate investment in Sub-Saharan Africa has resulted in low industries with extra obligations originating from the rural sector [17].

Contrarily, studies evidenced that urbanization positively affects the welfare of households [1,18,19]. Urbanization enhances the transition from agriculture to more lucrative industrial and non-farm jobs and boosts rural households' consumption expenditures by increasing investments in farming technologies and creating market opportunities for agricultural products [14,15,20,21]. It paves the way for market linkage through increasing demand for high-value farming products and non-farm employment, earning higher income to support rural livelihood [22]. Studies show that urbanization positively correlates with higher per-capita income [23–25] and motivates farmers to modify their agricultural production parallel to urban growth to earn a higher return [22,26,27]. It fosters a favorable environment for non-farm income, total income, and consumption expenditures of rural households [28,29]. Innovation in social media and internet use provides peri-urban farmers with access to information, market opportunities, networking, capacity building, and financial services [30–33]. These benefits empower farmers to overcome the adverse effects of urbanization on their livelihoods. By leveraging these digital tools, peri-urban farmers can optimize their farming practices, connect directly with consumers, collaborate with peers, enhance their skills, and access financial resources, ultimately ensuring sustainable and resilient livelihoods [34].

Contradictory viewpoints exist concerning the impact of urbanization on farm households, with some asserting positive effects while others highlight negative consequences [35,36]. The significant negative impact of urbanization on peri-urban farmers is the reduction in landholding farming [37,38]. As cities expand, agricultural land in peri-urban areas is often converted for non-agricultural purposes such as residential or commercial development [39–41].

In developing countries, urbanization reduces the amount of land accessible for agricultural purposes, constraining farmers' capacity to engage in crop cultivation or livestock rearing and environmental degradation, decreases available incomes and labour productivity, and brings negative motivation for agriculture [42,43]. Studies in the Philippines revealed that urbanization converts agricultural land into residential or commercial purposes that, in turn, affects farmers' income sources, displaces their livelihoods, and decreases their economic status [44]. The sewerage and polluted water flow from urban areas affect food production and nutritional quality, influencing farm households' consumption behavior [3–6]. The interactions between tourism, urbanization, and natural resource exploitation significantly impact the environmental sustainability and welfare of households on the outskirts of urban areas [45].

Studies have shown that urbanization has decreased the asset valuation of the surrounding residences and the loss of agricultural land [46–48]. Urban villages negatively influence the value of neighboring assets, such as flats; however, the impact was most significant on residential units that were closer to these villages than on those that were farther away compared to other homes located far away. The result reveals that the neighborhood of urban villages harmed a home's selling value, indicating the adverse effects of urbanization on the surrounding residences.

In Ethiopia, land is a public resource, and the government appropriates land for speculation purposes with possible financial compensation, compromising land discourse for farming and resulting in a differential impact on the welfare of subsistence farmers [49,50]. As a result, farm households close to urban areas are less likely to move out of poverty than farm households apart from urban areas [51–53]. Urban expansion negatively affects the consumption expenditure of dispossessed farm households and asset ownership [54–56]. A multidimensional poverty index analysis of poverty in Tigray highlighted that urban development positively affects the poverty of smallholder peri-urban farmers [57].

Ethiopian rural farmers face significant challenges due to urbanization and the decline in their yield, which is linked to agricultural land loss [7,57–59]. As urban areas continue to expand, it significantly impacts peri-urban farmers. They have been facing a substantial decrease in available land for cultivation, and in some cases, they have lost their land altogether. The process has made farmers more vulnerable than ever [7]. The land cultivated by Ethiopian smallholder farmers accounts for 95 % of the total area under agricultural use, and the farmers are responsible for more than 90 % of the farm output [60–62].

Urbanization has had a significant impact on rural farm households in Ethiopia. This multidimensional impact includes challenges related to land availability, poverty dynamics, consumption patterns, and environmental sustainability. While many studies have been conducted on this topic, there is still a need for more studies in the Oromia region to explore the relationship between urbanization and rural farm households. There is also a lack of investigation into the impact of urbanization on the welfare of rural households in rural areas and towns within Oromia. Thus, the study aims to examine the effects of urbanization on rural farm households in Oromia, Ethiopia, based on their distance from the urban center.

2. Review of literature

Urban expansion and its effects on rural farm households near urban areas have been the subject of various theoretical explanations. There are theoretical viewpoints that explain urbanization and its effects on rural farm livelihoods. However, this process is complex and diverse, occurring with varying intensities and impacts in different countries [63]. This study builds upon [64] theoretical foundation, which proposed three theories to explain urban expansion. The first theory, known as population growth theory, suggests that an increase in the urban population through natural growth or rural-to-urban migration leads to the outward expansion of cities, encroaching upon surrounding areas [65–68]. The second theory, economic growth theory, highlights that expanding the income base, including per capita income and employment rates, creates a demand for new housing and infrastructure amenities [69–71]. As economic growth advances, it frequently leads to the displacement of farmers from their land due to establishing new industries on the

outskirts of urban areas [72,73].

The third theory focuses on government development policies, particularly the implementation of restrictive land policies to facilitate urban development [74–76]. The policy poses a significant threat to agricultural communities' livelihoods in developing countries' urban fringes [77,78]. The development policy perspective suggests that variations in the regulation of development and land use strategies can have significant economic and social implications for farm households near urban areas [79]. The differences in the policies may hinder agricultural communities' economic and social well-being [64]. In addition, the absence of proper planning policies and the failure to enforce existing policies contribute to uncontrolled urban expansion, disrupting established zoning structures for residential, commercial, industrial, institutional, and other land uses [80,81]. The practices cause a significant threat to agricultural communities' livelihoods in developing countries in urban peripheral areas [82,83].

The study also considers [53] the Impoverishment Risks and Reconstruction (IRR) Model) as its theoretical framework. The model outlines eight key factors that can result from displacement caused by development projects [84–86]: landlessness, joblessness, homelessness, marginalization, food insecurity, increased mobility, education loss, loss of access to common property resources, and social disintegration. Although development projects are seen favorably in the comprehensive development paradigm, they have destroyed the environment, uprooted and impoverished people who depended on the land, and fostered social and economic inequality that serves the interests of a small elite [87–89]. The central concern of this theoretical model is that forced displacement for development projects disproportionately marginalizes and impoverishes individuals already in vulnerable situations. Under pressure, they are obliged to surrender their valuable possessions, sources of income, and overall means of sustaining their livelihoods [53]. Furthermore, the land is the foundation of people's productive systems in agricultural societies [90–92]. Without sufficient replacement through stable income-generating employment opportunities, confiscating these assets will result in impoverishment and interconnected social, political, and economic disruptions and infringements [53,93,94].

Empirical strands support the urbanization impact on rural farm households' welfare near urban areas in developing countries, with the impact extending beyond the absolute quantity of land involved, significantly affecting agricultural production and food security [95]. Arguably, urbanization in Sub-Saharan countries needs to be supplemented with appropriate and adequate investment in infrastructure and industrialization to utilize the already evicted productive labour from the displaced rural farming households [17]. Notably, urbanization not only occupies vast spatial areas of farmland but also exerts economic pressures that diminish agricultural production, ultimately leading to the marginalization of farmland and posing significant threats to food security [7,96]. The areas surrounding urban areas, known for their fertile and productive agricultural land, are increasingly susceptible to swift conversion into urban areas. This rapid transformation, in turn, results in farmers losing their vital assets for livelihood [97]. Consequently, numerous local farmers lose land rights [98].

Empirical literature ascertains that urbanization significantly affects the well-being of rural farm households residing near urban areas in developing countries [37,99,100]. Urbanization not only encroaches upon extensive farmland but also exerts economic pressures that diminish agricultural production, thereby marginalizing farmland and posing substantial threats to food security [101–103]. The fertile and productive agricultural land surrounding urban regions is increasingly susceptible to swift conversion into metropolitan areas, resulting in farmers losing their vital assets for sustaining their livelihoods [97,104]. The process brings numerous challenges, including the loss of income opportunities and heightened vulnerability for rural farm households near urban areas [7,9,105]. Hence, sub-Saharan countries must invest more adequately in infrastructure and industrialization to effectively utilize the labour force displaced from rural farming households due to urbanization [106–108].

Urbanization increases demand for agricultural products, resulting in the loss of agricultural land. The trend puts overwhelming pressure on rural communities to produce food for the growing urban population, contributing to food-related challenges [17]. Agricultural-based livelihoods are closely tied to land and rely on the physical environment [109–111]. However, it negatively impacts the use of farmlands in areas on the outskirts of cities, posing a threat to small-scale farmers' food and income security [112]. Study reveals that while urbanization may lead to increased landlessness among rural households and reduced farm income, it has also facilitated higher wages and non-farm incomes [54,113]. The total income and consumption expenditure of rural households tend to experience an overall increase due to urbanization [28,114,115].

Food, energy, water, and environmental security are essential to human survival and socioeconomic development [40,116]. However, the safety of these critical resources is threatened due to growing demand. Beyond the widespread implications on public health, Coronavirus disease (COVID-19) has raised additional challenges for critical resource security, particularly for urban populations, as they mainly outsource their demands from rural areas outside their physical boundaries [45,117,118]. In developing countries, where there is poor health infrastructure coupled with a low level of education and a high incidence of poverty, the pandemic would result in increased unemployment, decreased income for daily labour, increased food insecurity, depletion of saving and relief measures, and disrupted the marketing system [117].

In Ethiopia and other African countries, the pandemic significantly affected and forced households to cease their livelihood activities such as daily labor, small business trade, livestock trading, income from remittance, and labor migration [119,120]. The pandemic has resulted in crisis management challenges and international concerns related to health issues [121,122]. Different actors' cooperation, commitment, and responsible approaches are needed to correct the problems, which should guide their actions to seek common interests that can fix them [117]. Rural-urban collaboration is the mechanism of cooperation that manages these linkages to reach common goals [118]. To this effect, recently, rural-urban collaboration has been conceptualized as the mechanism of cooperation that operates these linkages to reach common goals and, hence, urban-rural relationships.

The COVID-19 pandemic caused significant economic disruption, affecting the entire population's lives, livelihoods, and well-being [119]. However, the degree and severity of its effects vary among groups and sectors. The pandemic has adversely affected Travel and tourism, a decline in the productivity and production of the services industry [117]. Besides, Social media and internet use have

enabled peri-urban farmers to access information on pandemics, market opportunities, networking, capacity building, and financial services [30–33]. Hence, households quickly adapted to the pandemic shock with the support of significant fiscal and monetary policy measures.

3. Analytical framework

The study's analytical framework in Fig. 1 below draws upon the existing literature regarding urbanization and its effects on rural farm households close to urban areas. The study area is experiencing rapid urbanization due to natural population growth, rural-to-urban migration, economic growth, government development policies, restrictive land policies, and the reclassification of rural settlements [123]. The natural population growth in both rural and urban due to improved health facilities lead to population growth, increasing the demand for resources and services in the outskirt of urban areas. Urbanization is often driven by rural-urban migration as individuals and families move from rural areas to urban centers for better economic opportunities, education, healthcare, and improved living standards. This factor contributes to the growth of the urban regions and places pressure on rural farm households near urban areas.

Economic growth tends when economic activities shift from primarily agricultural–based activities to manufacturing and more services sectors contributes to urbanization and the subsequent decrease in agricultural land near urban manufacturing and services sector increase, the demand for land for factories, warehouse, and commercial and residential area spaces increases, resulting in the conversion of agricultural into urban areas. Government policies and development initiatives often lead to the displacement of farms near urban areas. Land acquisition for urban infrastructure projects, special economic zones, or housing developments can force rural farm households to relinquish their land and livelihoods. The loss of productive agricultural land and other socioeconomic and institutional factors can result in reduced incomes and increased vulnerability to poverty in farm households near urban areas. It may also disrupt traditional farming practices and agricultural activities, reducing household income and limiting their capacity to invest in education, healthcare, and other essential needs. The process can perpetuate a cycle of poverty and inequality. Therefore, by employing this analytical framework, policymakers, researchers, and stakeholders can better understand the complex dynamics of urbanization and its consequences on rural farm households near urban areas in developing countries. This understanding can inform the design of effective policies and interventions to mitigate the negative impacts and promote sustainable and inclusive development.

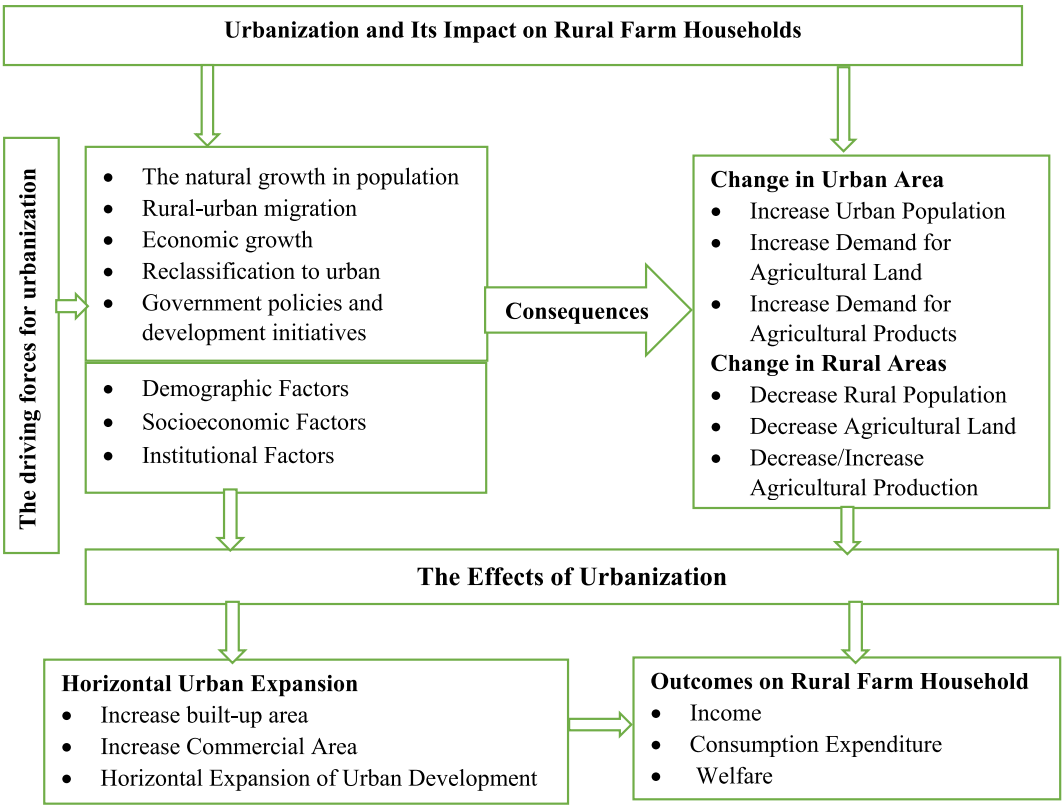

Fig. 1. Analytical Framework of the study.

4. Material and methods

4.1. Description of the study area

Adama Woreda, in the East Shewa Zone of Oromia, Ethiopia, and Adama City, the capital of Woreda, lies 100 km southeast of Addis Ababa, the nation's capital, at latitudes 8° 14′ 0″ and 8° 43′ 0″N, and 39° 6′ 0″ and 39° 25′ 0″E. Adama has a total area of 871.18 km^2. The area is situated within the Great Ethiopian Rift Valley and has an altitude range of 1415–2505 m above sea level. Adama Woreda has an average yearly rainfall of 844.20 mm and a maximum monthly average rainfall of 259.8 mm in July. June, July, August, and September get the most rain, similar to most other parts of the country. While January, October, November, and December are the dry months. The warmest month, on average, is May, while the coldest month is July [124]. Adama rural Woreda's main economic activities are subsistence agriculture and petty trade. Teff, wheat, barley, maize, and sorghum are locally grown and harvested between October and December when the weather is dry. It has 37 rural kebeles and a population of 235,986 in July 2022, of which 118,403 were males and 116,583 were females, based on Ethiopian Statistical Service (ESS) statistics.

Adama, the second most populous and fastest growing city of the Oromia Regional State, is located along the central railway leading to Djibouti. It is the largest urban center in the Oromia region and has more non-farm and off-farm employment opportunities. Adama City is situated in the Ethiopian Great Rift Valley, surrounded by towering mountains and rugged terrain, strikingly contrasting its flat surroundings.

. According to Ethiopia Statistical Services, in July 2021, the total population of Adama town was 435,222, of which males account for 212,991 (49 %) and 222,231 women (51 %). Adama town is the center of the regional government's political, business, and economic activities and the largest urban center in the Oromia region. It is the principal city where business activities are underway in the country, next to Addis Ababa. Because of this, the scale and diversity of the infrastructure and economic activities are relatively larger and broader compared to other towns in the region.

There is a higher availability of non-farm and off-farm employment opportunities. Moreover, the city has rapidly expanded into the adjacent Adama rural district. Recently, four rural kebeles have been included in the city administrative boundary by the preceding Adama structure plan via Malka Adama, Dhaka Adii, Boku Shanan, and Daabee Soloqee. Therefore, it needs to be better understood by considering urban dynamics, trends, and overall effects on the welfare of rural farm households, taking Adama City and its surrounding areas as a case study.

4.2. Research design

This study used a cross-sectional survey design to collect participant data at a specific time. The cross-sectional design offers the benefit of assessing current attitudes or practices, allowing researchers to examine multiple characteristics simultaneously and gather information within a relatively short timeframe [10]. It used a descriptive and explanatory concurrent mixed research design to analyze the data. The researchers used quantitative and qualitative data to analyze the cross-sectional study.

4.3. Sampling methods and sample size determination

Using a multi-stage sampling method, the researcher considered Adama rural district targeted kebeles near and far from the urban center. The researchers chose Adama City based on the region's significant urbanization trends and potential for new construction and business opportunities following Adama City. Compared to other regions in Oromia, the area experiences the highest degree of urban expansion, threatening fertile agricultural land crucial for crop production.

Farm households in the Adama peri-urban area comprise the study's sample and analytical unit, where agriculture is their primary income source and shares boundaries with Adama city. Therefore, two rural kebeles near the city and two rural kebeles far away from Adama town were selected using simple random sampling. The study focused on two groups of kebeles in Adama Woreda's peri-urban area, emphasizing those whose primary income source is agriculture.

Selecting kebeles representing the interaction between urban and rural dynamics was crucial, which were considered suitable as they share boundaries with Adama town. By including farm households from this peri-urban area, the study can capture the direct influence of urbanization on agricultural practices and livelihoods of homes in the area.

To ensure a thorough analysis of the impacts of urbanization on rural farm households in the peri-urban area, two rural kebeles near the town and two rural kebeles faraway were selected [47]. These distant rural areas are expected to have less pronounced effects of urbanization. The study can assess and compare the impacts of urbanization on these two distinct groups. A simple random sampling technique was used for selecting the four rural kebeles [125,126]. It ensures each kebeles within the chosen groups has an equal chance of being included in the study. This approach minimizes bias and increases the findings' generalizability to larger rural farm households near urban areas. Lastly, employing a simple random sampling technique to select the study participants from the two groups ensures that each household within the selected kebeles has an equal opportunity to be included. The technique enhances the fairness and validity of the collected and analyzed data.

The study's sample size was estimated using the [127] formula, an established methodology, considering proportional representation, confidence level, and margin of error accounting for the total population [128–130]. Accordingly, the sample size estimation of the [127] formula is reported as follows;

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

where p represents the proportion of individuals agreeing, and q is equal to 1 - p. Z represents the value of the standard variate at a specific confidence level, n indicates the desired sample size, e represents the expected margin of error, and N represents the total population.

Using [127], 333 households from 2515 households in the four sampled kebeles were selected. The formula represents a substantial portion of the population under study, enabling a comprehensive understanding of the research objectives. The study aims to capture the diversity and variability within the population by including a significant number of households, resulting in more reliable and generalizable findings. An additional 20 % of the sample size (64 household heads) was considered for a contingency measure. The technique accounts for potential non-response, dropouts, or other unforeseen factors affecting data collection.

Moreover, this additional sample size helps ensure that the desired sample size (397 rural household heads) is achieved even if there are unavoidable issues during the data collection process. This sample size allows for adequate population representation, accounts for potential contingencies and data quality, and employs multi-stage random sampling techniques to enhance the validity and representativeness of the sample. The technique contributes to the overall robustness and reliability of the study's findings.

Data was gathered from 397 farm households in the same district and neighboring rural kebeles with similar agro-climatic and socioeconomic conditions. The control group consisted of households located at an average distance of 27 km from the urban center, while the treatment group comprised households at an average distance of 9 km. Of the 397 selected household heads, 249 were from households far from the urban area, serving as the control group, while 148 were from households near the urban area.

The decision to have more control group participants than the treatment group in our impact analysis is based on several justifications. We used propensity score matching to create a balanced comparison between the treatment and control groups, and a larger control group provided greater statistical precision and reduced the variability in the estimated treatment effects. By including a larger control group, we increase the pool of potential matches for each participant in the treatment group, thereby enhancing the quality of the matching process and reducing bias [131,132]. It allows for a more robust analysis by providing a larger sample size for estimating the counterfactual outcomes. This increased precision improves the reliability and validity of the impact analysis results.

A larger control group helps ensure the findings' generalizability [133] and improves the balance of the study. Moreover, a diverse and representative control group increases the external validity of the estimated treatment effects. In summary, the decision to have a more significant number of participants in the control group compared to the treatment group in our impact analysis using propensity score matching is argued by the need for improved balance, increased statistical precision, enhanced generalizability, and a comprehensive assessment of the intervention's impact [131–133].

4.4. Data collection techniques

The study collected quantitative and qualitative data through personal interviews using a structured questionnaire. The data covered various aspects such as household heads' demographics, socioeconomic status, income, consumption expenditure, and welfare. The questionnaire was initially developed in English and later translated into Afaan Oromo. Four enumerators were recruited and trained to collect data. Before the data was collected, a pilot test was conducted with 50 households to ensure that the interviewee understood the questionnaire well. A structured questionnaire is essential to ensure that respondents' comprehension of the questions is accurate. Data on various aspects such as household heads' demographics, socioeconomic status, income, consumption expenditure, and welfare, were gathered.

Qualitative interviews were conducted with individuals outside the sampled households to complement the quantitative data and provide a vivid picture of the participants' natural life experiences. Key informants from the community were chosen based on their extensive understanding of the issue. These key informants included kebele administrative management, religious leaders, civil servants in kebeles, experts from the woreda office of Agriculture, the woreda land administrator officer, and experts from the Adama municipal. In total, 12 respondents were included in the qualitative interviews. Questions were raised during the interviews and observations with the key informants to capture firsthand data by observing the environment and community activities. Observation was not only used as a data collection tool but also helped in formulating questions to gain a better understanding of the situation being studied.

4.5. Data analysis method

Data was analyzed using various methods, including descriptive statistics, inferential statistics using econometric models, and geographic information system (GIS) and remote sensing tools. Propensity score matching models were also employed in addition to descriptive analysis. Geographic Information System (GIS) and remote sensing tools were used to extract data from the U.S. Geological Survey (USGS), Landsat Thematic Mapper (TM), Landsat Enhanced Thematic Mapper Plus (ETH+), and Operational Land Imager (OLI) datasets spanning the years 1986–2022. Qualitative data was also analyzed by transcribing, contextualizing, and triangulating it with quantitative data.

4.6. Model specification

The main objective of this study was to analyze how urbanization affects the consumption expenditure of rural households living

near urban areas compared to those living farther away. The impact was evaluated using Propensity Score Matching (PSM), which has the advantage of not making assumptions about any specific functional or distributional form in the impact estimation [134,135]. PSM helps control selection bias, reduces the dimensionality of any matching problem, and deals with observable confounding factors to produce unbiased estimates [134–136].

Propensity Score Matching (PSM) uses a continuous outcome variable, and the regression used household expenditure per adult equivalent as a dependent variable [137–139]. Households were categorized into treated and control groups depending on the distance of farm households from the urban area [57,140,141]. However, the main problem in evaluating any intervention is obtaining a good result of the counterfactual effects [142]. The author argues that if all information relevant to participation and outcome variables is observable to the researcher, the propensity score produces suitable matches to estimate the impact of an observation. The observed treatment variable, which represents the rural households nearest to an urban area (i) denoted by (Ci), can take the values of 0 or 1, where $Ci = 1$ for rural households nearest to an urban area and $Ci = 0$ for rural households far away from urban area.

The treatment status is correlated to the rural households nearest to an urban area (Ci) as follows:

$$C_i = 1 \; if \; C_i > 0, 0 \; otherwise \tag{1}$$

The development intervention issues of the study under consideration are advised to be evaluated by comparing the results that would have been seen had the program impacted households close to the urban area but had little or no impact on the households far away from the urban fringe. Following [143], let Y_{i1} denote the potential outcome for unit i if the unit receives treatment, and let Y_{i0} indicate the likely outcome for unit i in the control group. The treatment effect for observation i is defined by:

$$Ti = Y_{i1} - Y_{i0} \tag{2}$$

Where Ti denotes the treatment effect for a given household (i), the fundamental problem of evaluating an individual treatment effect arises because one can never observe both the treatment effect and the counterfactual outcome for the same household, either Y_{i1} or Y_{i0}, can be observed. Hence, Y_{i1} and Y_{i0} can never be seen concurrently (i) for the same household. The fence results in a missing data issue, the evaluation problem's crux [144]. The unobservable component in equation (2), be it Y_{i1} or Y_{i0}, is called *the* counterfactual outcome. Therefore, one has to concentrate on sample averages for the impact on a treatment group [145–147].

Measuring impact as the difference in mean outcome between all rural households near an urban area and rural households far away from the urban area may give a biased impact estimation. Therefore, since there will never be an opportunity to estimate individual treatment effects in Equation 1 directly, one has to concentrate on sample averages for the impact on a treatment group.

When the two groups are drawn from the same population, and the treatment assignment is independent of all baseline variables, the expected value of the Average treatment effect (ATT) is explained in a random program assignment. Accordingly, it is defined as the difference between expected outcome values with and without treatment for those who participated in the program [148]. It is given as follows:

$$\Delta YATT = ATT(\Delta Y / X; Z = 1) = E(y_1 - \; y_0 / , Z = 1) = E(y_1 \; / , Z = 1) - E\left(\frac{y_0}{, Z} = 1\right) = \ldots 1\Big) \ldots \ldots\Big) \tag{3}$$

YATT denotes that rural farm households are more likely to diversify their livelihood strategies and well-being if they live near urban areas. Z – is an indicator variable showing whether a rural household (i) received treatment or not (i.e. $(Zi$ being equal to 1 if the household is near an urban area and 0 otherwise): X – Denotes a vector of the control variable.

Data on program beneficiaries identify the mean outcome in the treated state $(Y_1 \; /X, Z = 1)$. The mean outcome in the untreated state $E(Y_0 \; /X, Z = 1)$ is not observed, so a proper substitute must be chosen to estimate ATT.

Since the assignment of the households to the nearby urban area and far away from an urban area is not random (i.e., due to household self–selection to a nearby urban area), the estimation of the effect of urbanization using equation (3) may be biased due to the existence of confounding factors. In non-experimental research like this, estimating the mean impact of treatment on the treated by computing the difference between mean values of the outcome variable for the treatment and control groups gives rise to a biased estimation of treatment impact. An impact evaluation uses a suitable non-experimental method in a setting like this [149]. Using PSM to reduce the bias in the treatment effect estimation with observational data set proposed. PSM, therefore, is the most appealing approach to estimate the impact of urbanization on diversifying livelihood strategies and income/expenditure of rural households using distance as a measure of the indicator.

4.7. Selection of covariates/variables

There are recommendations for including or excluding covariates in the propensity score matching [150]. have suggested that only variables that simultaneously influence the treatment status and outcome variables should be included in the propensity score matching. Given that unconfoundedness requires the outcome variable to be independent of treatment conditional on the propensity score, only variables not affected by treatment should be included in the model. Variables should be fixed over time or measured before participation to confirm this fact.

4.8. Estimation of propensity score

While the propensity scores are unknown, the assignment mechanism is non-random; an essential first step is to estimate them as

far as the primary objective is to obtain the estimate of the propensity score. This study uses the probit model to compute the propensity score for rural households near the urban area and the other found at a far distance rather than on the estimates of the accurate propensity score as accurately as possible. Each observation (household unit i) in the data will have a propensity score variable between 0 and 1. The probit model on the selected covariates will estimate the propensity score of rural households near urban areas. Hence, the propensity score will be calculated using the formula given;

$$P(Zi) = Prob\left(Ci = \frac{1}{Zi}\right) \tag{4}$$

where P (Zi) is the propensity score of households, Ci and i represent the status of the household (ci = 1 for households near urban areas and Ci = 0 for households far away from urban influences). Z is the covariates included in the model, and i is the number of households in the sample.

Therefore, the propensity score, $P(Zi)$, will be estimated by the probit model, representing rural households near urban areas (1 = yes and 0 = No) on the selected covariates.

4.9. Matching estimator (algorithm)

Several matching techniques have been suggested in the literature to estimate the ATT. An excellent matching estimator only allows a few original observations [151]. It should yield statistically equal covariates simultaneously for households in the treatment and control groups.

Common Support Assumption: A further requirement besides independence is expected to support. It rules out the phenomenon of perfect predictability of D given X:

$$0 < \mathrm{P}(D = 1|\mathrm{X}) < 1$$

The common support assumption ensures that persons with the same X values have a positive probability of being both participants and non-participants [148].

Estimation strategies involve estimating treatment effects on the treated (ATT), urbanization's average impact on consumption expenditure for rural households near the urban area, and rural homes far from the urban area. As [152] states, the ATT is urbanization's average impact on consumption expenditure.

$$ATT = E\left\{Y_{1i}^{k} - Y_{0i}^{k}|Ci = 1\right\} = E\left[E\left\{Y_{1i}^{k} - Y_{0i}^{k}|Ci = 1, P(Zi)\right\}\right]$$

$$E\left[E\left\{Y_{1i}^{k}|Ci = 1, P(Zi)\right\} - E\left\{Y_{0i}^{k}|Ci = 0, P(Zi)\right\}|Ci = 1\right] \tag{5}$$

Where ATT is the impact of urbanization on consumption expenditure, Y_1 and Y_0 are the outcome variables of interest for the households near the urban area and the rural households far from the urban area. i denotes the number of households in the sample (n). K refers to the livelihood outcomes under study (diversifying livelihood strategies and expenditure status of the rural households.

Estimation strategies involve estimating treatment effects on the treated (ATT), urbanization's average impact on consumption expenditure for rural households near the urban area, and rural households far from the urban area.

Table 1
Temporal and annual rate of change between 1986 and 1996, 1996–2006, 2006–2016, and 2016–2022.

Major LULC Class	Area in (Sqkm)				
	Area Sqkm (1986)	Area Sqkm (1996)	Area Sqkm (2006)	Area Sqkm (2016)	Area Sqkm (2022)
Agricultural land	46.64	41.32	36.99	26.58	16.31
Bare land	0.12	2.33	0.28	0.26	0.12
Built-up area	4.52	16.36	21.67	33.75	50.22
Forest land	2.27	2.49	3.99	5.61	4.97
Grassland	6.69	7.58	3.17	3.11	1.81
Shrub and woodland	16.06	6.23	10.22	7	2.88

Major LULC Class	**Area (%)**				
	Area Sqkm (1986)	**Area Sqkm (1996)**	**Area Sqkm (2006)**	**Area Sqkm (2016)**	**Area Sqkm (2022)**
Agricultural land	61.12	54.14	48.48	34.83	21.37
Bare land	0.16	3.05	0.36	0.34	0.16
Built-up area	5.93	21.43	28.39	44.23	65.81
Forest land	2.97	3.26	5.23	7.35	6.51
Grassland	8.77	9.94	4.15	4.08	2.37
Shrub and woodland	21.05	8.17	13.39	9.17	3.77

Source: Own computed land Use land change between 1986 and 2022

5. Result and discussion

Before delving into the discussion of the findings regarding the implications of the study's impact, let us first explore the results of the Land Use Land Cover Change analysis conducted in this study.

6. LULC change for the period 1986–2022

The study examined the extent and intensity of urbanization by identifying six land use and land cover (LULC) categories from 1986 to 2022. These categories included agricultural land, built-up areas, grassland, bare land, forestland, and shrub and woodland. The authors analyzed cloud-free images from Landsat Thematic Mapper and Landsat 8. The images were acquired between December 2021 and February 2022 for the years 1986, 1996, 2006, 2016, and 2022. Accuracy assessments were conducted for each classified image, yielding Kappa coefficients of 0.8858, 0.8949, 0.8802, 0.8745, and 0.9112 for 1986, 1996, 2006, 2016, and 2022, respectively.

Throughout the study period, there were notable transformations in the spatial pattern, composition, and extent of land use and land cover (LULC). Table 1 provides an overview of the transitions observed among the different LULC categories for each year examined. Between 1986 and 2022, the built-up area in Adama City increased, while agricultural land experienced a decline. The gains in built-up areas and the losses in agricultural land were significant changes during this period. Farmland and built-up areas were the prominent land use and land cover types depicted in the maps throughout the relevant period. In proportion, farmland and built-up areas constituted the largest share of land use and land cover across all categories. Specifically, agricultural land accounted for 1631 ha (21.37 %) of the total area of Adama City, while built-up areas covered 5022 ha (65.81 %). Forestland, bare land, grassland, and shrub and woodland comprised 497 ha (6.51 %), 12 ha (0.16 %), 181 ha (2.37 %), and 288 ha (3.77 %), respectively. Agricultural land and built-up areas constituted the largest share of land use and cover across all categories, highlighting a significant extent of urban development. The expansion of residential and other infrastructures and the occupation of public lands by settlers may have contributed to the increase in built-up areas [153].

Adama City has experienced rapid urbanization for over three decades, as depicted in Fig. 2. The significant urban development in Adama occurred primarily between 1986 and 1996, followed by another considerable period from 1996 to 2006. However, since 2006,

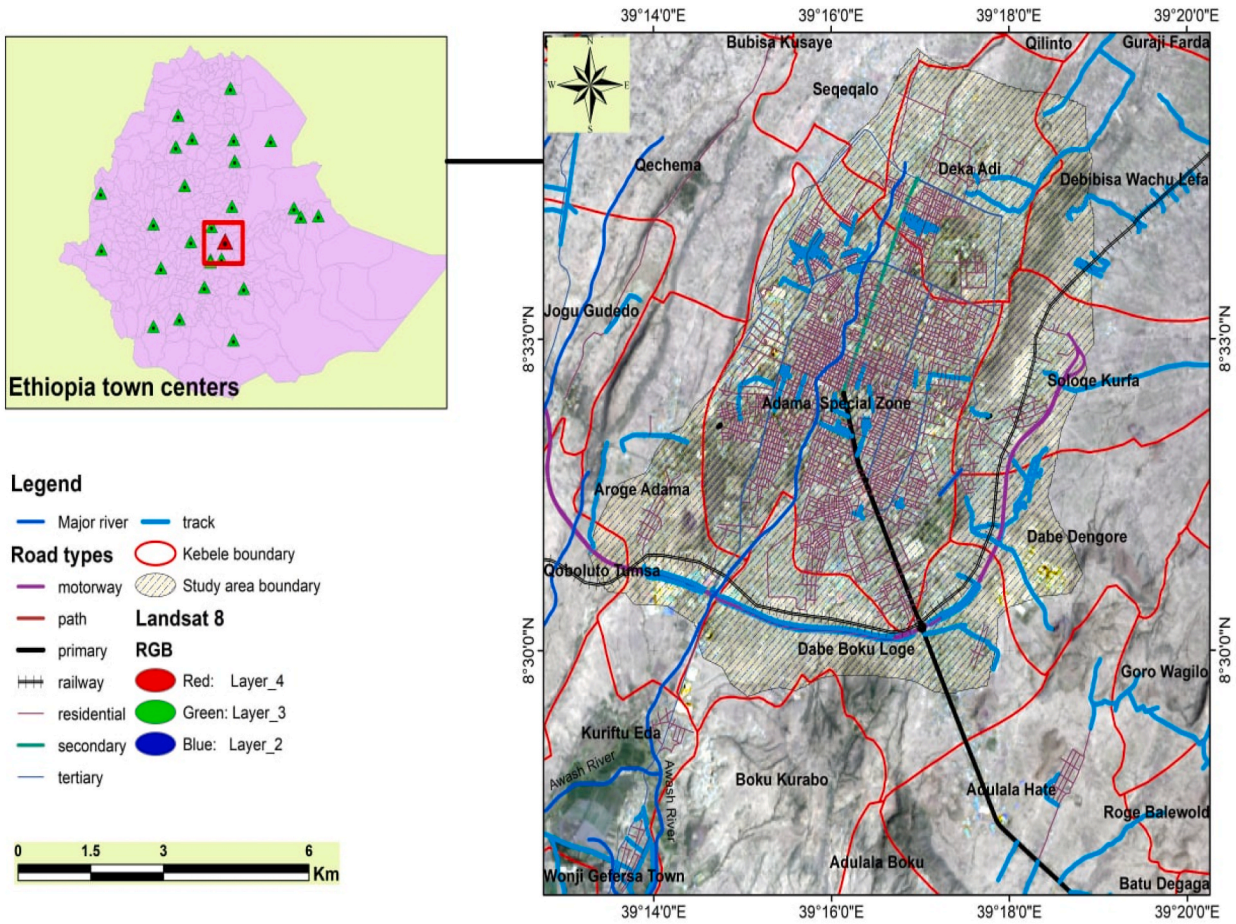

Fig. 2. *Location map of the study area, Adama City &Woreda, Oromia Region.*

the urbanization process has expanded in all directions. Notably, between 2006 and 2016, there was swift and sporadic urban land expansion in the city's eastern, northeastern, and southeastern parts. This expansion continued in all directions but accelerated in the east and south between 2016 and 2022. The overall trend indicates growth in Adama city from its original urban center in various directions. Furthermore, the most substantial changes occurred in the built-up and agricultural regions, with the built-up areas expanding at the expense of the farmland, shrub, and woodland sectors illustrated in Fig. 2.

Fig. 3 depicts significant changes in two categories, agricultural land, and built-up area, between 1986 and 2022 in Adama City, Ethiopia. The analysis in Fig. 4 reveals a substantial increase of 59.88% in the built-up area, rising from 5.93 to 65.81. Conversely, the agricultural land classification experienced a decline of 39.75%, decreasing from 61.12 to 21.37. The transformation of land use and land cover due to urbanization in Ethiopia has directly impacted rural farm households near Adama City [154,155]. The change, converting farmland into built-up areas and infrastructure expansion, poses significant challenges to food security, rural farm households, and sustainable development [156].

7. Impact assessment

Propensity score matching (PSM) analysis was used to examine the difference in annual food and non-food consumption between households headed by males and females, as households located near urban areas (treated group) and those situated farther away (control group); a pre-test was employed for this analysis [145,147,157].

Table 2 indicates no statistically significant differences in annual food consumption between households headed by males and females. However, there is a statistically significant difference between the treated and control groups at a significance level of $p < 0.01$. This finding can be attributed to the inability of the modern sectors to absorb the surplus labour from rural areas. Additionally, rural households need more productive assets and alternative skills beyond agriculture to engage in non-farm activities or be employed in industrial sectors [113,158,159]. Consequently, this demonstrates that the expansion of urban areas hampers the annual consumption expenditure of farming households.

There are evident variations in various socio-economic factors between the control group and the group. The control group spent more on non-food items, which exhibited a statistically significant difference between the two groups. This finding suggests that farming households not allocating a portion of their land tend to spend more on non-food goods [160]. Consequently, the control households enjoy a more stable livelihood than the treated households. Furthermore, the study demonstrated a statistically significant difference in mean expenditure between the groups, with the treated group spending less on durable goods, health, and education. The inferential statistics revealed a substantial disparity in the mean average between the two groups. Hence, urbanization reduces

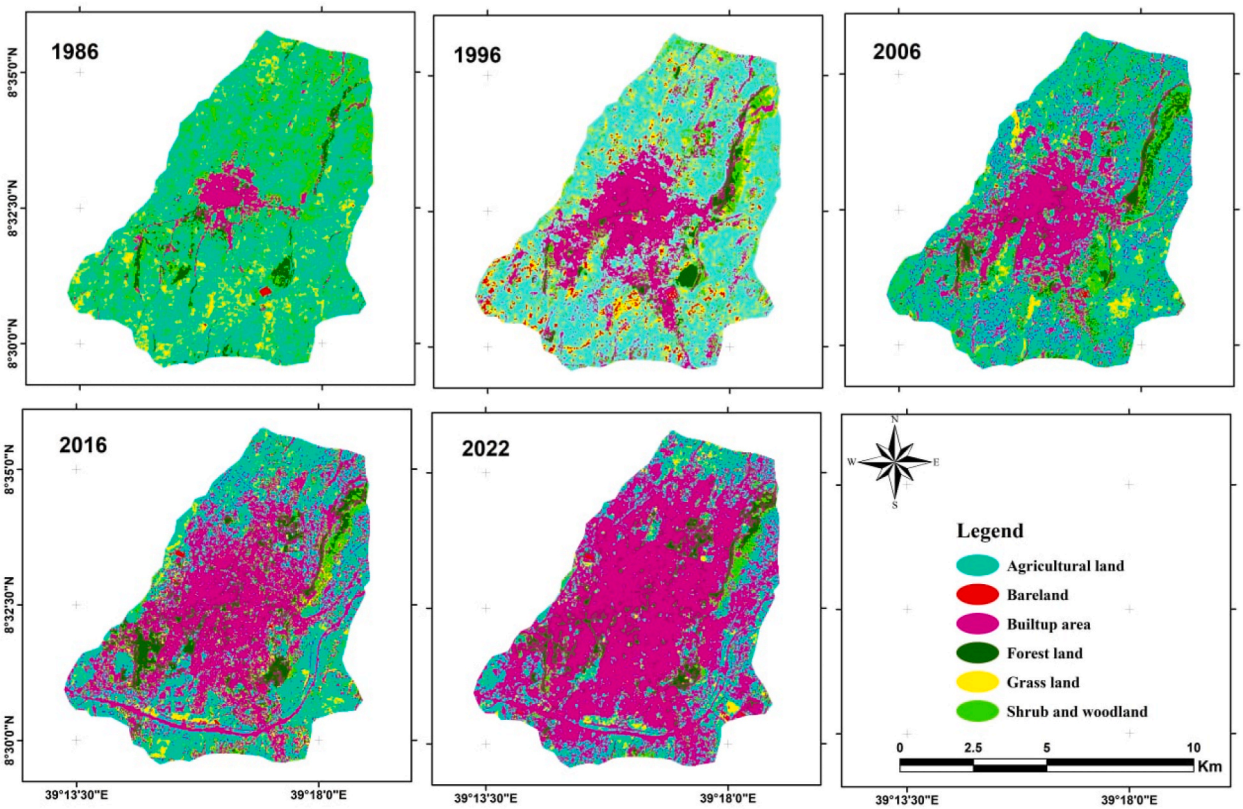

Fig. 3. Classified Land-use/cover map of Adama City (1986–2022).

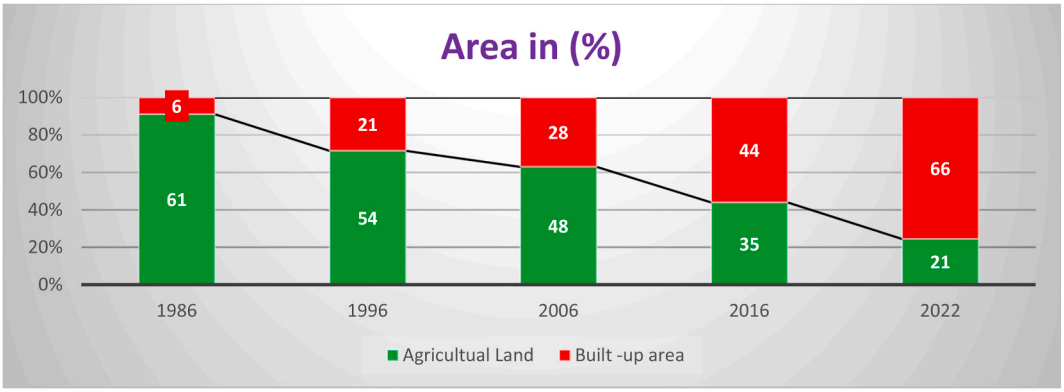

Fig. 4. Land Use Land change between 1986 and 2022.
Source: Own computed Data of 1986–2022

Table 2
Annual expenditure distribution of households.

Explanatory variable	Obser	Mean value			*P*-value	Mean value			p-value
		Male	Female	Combined		Control	Treated	Combined	
Annual income	397	7000	7113	7016	0.7638	8092	5207	7016	0.000***
Expenditure on non-food goods	397	–	–	–	–	501	236	402	0.0051***
Expenditure on durable goods	397	–	–	–	–	1187	2639	1728	0.0000***
Expenditure on health	397	–	–	–	–	1222	553	973	0.0002***
Expenditure on education	397	–	–	–	–	2450	1095	1945	0.0000***

Source: Compiled from own survey (2021)

displaced farmers' expenditure on non-food goods, durable goods, health, and education [7,113,161].

As stated earlier, the dependent variable used to assess the impact of urbanization on farming households was the annual household consumption expenditure. To avoid bias in estimating the impact of urbanization on farming households, variables that were not directly influenced by the treatment effect were chosen. This selection was made to ensure that essential variables were not excluded while avoiding an excessive number of variables. According to Ref. [162], too many variables can lead to biased impact estimation results [163,164]. Although various demographic and socio-economic factors influence consumption expenditure, variables that affect the decision to participate and the outcome variables were selected. These variables include the sex of the household head, age, educational status, dependency ratio, access to credit, and savings status of the household were selected. The probit analysis of (equation (4)) result presented in Table 3 indicates that, except for the dependency ratio, all of these variables have a statistically significant effect on the annual consumption expenditure of the households.

To create a homogeneous group, variables with statistically significant associations or mean differences must be transformed into statistically non-significant or mean differences. The selected variables were determined based on the percentage of mean bias and value. The objective is to match participants based on common characteristics to estimate the impact accurately. Thus, repeated tests were conducted to determine which variables should be included, satisfying the propensity score matching (PSM) assumptions. Table 4 displays the selected variables based on the percentage of mean bias and β value.

The mean bias and β value should be below certain thresholds after matching. Specifically, the mean bias should be less than 5 %, and β should be less than 25 % [165]. In this study, two continuous variables and four categorical variables were chosen: the sex of the

Table 3
Psmatch2 probit regression estimation result.

Log-likelihood = −199.97983	LR chi2 (6) = 124.42	Pseudo R2 = 0.2373
Number of obs = 397	Prob > chi2 = 0.0000	
Variables	Coef.	Std. Err.
Sex of household head	0.523**	0.211
Age of household head	0.0412***	0.008
Educational status of household head	0.999***	0.163
Dependency ratio	−0.068	0.195
Access to credit	0.434*	0.242
Saving status of households	−1.032***	0.153
_cons	−3.469	0.800

Source: Compiled from own survey (2021)

Table 4
Statistical summary of *t*-test distribution.

Explanatory variables	Mean values			*P*-values
	control	treated	Combined	
Age of household head	49.97	60.89	53.21	0.0000***
Dependency ratio	0.85	0.54	0.75	0.0001**

***indicates a significant level at 1 %,. Source: Computed from own survey data (2021)

household head, age of the household head, dependency ratio, and access to credit, household saving status, and educational status of the household head.

Before matching, a *t*-test, and a chi-square test were conducted to determine if there were any mean differences or statistical disparities between the treated and control groups for the selected variables [166]. Two continuous and two categorical variables exhibited statistically significant differences between the treated and control groups.

Unlike the continuous variables, only two categorical variables have a statistically significant relationship between the control and treated groups (Table 5).

7.1. Testing the balance of propensity score and covariates

Balancing was successfully achieved after conducting rigorous matching tests. Before matching, the bias percentage ranged from 9.5 % to 92.2 %. After matching, the bias percentage was significantly reduced to a range of 0.8 %–6.8 %. This reduction in bias indicates that the matching process effectively balanced the selected variables, bringing them closer to the critical level cutoff point of 25 % [167,168], as shown in Table 6.

Before matching, the variables such as the age of the household head, dependency ratio, household head's educational status, and household saving status exhibited statistically significant differences between the treated and control groups. After matching, no statistically significant correlations were found between the treated and control groups for the variables. This outcome suggests that the matching process successfully homogenized the households, making them comparable and suitable for further analysis.

7.2. Matching treated and control groups

The mean propensity score of households is 0.375, with a minimum and maximum score of 0.007 and 0.954, respectively. The treated and control groups' mean scores are 0.554 and 0.266, respectively. The minimum and maximum scores of the treated and control groups were between 0.024-0.954 and 0.007–0.910, respectively. The joint support region lies between 0.024 and 0.910, according to minima and maxima criteria (Table 7).

Graphically, the score is presented in Fig. 5. The score is higher in treated on support than untreated on support.

7.3. Matching algorithm

After matching, both groups of households had a comparable distribution of variables, as seen by the reasonably low pseudo-R2 and statistical insignificance. Therefore, the matching process satisfies the criteria and balances the characteristics of the study area's treatment and control group of households. According to Ref. [165], no one matching procedure predominates and is relevant in all data gathered to estimate impact. Three matching algorithms, namely, neighbor, caliper, and kernel matching, were used at various levels for this study. The result showed that the dispossessed/treated households had lower annual consumption expenditure than the control households (Table 8). The output implies a reverse correlation between urbanization and household yearly consumption expenditure of smallholder peri-urban farmers. Moreover, in most developing countries, higher consumption expenditure is related to better wealth accumulation as it is correlated with poverty reduction and food security [169].

Based on (equation (5)), the result of the study in Table 9 aligns with previous research in Ethiopia [54,80,170]. [54]'s study

Table 5
Statistical summary of the chi-square distribution.

Explanatory variables	Categories	Sample Percentage	Control %	Treated %	Chi-Square
Access to credit	No	307 (90.0)	213 (88.7)	94 (93.1)	0.224
	Yes	34 (10.0)	27 (11.3)	7 (6.9)	
Sex of household head	Female	96 (28.1)	28 (27.7)	68 (28.3)	0.909
	Male	245 (71.9)	73 (72.3)	172 (71.7)	
The educational level of the household head	Literate	140 (35.3)	67 (26.9)	73 (49.3)	0.000***
	Illiterate	254 (64.7)	182 (73.1)	75 (50.7)	
Saving status of household	No	192 (48.6)	159 (63.9)	33 (22.3)	0.000***
	Yes	205 (51.6)	90 (36.1)	115 (77.7)	

Source: Computed from own survey data (2021)

Table 6
Propensity score and covariate matching.

variables		Mean				P>|t|
		Treated	Control	% bias	% reduction |bias|	
Sex of household head	U	1.16	1.13	9.5	.	0.353
	M	1.16	1.18	−6.8	28.3	0.586
Age of household head	U	48.67	43.04	57.7	.	0.000
	M	48.40	47.92	4.9	91.6	0.702
Educational status of household head	U	1.49	1.27	47.3	.	0.000
	M	1.48	1.49	−2.2	95.4	0.861
Dependency ratio	U	0.79	0.74	13.4	.	0.201
	M	0.78	0.81	−7.7	42.5	0.546
Access to credit	U	1.91	1.89	4.6		0.662
	M	1.90	1.88	6.8	−49.5	0.570
Saving status of households	U	1.22	1.64	−92.2	99.2	0.000
	M	1.23	1.22	0.8		0.944

Source: Computed from own survey data (2021)

Table 7
Distribution of estimated propensity scores.

Groups	Obs	Mean	Std. dev.	Min	Max
Treated	148	0.554	0.231	0.024	0.954
Control	249	0.266	0.207	0.007	0.910
Total HH	397	0.373	0.257	0.007	0.954

Source: Computed from own survey data (2021)

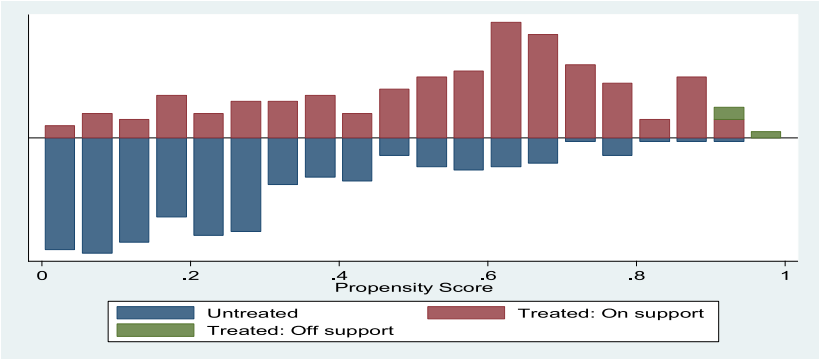

Fig. 5. Distribution of propensity score.
Source: Computed from own survey data (2021)

demonstrated that farm households located near urban areas experienced a decrease in their physical asset holdings, such as land and livestock. This decrease in assets resulted in a decline in the consumption expenditure of rural households over a year. Similarly [170], indicated that farm households displaced due to urban expansion experienced a significant reduction in their consumption expenditure per adult equivalent, and the combined asset index of these displaced households decreased due to the urban-induced expansion. The study findings also correspond with [80], which revealed that evicted farmers faced a substantial annual income reduction compared to their counterfactuals. The decrease in income further underscored the negative impact of evictions on farmers' financial well-being. The study results align with previous research in Ethiopia, which indicates that farm households located near urban areas, displaced by urban expansion, or subject to evictions experience a decline in their consumption expenditure and overall welfare outcomes.

A study in sub-Saharan Africa by Ref. [106] revealed that urbanization in countries within the region needs to be accompanied by sufficient investment in infrastructure and industrialization, which could effectively utilize the labour force from displaced rural farming households. Lack of investment stems from inadequate policy design and implementation by the government, which primarily benefits a small segment of the population. These policies are often based on flawed studies and fail to align with on-the-ground conditions. Urbanization exacerbates welfare inequality within communities near urban areas [1]. Recent empirical strands in the Philippines have demonstrated that urbanization leads to converting agricultural land for residential and commercial purposes. This transformation, in turn, adversely impacts farmers' income sources, displaces farmers' livelihood, diminishes their economic standing, and undermines the overall motivation for agricultural activities [171]. Besides, the result of the study aligns with [172]

Table 8
Estimated results of different matching algorithms.

Matching type	Pseudo-R^2	β	Mean- bias	Matched sample size	ATT	T-value
Neighbor matching						
Neighbor (1)	0.005	15.8	5.0	145	−2562.5	−6.73***
Neighbor (2)	0.003	12.0	4.9	145	−2542.3	−6.81***
Neighbor (3)	0.003	13.1	4.9	145	−2584.4	−7.45***
Neighbor (4)	0.005	16.1	6.2	145	−2439.0	−7.28***
Neighbor (5)	0.007	19.7	7.9	145	−2590.3	−7.71***
Caliper matching						
0.01	0.005	16.8	4.7	130	−2552.5	−6.88***
0.05	0.005	15.8	5.0	145	−2562.5	−6.73***
0.1	0.003	15.8	5.0	145	−2562.5	−6.73***
Kernel matching						
Bandwidth of 0.01	0.008	20.7	7.5	130	−2448.4	−7.01***
Bandwidth of 0.05	0.003	12.2	4.7	145	−2534.6	−7.99***
Bandwidth of 0.1	|0.003	13.6	4.9	145	−2553.5	−8.31***

***indicates statistically significant at 1 %,. Source: Compiled from own survey data (2021)

Table 9
Estimated value of ATT.

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
TOTALHHEXPYR_A	Unmatched	5206.42	8091.23	−2884.81	228.76	−12.61
	ATT	5267.50	7830.04	−2562.55	380.98	−6.73

Source: Compiled from own survey data (2021)

Impoverishment Risks and Reconstruction framework, which asserts that when small-scale farmers are compelled to leave their land, they experience significant levels of poverty. However, sustainable development objectives encompass attaining food security, eliminating hunger, and promoting sustainable agriculture by 2030.

Some studies contradict the results of this study, stating that urbanization can lead to increased landlessness among rural households and reduced farm income but has facilitated higher wages and non-farm incomes, resulting in an overall increase in rural households' total income and consumption expenditure [173]. [174] explain that urbanization significantly shifts the livelihoods of farming communities by creating non-farm employment opportunities that are more financially rewarding than agriculture [175]. also state that urbanization improves forward market linkage by increasing the demand for agricultural outputs and non-farm employment. Additionally, urbanization helps farmers diversify their sources of income, leading to higher income levels and supporting rural livelihoods [176].

Furthermore, studies conducted by Ref. [177] demonstrate that urbanization positively impacts the welfare of rural households by improving access to and investment in agricultural technologies. The result, in turn, increases agricultural productivity even with limited farming land. Urbanization also motivates rural households to align their agricultural production with urban areas' needs and food preferences, enabling them to generate higher income [175]. In summary, while the present study suggests adverse outcomes of urbanization on rural households, other research highlights the positive effects of urbanization, such as increased non-farm employment opportunities, higher income levels, improved market linkages, and enhanced agricultural productivity. According to Ref. [178], urbanization encourages rural residents to improve their consumption habits, but the impact varies significantly across regions, indicating regional heterogeneity in its effects.

In Ethiopia, urban expansion predominantly occurs in the larger cities, which have limited capacity to transform the livelihoods of rural areas. The process is due to rural individuals' need for more skills, financial resources, and educational levels, making it difficult to compete with urban dwellers [179]. indicated that small towns play a more significant role in reducing rural poverty and improving welfare than large cities. The development of small towns provides a favorable environment for rural households, offering non-farm employment opportunities and income prospects with minimal competition [180].

The COVID-19 pandemic has had a profound impact on the economy. It has detrimentally affected the lives, livelihoods, and overall well-being of individuals in developing nations with fragile healthcare infrastructure, limited education, and high poverty rates [119, 181,182]. However, the extent and severity of these consequences vary depending on different groups and industries [183]. The pandemic has increased unemployment, reduced income from daily labor, heightened food insecurity, drained savings and relief funds, and disrupted the marketing systems. Furthermore, the travel and tourism sectors have experienced various consequences resulting in decreased output and productivity in the services industry [117].

The pandemic in Ethiopia and other African countries caused households to cease livelihood activities such as daily work, small-scale trade, selling livestock, receiving remittances, and engaging in labor migration [119,120]. As a result of these limitations on household activities, opportunities to utilize services decreased, and increase their purchases of products [121]. The effect led to a profound impact on hotel, tourism, and hospitality businesses.

The consumption recovery was significantly more potent than anticipated during the pandemic because fiscal and monetary policy actions helped consumers quickly adjust to the pandemic shock. This path requires various actors' cooperation, dedication, and

responsible approaches. These traits should direct their actions as they look for shared interests that can address the issues noted in the 2030 Agenda of new economic, social, and environmental strategies [121]. Positive measures like the media's role in raising awareness of social exclusion and consumption modeling, as well as new business initiatives that lessen the adverse effects on employees' health, can better combat the virus' effects on household income and consumption expenditure [45,117,120,184,185].

The global consumption recovery from the pandemic surpassed earlier expectations due to significant fiscal and monetary policy measures. However, this recovery path is complex and requires various stakeholders' collaboration, dedication, and responsible actions. These qualities should guide their efforts as they seek common interests to address the issues outlined in the 2030 Agenda, which focuses on new economic, social, and environmental strategies [121]. Positive initiatives and the media's role in raising awareness of social exclusion and promoting responsible consumption, as well as new business ventures that mitigate the adverse effects on employees' health and productivity using corporate social responsibilities initiatives, can effectively alleviate the impact of the virus on household income and spending [45,117,120,184,185].

The study found that despite the significant impact of COVID-19 on households' income and consumption expenditure near urban areas, interview data collected from key informants shows no significant effects of the pandemic on their consumption expenditure. The result suggests that the negative impact on consumption expenditure and overall welfare in households near urban areas can be attributed solely to urbanization rather than the additional influence of the pandemic.

8. Conclusion

The study examined the impact of urbanization on the annual consumption expenditure of rural farm households near the Adama City Administration. Specifically, the study reveals that farm households near urban areas experience lower yearly average consumption expenditure per adult equivalent than those in more distant areas. This reduction in consumption expenditure is attributed to converting farmland to non-agricultural development activities and the subsequent need for farm households to diversify their livelihoods. The gradual expansion of urban land coverage diminishes the availability of agricultural land for farm households near urban areas, thereby negatively influencing their livelihoods and overall welfare. Given that farming serves as the primary economic activity for these households, it is crucial to acknowledge and evaluate the existing conditions of both urban areas and neighboring rural settings before initiating the urbanization process. This proactive approach is necessary to preserve mutual benefits for urban and rural communities.

9. Recommendations

Based on the study's findings, the following recommendations can be categorized into three parts: Implications for Development Practitioners, Implications for Research, and Implications for Policy.

10. Implications for development practitioners

a. City administrations and regional governments should prioritize land use planning that balances urban expansion with agricultural land preservation. This can involve designating protected agricultural zones or implementing regulations to limit the conversion of farmland for non-agricultural purposes. Development practitioners should play a key role in implementing and enforcing these measures to safeguard farmland for rural farm households.
b. The regional government should implement programs to support rural farm households near urban areas. These programs can include providing access to credit, improved agricultural techniques, and modern farming equipment to enhance productivity and efficiency. Development practitioners should facilitate the implementation of these programs to maximize the income-generating potential of rural farm households despite limited farmland availability.

11. Implications for research

a. Further research is needed to explore and identify specific alternative income-generating activities suitable for rural farm households near urban areas. This research can focus on agro-tourism, rural industries, or value-added agricultural products that can help offset the negative impact of diminishing farmland on income and consumption expenditure.
b. Research should investigate the effectiveness of farmer cooperatives and associations in enhancing the marketing and bargaining power of rural farm households near urban areas. This can provide insights into how collective action can help overcome challenges related to diminishing farmland and secure land tenure rights and fair prices for produce.

12. Implications for policy

a. Policy interventions should be designed to encourage rural farm households near urban areas to diversify their income sources beyond traditional farming. The process can be achieved by providing training and resources to develop alternative income-generating activities. Policymakers should create an enabling environment and provide the necessary support for successfully implementing these initiatives.

b. Policies should promote the formation and strengthening of farmer cooperatives and associations. The trend can help rural farm households near urban areas access markets, negotiate for their land tenure rights, and secure fair prices for their produce. Policy frameworks should be developed to facilitate the establishment and functioning of these collective organizations.

In summary, development practitioners should prioritize land use planning, implement support programs, and promote diversification and collective action among rural farm households near urban areas. Further research is needed to explore alternative income-generating activities and assess the effectiveness of collective marketing strategies. Policymakers should design and implement policies that encourage diversification and support the formation of farmer cooperatives and associations.

13. Limitations of the study and implications for future research

While this study has important theoretical and practical implications, it is essential to acknowledge its limitations. The study did not consider the impact of urbanization on various characteristics such as agronomic factors, socio-economic settings, weather conditions, spatial arrangements, agricultural inputs, and other physical and intangible assets. Including these factors in future research would enrich our understanding of the impact of urbanization on farm households. The presence of this limitation indicates that there is still more research to be done on this topic. Further research is needed to investigate the diverse effects of urbanization on farm households based on the mentioned specific characteristics. The impact of urbanization may vary significantly depending on factors such as institutional arrangements, socio-economic status, and demographic characteristics. Exploring these factors is essential to understand the differential impacts of urbanization fully. Investigating the factors influencing urbanization and its relationship with consumption patterns is also essential. The approach can help identify farm households' key traits or actions associated with welfare outcomes in the face of urbanization. Additionally, conducting similar studies in multiple locations over time can help validate the results and provide more conclusive recommendations.

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Data availability statement

Data will be made available upon request and can be accessed by contacting the corresponding author.

CRediT authorship contribution statement

Wakitole Dadi: Jawi, Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Messay Mulegeta:** Tefera, Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Negussie Simie:** Tesema, Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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