

# The Role of Urban Vegetable Production to the Livelihoods Enhancement of Producers in Addis Ababa: Examination of Food, Employment and Income Effects

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## Abstract

For urban agriculture to make a significant contribution to development, particularly in a city like Addis Ababa, Ethiopia, where chronic poverty persists, it must present feasible, sustainable business opportunities in addition to its established social benefits. Ultimately, this research intends to investigate how vegetable production has helped supplement the food and income of dwellers in the urban areas of the Addis Ababa metropolitan area. Both qualitative and quantitative data were used. Household quantitative data were analyzed using descriptive and inferential statistics. The results disclosed, people in Addis Ababa use vegetable production as a source of food stability to ensure self-sustainability. Further, the creation of job opportunities in vegetable cultivation in the city allows the unemployed and even employed groups to participate. There is no academic criterion required, which makes it easier for people with low or no education to engage in vegetable production. According to 99.2% of respondents, vegetable production activities provide fresh food for their households. Per production, 41.9% of respondents earned up to 10,000 birr. For farm activities, 30.7% of vegetable producers hire up to ten employees, while seeds and pesticides are more expensive inputs than other necessary items. The multivariate analysis showed that households that earn around 10,000 birr per production were significantly affected by farming in residential areas ( $p = 0.008$ ). Surveys conducted reveal that households are more concerned about food consumption than using their products to profit.

**Keywords:** Food security; urban farming; Addis Ababa; urban economy; urban employment; socioeconomic development

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## 1. INTRODUCTION

Urban authorities face significant challenges in providing adequate services such as housing, infrastructure, facilities, and employment (UN-Habitat, 2017). This occurs at a time when many cities are grappling with the challenge of combating rising unemployment and poverty (Md Abdul Kuddus *et al.*, 2020). Food insecurity and unemployment have been and continue to be major issues in many parts of Sub-Saharan Africa, particularly in and around major urban areas (WB, 2023).

As a response to rising urban unemployment, poverty, and hunger, some cities have turned to urban agriculture. This is because urban agriculture (hereafter - UA) promotes food security and nutrition, creates jobs, and generates income for the general urban poor, as well as disadvantaged groups such as women, the disabled, the elderly and unemployed youth (Beach, 2013; Gonfa, 2019).

UA is the practice of cultivating, processing, and distributing food in or around a town or city (Nzimande, 2013). Thus, in the majority of cases, UA is a response by the urban poor to insufficient, unreliable, and irregular food access, as well as a lack of purchasing power (Gonfa, 2019), while ensuring children's access to food, improves their health, and contributing to women's empowerment (Stewart *et al.*, 2013).

According to Grace *et al.* (2022), despite the economic importance of UA, it has received little attention to date. Urban agriculture's economic benefits can be discussed in terms of employment, income generation, enterprise development, the national agriculture sector, and land-use economics (Belayneh and Addisu, 2021). It's no surprise that both low- and high-income entrepreneurs choose urban farming as a business. Food is a basic consumption item with consistent and reliable demand, even during an economic downturn. Urban farmers can tailor their production to meet demand and supply high-value and perishable items because they are close to markets (Smit *et al.*, 2001).

Most cities, especially those in developing countries, are unable to generate sufficient income and employment to support their rapidly growing populations. This directly translates into a food shortage (Zeeuw, 2004). According to Bryceson and Potts (2005) and Tewodros (2007), UA arose in Africa as a response to scarce

sources of urban economic sustenance, namely an insufficient supply of staple foods to cities combined with city dwellers' declining purchasing power. As a result, millions of African city dwellers are being encouraged to reintroduce farming, either to supplement their household income or because they cannot afford to meet their daily food needs. The dynamics of the urban social, economic, political, ecological, and spatial systems with which it is interconnected have a significant impact on the development of UA. UA adjusts to new economic and geographic conditions (Fan *et al.*, 2022).

Ethiopian vegetable production is not a new industry; it has been going on for decades. Large state farms produce fruits and vegetables for both the local market and export. A few private companies produce vegetables, primarily for the European market. Furthermore, many small producers grow a limited variety of vegetables for the local and regional export markets (Kebede *et al.*, 2019). Vegetable crops grown in different agro ecological zones are produced by commercial as well as small farmers, each as a source of financial gain as well as food. However, the sort is restricted to a few crops, and production is concentrated in some pocket areas (Nimona, 2017). In spite of this, the production of vegetables varies from cultivating a few plants in backyards for home consumption to large-scale production for domestic markets (Tadele and Derbew, 2015).

A study on livelihood dependence on UA conducted in Addis Ababa by Tewodros (2007) and Mekuria and Messay (2018), revealed that cultivating vegetable crops and rearing large cattle are the most common agricultural activities among urban crop producers and livestock owners, respectively. Tewodros emphasized that farming accounts for 65 percent of household income. Aside from that, it is equally important to the livelihoods of both poor and well-off urban farmers, and it has contributed to farmer income inequality.

Leafy vegetables are high in beta-carotene and provide more food per unit area; vegetables provide more farm income than other crops; and cropping intensity is very high in vegetable growing when compared to other crops. Normally, three to four vegetable crops can be grown in a single year (Galhena *et al.*, 2013; Tadele and Derbew, 2015). Vegetables are also a source of cash income for households and provide an opportunity to increase smallholder farmers' market participation (Gonfa, 2019). The majority of the vegetables produced were sold at local markets, with only a small portion consumed at home. According to the study, with the right support, urban farmers could supply more than 42% of Addis Ababa's vegetable demand. In addition to the above economic benefits, the study discovered that UA in Addis Ababa was making significant social contributions (Fufa, 2017).

These systems adapt to the city's ever-changing local conditions, where urban vegetable production takes on new roles (Eigenbrod and Gruda, 2015). A major function of UA is and will always be food supply and income generation in cities, but vegetable cultivation is increasingly playing a role in environmental, landscape, and biodiversity management, as well as providing recreational services, among other things. Production's flexibility and multi-functionality will most likely determine its long-term viability (Hubert *et al.*, 2010).

Growing poverty, hunger, and a lack of formal employment opportunities, as well as the unique opportunities provided by cities, such as rising food demand, proximity to markets, and the availability of inexpensive resources such as urban organic wastes and wastewater, have fuelled the development of diverse agricultural production systems in and around cities (de Bruin *et al.*, 2021). These systems frequently specialize in perishable products like green leafy vegetables, milk, eggs, and meat, and they take advantage of vacant open spaces. This development has significant potential and addresses some of the most pressing issues confronting cities (FAO, 2007; Ababulgu *et al.*, 2022).

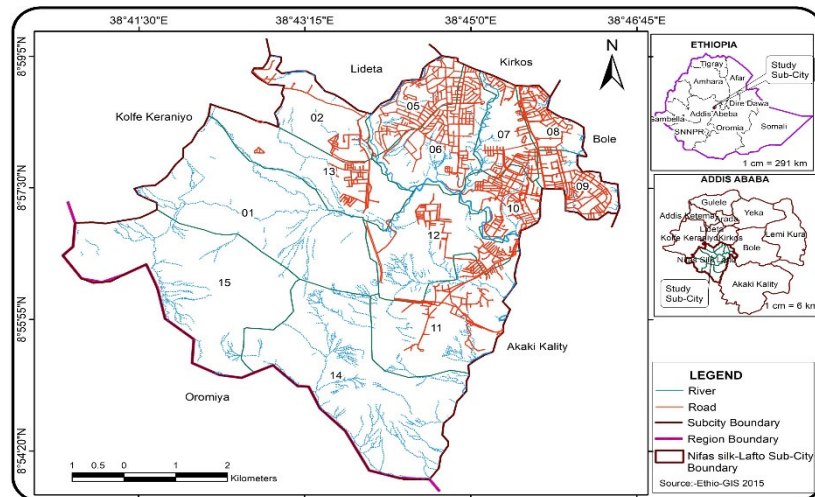
Poor farmers, on the other hand, have little or no financial capacity to absorb "economic shocks," especially when they receive little or no government assistance (Czekaj *et al.*, 2020). Unemployment is potentially a matter of serious concern because of its effects on economic welfare, production, erosion of human capital, social exclusion, crime, and social instability. Perhaps this is because not much has been documented regarding its impact on food security, job creation, and wealth generation (Kingdon and Knight, 2004). According to the Central Statistical Agency's (CSA, 2018) Urban Employment Unemployment Survey, 20% of the working-age population in Addis Ababa is unemployed, and 30% of the employed population is self-employed (Kalle *et al.*, 2021).

There is a growing interest within the UA sector, though its scale and reasons differ. Urban farming generates direct income through sales and employment, as well as indirect income through reduced food expenditure. UA, particularly vegetable production, is an easy industry to break into (Oekan *et al.*, 2023). Vegetable production is a significant economic activity and plays a central role in meeting food and nutrition security in Addis Ababa, Ethiopia. Diversifying and increasing vegetable production can help to alleviate malnutrition and poverty by increasing household consumption, as well as create new income and job opportunities in the production, trading, and processing sub-sectors (Ibrahim *et al.*, 2021).

As there are few studies thus far, the goal of this review is to improve our understanding of how urban vegetable production contributes to urban society's livelihoods. The purpose of this research is, therefore, to examine the dynamics of vegetable cultivation and its contributions to food, employment, and income in the study area.

## 2. MATERIALS AND METHODS

This research was carried out in the Nifas Silk Lafto Sub-city, Addis Ababa, Ethiopia. The sub-city is located at the southwest (Fig. 1) edge of Addis Ababa. The climate in the area is cool temperate type (Abraham, 2012). The main rainy season lasts from June to September and accounts for roughly 70% of total annual rainfall. The average annual temperature is 17.25 degrees Celsius.



**Fig. 1** Map of Nifas Silk Lafto sub city, Addis Ababa, Ethiopia

The Little Akaki River, along with its tributaries, runs through the sub-city, through which many smallholder vegetable producers grow a variety of vegetable products (Deshu *et al.*, 2021). UA activities, particularly vegetable production, are common in the study area, including backyard farming, open spaces around houses, and riverside farming (Tewodros, 2007).

### 2.1. Sampling procedure and sample size

According to the Addis Ababa Urban Agriculture Office, there are thirteen thousand, one hundred ninety-nine vegetable-producing households in the thirteen woredas (the smallest administrative unit in Ethiopia's urban hierarchy) of Nifas Silk Lafto Sub-city. Using a simplified formula, the number of sample households was estimated to be around 388, assuming a 95% level of confidence and a 5% level of sampling error (Yamane, 1967).

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

Where N = stand for number of total vegetable-producing households in the sub-city, n = sample size and e = sample error, respectively.

### 2.2. Data sources and data collection tools

To collect quantitative and qualitative data for this study, primary and secondary data sources were used. Questionnaire survey, interviews with key informants, focus group discussions, and field observations were used to collect primary data at the household level from Nifas Silk Lafto in urban vegetable producer areas. An intensive desk review of peer-reviewed journals, conference papers, government records, and research reports was used to collect secondary data from existing sources. To collect quantitative data, 388 vegetable producers participated in household surveys. In addition, a focus group discussion with six people was held using a pre-designed checklist.

### 2.3. Data Analysis

The study used both qualitative and quantitative data analysis techniques. Thematic content analysis was used to examine qualitative data gathered through focus group discussions, key informant interviews, and field observations. The quantitative method, on the other hand, focuses on numerically collected and recorded data. To test the relationship between the study variables, the data collected through the household survey was analyzed using descriptive statistics and multinomial regression. The information was organized, summarized, analyzed, interpreted, and used to back up the survey findings.

### 2.4. Description of variables

In this study, annual income from vegetable production, total employment in the production, and the types of vegetables produced represent dependent variables. It is hypothesized that vegetable production in the study contributed to food security, employment, and income. The explanatory variables are hypothesized to have an effect on the status of vegetable producers. Based on a review of related literature, six potential explanatory

variables, as shown in Table 1, (land size, source of land, farming production costs, gender of the house head, educational status, and market distance from the production area) were identified as factors explaining vegetable production in the study area.

**Table 1:** Dependent and Independent variables descriptions

<i>Dependent variable</i>	<i>Description</i>
annual income from vegetable employment in vegetable	1= up to 10,000, 2= up to 20,000, 3= up to 30,000, 4=> 30,001, 5= total employment creation in the vegetable farming process
Types of vegetables produced	name of vegetables produced by households
urban vegetable farming profits	the vegetable benefits from the production (food, income etc.)
<i>Independent variable</i>	<i>Description</i>
land size in m <sup>2</sup>	1=100-300, 2= 301-600, 3=601-1000, 4= > 1001
source of land	1= river side, 2= park, 3= damped area, 4=Private residential, 5=
distance of farms to markets	How long do they travel to sell their vegetable products?
gender of the house head	Dummy; 1 if head is male 0 if female
educational status	0= unable to read and writing, 1= non-formal education but reading and writing, 2= primary, 3= secondary, 4= diploma, 5= bachelors, 6=
farming production costs	the amount of vegetable production cost in the farming systems

### 3. RESULTS AND DISCUSSION

#### 3.1. Socioeconomic Profile of Producers

Demographic characteristics such as age, gender, and family size, as well as socioeconomic characteristics such as marital status and educational status, are important in vegetable production and marketing. According to Table 2, the majority of vegetable-producing households (59.3%) were male. As a result, it appears that male dominance is more prevalent in this industry. Age was a significant factor in vegetable production. According to the study, the vast majority of respondents (56.8% of all respondents of working age) are between the ages of 21 and 40. Table 2 also showed that the majority of vegetable producers (67.8%) were married. According to Banchamlak and Akalu (2022), male vegetable producers dominated the production sector more than females.

**Table 2:** Households' demographic characteristics

<i>Item</i>	<i>categories</i>	<i>Frequency</i>	<i>Percent</i>
<i>Sex</i>	male	227	59.3
	female	156	40.7
<i>Age</i>	21-40	219	56.8
	> 41	166	43.2
<i>marital status</i>	married	261	67.8
	single	82	21.3
	divorce	42	10.9

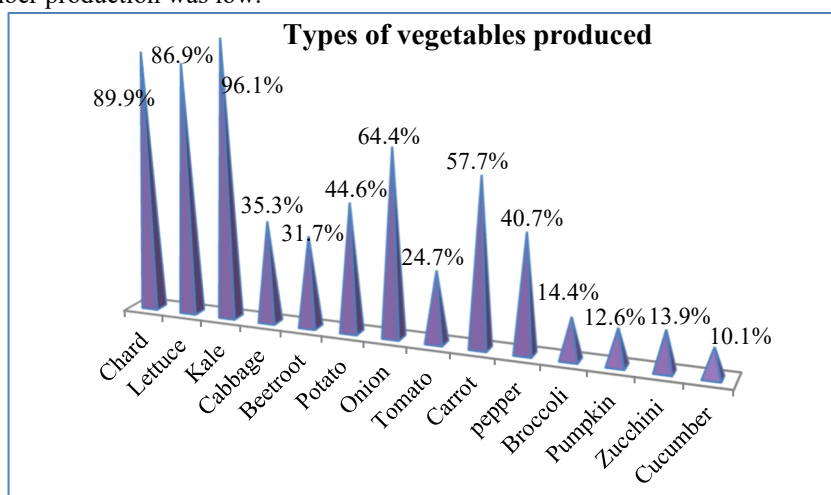
According to Table 3, 30.9% of respondents could not read or write and had no formal education. A little more than half of those polled (56.2%) have completed primary and secondary school while 12.9 percent of respondents have completed higher education. According to Table 3, 55.0% of families had 4-6 members, 34.4% had 1-3 members, and 17.8% had a family of 7 or more. Vegetable production is the primary occupation of 64.0% of households; however, urban vegetable production is also practiced by individuals who are not primarily farmers (Table 3). According to the survey results, 73.9% of participants have five or fewer years of experience in vegetable production, indicating that vegetable farming capacity has increased in the last five years. Participating in the vegetable industry, according to Kebede *et al.* (2019), results in higher food availability and access.

**Table 3:** Households socioeconomic characteristics

<i>Item</i>	<i>categories</i>	<i>Frequency</i>	<i>Percent</i>
<i>employment</i>	vegetable production only	247	64.0
	other types of professions	139	36.0
<i>educational status</i>	unable to read and writing and non-formal education	120	30.9
	Primary and secondary	218	56.2
	Higher education	50	12.9
<i>farming experience</i>	up to 5 years	272	73.9
	more than 5 years	96	26.1
<i>family size</i>	1-3 family	133	34.4
	4-6 family	213	55.0
	>7 family	41	17.8

### 3.2. Types of vegetables and contribution to food security

According to Figure 2, the majority of respondents produce one or more vegetable products. The vast majority of respondents (91.0%), however, produced leafy vegetable products (kale, chard, and lettuce). Broccoli, pumpkin, zucchini, and cucumber production was low.



**Fig. 2:** Types and capacity of vegetables produced in the study area

According to the respondents, the production of vegetables is now widely recognized as a mechanism for community household resilience as shown in Table 4 that 99.2% of respondents agreed that vegetable production activities provide fresh food for their households, 84.5% contribute to food security, and 81.1% make it easily accessible. Urban vegetable production is important for generating income for 81.2% of households. According to Joosten *et al.* (2015); Habtamu and Adugnaw, (2016), one of the important variables impacting the proper utilization of nutrients consumed is the contribution of vegetable production to getting healthy and fresh food for an individual's health state. Average dietary intakes today are typically unhealthy, failing to meet basic dietary requirements for health (Joosten *et al.*, 2015).

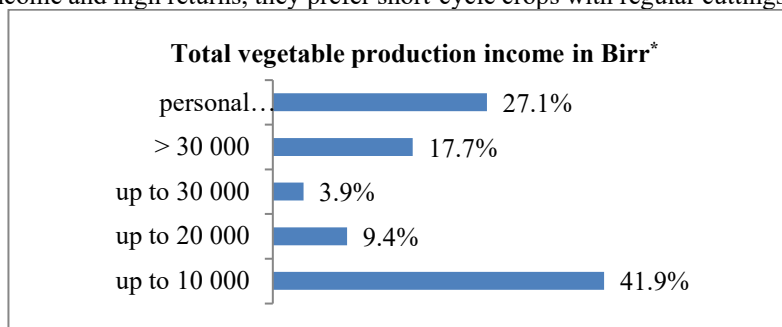
**Table 4:** The advantages of vegetable production

<i>Items</i>	<i>Frequency</i>	<i>Percent</i>
<i>providing fresh food</i>	385	99.2
<i>contribution to food security</i>	328	84.5
<i>income creation</i>	315	81.2
<i>easily available</i>	315	81.1

### 3.3. Urban vegetable production as an income-generating tool

This scarcity of reliable economic data is due to the fact that UA is a newer field of study with many methodological and practical issues to work out. Farmers' incomes are difficult to estimate due to the diversity of farmer profiles, their refusal to provide income data, crop seasonality, continuous harvesting, and scattered plots (FAO, 2007). Traditional vegetable farmers primarily grow short-cycle crops for consumption and sale at home.

To ensure consistent income and high returns, they prefer short-cycle crops with regular cuttings (twice a month).

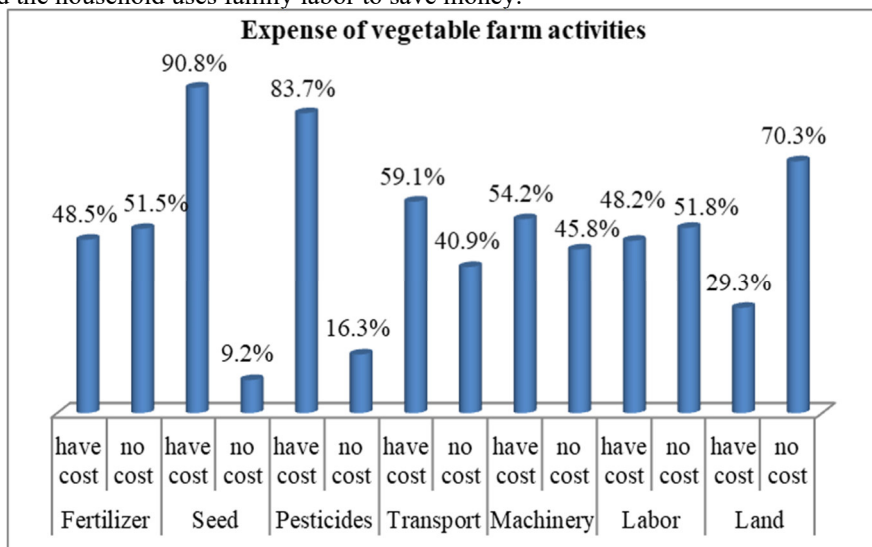


**Fig. 3:** Sales income from vegetable production per household in a single production season  
 \*Birr = Ethiopian currency

Figure 3 shows that 41.9% of respondents' sales of vegetable production income were up to 10,000 birr per single production season. However, 27.1% of respondents consume their vegetable products at home; those who do not profit from vegetable production save money for their families. The proportion of HHs earning more than 30,000 birr was 17.7%. According to the finding, the income from vegetable production is not sufficient to fulfil the food and other needs of the producers, but it is a big relief in many ways.

As shown in Figure 3, those participants who own large farm areas practice vegetable production for profit. Lucien *et al.* (2021) emphasized in their study in Cameroon that, comparing vegetable production incomes with the minimum monthly salary guarantee in Cameroon, vegetable production appears to be a worthy income-generating activity.

Farmers invest in their production activities. Some input costs are more expensive than others. As illustrated in Figure 4, seed and pesticide inputs are more expensive than other required items. However, land and labor are less expensive than the other costs. In most cases, the land is provided by the local government or owned by the respondent, and the household uses family labor to save money.



**Fig. 4:** Producers' farming costs during vegetable production

### 3.3.1. Vegetable Marketing Channels

From cultivation to the marketing of marketable surplus, vegetable production is a labor-intensive activity involving many people (Banchamlak and Akalu, 2022). According to Lisa *et al.* (2019), the marketable surplus is transacted through various agencies and passes through many hands between the producer and the final consumption point. The marketable surplus is the portion of the product that remains after deducting the farmer's local needs and post-harvest losses. The marketable surplus varies depending on the vegetable. The producer trades his/her marketable surplus at a location where he receives the highest return on his/her produce.

Village traders, urban markets, and regulated markets are the main transaction points. The marketable surplus travels through various channels before reaching the final consumer. The length of the channels varies between vegetables. Various market channels for the transaction of marketable surpluses of vegetables have been explored or identified through a field survey. The major channels are as follows:

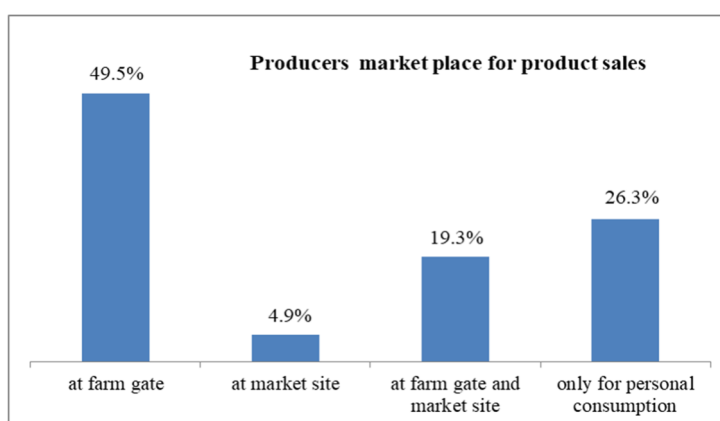
- Producer  $\longrightarrow$  consumer (at farm gate)
- Producer  $\longrightarrow$  village trader  $\longrightarrow$  consumer

- Producer  $\longrightarrow$  regulated market (whole seller)  $\longrightarrow$  consumer

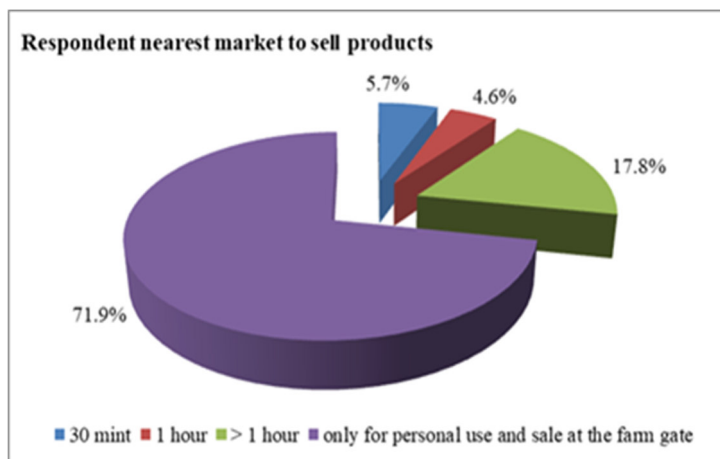
The producers are mostly small and marginal farmers. They are unable to generate a sizable, marketable surplus. As a result, they prefer to sell their produce at a nearby point of sale. Some of the produce (49.5%) is sold right on the farm (Figure 5). However, Table 5 shows that 71.9 percent of respondents provided the products for the market. According to the findings, the producers travel on average an hour to the nearest market.

**Table 5:** Farmers' responses to the market and production system

<i>Items</i>	<i>Frequency</i>	<i>Percent</i>
<i>Deliver your vegetable product to the market</i>	279	71.9
<i>washing production before getting into the market</i>	126	33.1
<i>packing your product before reaching the market</i>	19	4.9
<i>access to a sufficient market</i>	104	26.8
<i>fair price for the product</i>	68	17.5
<i>hidden costs associated with vegetable farm activities</i>	367	94.6



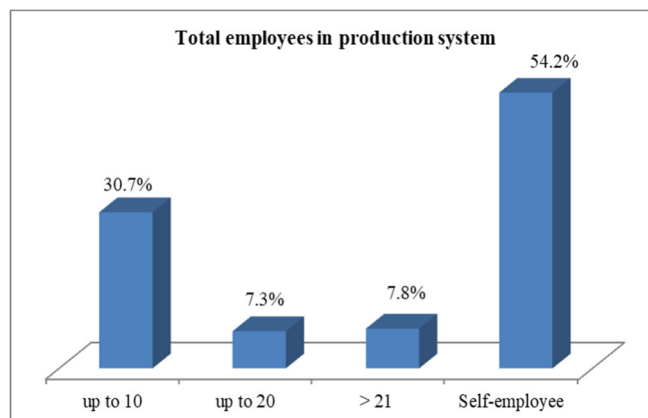
**Fig. 5:** Respondents' marketplace selection to sell the product



**Fig. 6:** Nearest market area for vegetable farm producers

### 3.4. Impact of Vegetable Production on Employment Generation

Vegetable cultivation and marketing necessitate a large amount of labor to be observed in various vegetable cultivation processes. Vegetable cultivation has created jobs for people involved in a variety of processes ranging from product production to final sale, and it has become a source of quick income. Vegetable cultivation is not limited to a single season but is practiced all year (Nimona, 2017). As a result, it employs people all year. Cultivation, collection, grading or packing, transportation, and marketing are the main processes that provide people with jobs.



**Fig.7:** Number and percentage employees participated in vegetable production

According to Lencucha *et al.* (2020), vegetable production not only increases poor people's income but also serves as a tool for social and economic growth, contributing to the socioeconomic development of the study area. The field survey of the selected study area, which included 388 households in 12 districts, revealed that many people benefited directly or indirectly from vegetable cultivation. Figure 7 shows that 30.7% of producers hire up to ten people for production activities, 7.3% hire up to 20, and 7.8% have more than 21 employees. In the production of vegetables the largest share (54.2 percent) goes to self-employed producers who use the product for personal consumption.

**Table 6:** Multinomial regression estimates for determinants of income from vegetable production

		B	Std. E.	Wald	df	Sig.	Exp (B)	95% C. I. for Exp (B)	
								Lower	Upper
up to 10,000	Intercept	1.847	997.794	.000	1	.999			
	Production in residential area	-2.240	.851	6.933	1	.008	.106	.020	.564
> 30,001	Intercept	16.061	997.815	.000	1	.987			
	expense of farming input	-8.621	2.804	9.450	1	.002	.000	7.389E-7	.044
	farming benefits (job creation)	-7.774	2.300	11.422	1	.001	.000	4.635E-6	.038
	riverside area production	-3.213	1.306	6.055	1	.014	.040	.003	.520
	public area production	-3.544	1.516	5.469	1	.019	.029	.001	.563
	residential area production	-3.519	1.353	6.769	1	.009	.030	.002	.420

Table 6 shows the multivariate analysis of the factors that affect vegetable income. The results demonstrate that sample households that earn around 10,000 birr/production were significantly affected by farming in residential areas ( $p = 0.008$ ), whereas those with a total income of more than 30,001 birr/production were significantly affected by the expense of farming input ( $p = 0.002$ ), job creation ( $p = 0.001$ ), farming riverside ( $p = 0.014$ ), farming public areas ( $p = 0.019$ ), and farming residential areas ( $p = 0.009$ ). This demonstrates the variety of diverse production sites, and hiring personnel and key inputs enables farmers to earn more money than others.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

Agriculture plays a central role in increasing food availability and incomes, supporting livelihoods and contributing to the overall economy. Vegetables contribute considerably to improving the human nutrition and income. These crops are excellent sources of income and employment for households operating as individuals and organized as cooperatives. Producers are able to meet their own food needs while also supplying the market with agricultural products, primarily vegetables. Vegetable products, particularly those produced through irrigation, are helping to stabilize the household food intake and market demand. Job opportunities for earning wages are currently not realistic due to limited production resources and certain economic factors. But Producers with the highest income from output provide more jobs for unemployed households. Almost all focus group participants agreed that land productivity is low due to a lack of technological intervention and poor working cultures.

Thus, in order to develop an effective vegetable cultivation system, the government should encourage cultivators while minimizing problems associated with vegetable cultivation and seeing the production in dual aspect: (1) more socially-oriented urban farming (leisure, recreation, community-based, subsistence oriented, often with greater variety, subsidized); (2) more economically-oriented urban farming (market-oriented, entrepreneurial, which can be family-based or in (micro-)enterprises, with often one dominant commodity), and environmentally sustainable.



Furthermore, there are several rivers in urban areas that can be used to enhance and improve agricultural productivity. Nonetheless, these rivers are less productive and unprotected. There is a need for the development of an efficient vegetable marketing chain that connects grass-roots markets with regional and national markets in order to provide vegetable cultivators with the highest possible return.

Urban agriculture should be encouraged, strengthened, and recognized in urban planning and development in a labor-rich but capital-poor city like Addis Ababa. One of the most important requirements for stimulating this sector is the implementation of an urban agricultural policy at both the national and local levels. While more research is needed to demonstrate how consumers' shopping habits may be influenced by purchasing locally-produced foods, the available evidence points in that direction. Because they are mostly unprocessed, vegetables are especially well suited to distribution via direct marketing. Communities could benefit from increased consumption of these healthy but underutilized items if local food market customers ate more of them. Reduced energy usage could also have environmental benefits if diets shifted to eating unprocessed foods instead of heavily processed foods.

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### **Data availability statement**

Data will be made available on request.

### **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.

### **Ethical Approval**

According to Addis Ababa University, all critical steps of its ethical implications were considered when designing this research article. This ethical approval passed all the processes of voluntary participation, informed consent, anonymity, congeniality, harmfulness, and result communication.

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