

# URBAN AGRICULTURE AND INCOME CONTRIBUTION: EVIDENCE ACROSS HOUSEHOLD INCOME GROUPS IN YOGYAKARTA

<sup>1</sup>Hedwig Ajeng Grahani, <sup>2</sup>Seno Budhi Ajar  
<sup>1</sup>Yamaguchi University, <sup>2</sup>Sebelas Maret University  
<sup>1</sup>e005cmv@yamaguchi-u.ac.jp, <sup>2</sup>senobudhiajar@staff.uns.ac.id  
Corresponding author: e005cmv@yamaguchi-u.ac.jp

## Abstract

*This study investigates how urban farming contributes to household income and the factors shaping income disparities among urban farmers in Yogyakarta, Indonesia. Despite Yogyakarta's status as a cultural and educational hub, urban poverty and unemployment persist, prompting the exploration of urban farming as an alternative livelihood strategy to enhance household resilience. Using data from 217 urban farming households, the research employs descriptive statistics and income contribution analysis to measure urban farming's relative role within household earnings, complemented by multiple linear regression to assess the influence of income group and other income sources. The findings reveal substantial variation, with net income ranging from IDR 1.7 million to IDR 123 million after deducting input costs. Urban farming's contribution to total income was lowest among low–middle income households (1.38%) and highest among middle–high income households (50.06%), with an overall average of 30.98%, indicating a moderate aggregate role. Regression analysis confirms that higher-income households gain more from urban farming, whereas other income sources reduce its relative importance. These results suggest that while urban farming serves as a key income generator for wealthier households, it remains supplementary for poorer ones, underscoring its broader value in strengthening urban food security and supporting targeted policy initiatives to improve productivity and cost efficiency across socioeconomic groups.*

**Keywords:** *income contribution, other household income, poverty reduction, sustainability, urban farming,*

## INTRODUCTION

In line with the global effort to achieve the Sustainable Development Goals (SDGs) by 2030, Indonesia continues to face challenges in reducing poverty. Poverty is defined as the inability to meet a community's minimum standard of living (Kurniawan & Kuncoro, 2016). In 2020, 25.77 million Indonesians (10.19% of the population) were living in poverty. Though this rate decreased slightly to 9.71% in 2021, poverty remains a critical social issue. The pandemic exacerbated this situation by reducing household purchasing power, increasing unemployment, and disrupting food supply chains. Poverty in Indonesia intersects with education, health, environmental conditions, and social marginalization, not just economics (UNDP, 1996).

Indonesia is an agricultural country that relies heavily on its productive agricultural workforce. In 2022, this workforce numbered 40.64 million people (BPS, 2022). Studies show that agriculture is more effective than other sectors in alleviating poverty, providing long-term benefits like food security, environmental protection, and community resilience (Mariyah & Nugroho, 2021). Traditional poverty alleviation

programs often face challenges related to targeting accuracy, leakage, and limited coverage, especially during crises like the 2020 pandemic. These limitations underscore the necessity of community-based strategies that bolster household income and resilience.

Urban farming has emerged as a promising strategy that transforms underutilized urban spaces into productive areas where food can be cultivated, income can be generated, and social engagement can be fostered. In addition to providing food, urban agriculture improves psychological well-being, fosters social cohesion, and promotes community learning (Turnšek, et. al., 2022; Wulandari, Witjaksono, Innekewati, & Dzikri, 2021). In Yogyakarta, urban poverty is concentrated in the city. There, 11.20% of the population lives below the poverty line, and the urban unemployment rate is 5.44%, which is higher than in rural areas (Central Bureau of Statistics, 2022). Community-led initiatives, such as the Ngudi Mulyo Pugeran project, demonstrate how urban farming can evolve from subsistence activities into productive livelihood strategies that meaningfully contribute to household economies.

Despite the recognized benefits of urban farming, its contribution to household income is not well understood. Existing literature has primarily focused on urban farming's social, cultural, and environmental functions, leaving little quantitative evidence on its economic dimension (Zezza & Tasciotti, 2010; Pribadi & Pauleit., 2015). Furthermore, previous studies have rarely differentiated income contributions across household income groups. Without this classification, it is unclear whether urban farming merely serves as a supplementary activity for low-income households or as a substantial source of income for wealthier ones. Understanding this differentiation is crucial because it reflects broader inequalities in access to productive assets, technology, and market opportunities that shape household economic resilience in urban areas.

The city of Yogyakarta is an ideal place to explore these dynamics. Despite its small geographic size, the city exhibits rapid urbanization, persistent income disparity, and a vibrant urban farming movement that integrates social participation with local economic innovation. These characteristics make Yogyakarta a microcosm for examining how socioeconomic diversity affects urban farming outcomes.

This study aims to quantify the contribution of urban farming to household income and to examine the factors that influence its variation across income groups in Yogyakarta. By quantifying the economic significance of urban farming, this research will contribute to the empirical understanding of its income-generating role. It will also provide policymakers with evidence-based insights on how urban agriculture can serve as a mechanism for livelihood diversification, poverty alleviation, and urban economic resilience.

## **LITERATURE REVIEW**

### **Conceptual Foundations of Urban Farming**

Depending on the context and purpose, urban farming, also known as urban agriculture or urban gardening, has been defined in various ways. For example, Mlozi (1996) described it as "an initiative to address the economic crisis by contributing to household income, food resource availability, employment, and market opportunities for the related agricultural sector in the urban economy." Urban farming optimizes local human and material resources by reducing food transportation costs and enhancing

energy efficiency within the same geographical area. Thus, urban farming is an integrated approach to food production that promotes social inclusion, economic development, and environmental sustainability simultaneously (McEldowney, 2017).

Urban agriculture encompasses controlled and uncontrolled production systems with social or commercial objectives (Dobbins, Cox, Edgar, Graham, & Perez, 2020). Hodgson, Campbel, and Bailkey (2011) further classified urban agriculture as non-commercial, commercial, or hybrid, indicating that it exists on a spectrum ranging from household production for subsistence to market-oriented systems. Thus, urban farming should be viewed as part of a broader urban economy where agricultural practices intersect with environmental management, livelihood diversification, and urban planning, not merely as a food security strategy.

### **Economic and Social Functions of Urban Farming**

Beyond its ecological and community functions, urban farming plays an important role in income generation and livelihood security, particularly in developing countries. Studies from Accra, Bangalore, and Nairobi found that about one-third of urban farmers earned more from agricultural activities than from their primary jobs, highlighting its impact on urban household economies (Mougeot, 2000). Similarly, in Lomé, Togo, urban farmers' monthly earnings were estimated to be up to ten times the minimum wage. In Dar es Salaam, Tanzania, nearly 70% of urban households earned more from urban farming than from formal employment.

Empirical evidence further supports the economic role of urban agriculture. In Kogi State, Nigeria, for example, urban agricultural income significantly increased total household income, prompting recommendations for government credit and extension support (Stephen, Shaibu, Sale, & Frank, 2016). In Indonesia, Almaghani, Winarno, Irham, and Pranyoto (2022) found that urban vegetable farming in Yogyakarta positively impacted household finances, though it accounted for only 0.24% of total income. These findings suggest that, although the financial contribution varies, urban farming consistently enhances income resilience for urban households.

At the city level, urban farming contributes to local economic development and the informal sector. In Kampala, Uganda, for example, urban farming strengthens food markets and creates circular economic opportunities by reusing organic waste for livestock feed (Kwiringira et al., 2024). Urban and peri-urban agriculture generate employment opportunities throughout the value chain, from production to distribution, making them drivers of livelihood diversification and economic sustainability (FAO, 2014; Pribadi & Pauleit, 2015).

### **Determinants of Income Contribution and Research Gap**

Understanding the economic implications of urban agriculture requires an understanding of poverty and income inequality. Poverty is broadly defined as the inability to meet basic living standards or access essential resources. It has multiple dimensions, including economic deprivation, structural constraints, and limited access to human and physical capital (Christopher, 2019). Scholars emphasize that poverty persists not only because of insufficient income, but also because of systemic inequities, such as low wages, a lack of education, and weak social institutions. Sachs (2005) elaborated that the extremely poor often lack six forms of capital: human, business, infrastructure, natural, institutional, and knowledge. These deficiencies collectively inhibit participation in productive urban economic activities, including urban farming.

In this context, urban agriculture is a strategy for diversifying livelihoods that can reduce vulnerability to income shocks. However, the magnitude and distribution of its income effects vary widely. Previous studies have shown that the contribution of urban farming depends on factors such as land area, input costs, production scale, and the presence of alternative income sources. Wijayanti and Bandesa (2019) identified land area, input prices, and labor as key determinants of farm income in Indonesia. Similarly, Gupito, Irham, and Waluyati (2014) demonstrated that sorghum farm income is influenced by farmer experience and resource inputs. In urban settings, Stephen et al., (2016) found that urban farming income was positively associated with household income in Nigeria, suggesting that urban farming enhances livelihood resilience. In Yogyakarta, Almaghani et al., (2022) revealed that the income contribution from vegetable farming was low and highly dependent on production scale.

Despite the growing body of research on this topic, there is still limited empirical evidence distinguishing income contributions across household income groups. Most studies evaluate average contributions without considering how socioeconomic status affects the advantages of urban farming. This gap is significant because income differentiation reflects broader inequalities in access to land, capital, and market networks, which influence a household's ability to benefit from urban farming.

Accordingly, this study uses a regression-based approach to identify factors that influence income contribution, emphasizing two key predictors. First, it is expected that other household income will negatively affect the proportion of total income derived from urban farming, as households with more diversified earnings rely less on farming activities. Second, it is hypothesized that income group differences, represented by a dummy variable (0 = low–middle income, 1 = middle–high income), will yield higher urban farming contributions among wealthier households because they typically have better access to land, technology, and production resources. Therefore, the following hypotheses are proposed are H1: Urban farming contributes differently across income groups, with higher contributions expected among middle-to-high income households and H2: Other household income negatively affects the relative contribution of urban farming.

## **RESEARCH METHOD**

The study was conducted on 217 farm households in urban Yogyakarta. The respondents were chosen by convenience sampling method and then stratified according to household income as perceived into two groups: low- to middle-income households (126 samples) and middle- to high-income households (91 samples).

Gross income from urban farming, operational expenses for fertilizer and electricity, and other household income were all included in the data collection. Fertilizer and electricity expenses were deducted from gross farming income to determine net income from urban farming. Net urban farming income was then added to other household income to determine total household income. The ratio of net urban farming income to total household income, expressed as a percentage, was used to calculate the contribution of urban farming to household income. Following Pratiwi and Haryastuti (2011), the level of contribution was classified into four categories: small (< 25%), moderate (25–49%), large (50–75%), and substantial (> 75%).

The analysis was conducted in two stages to find a solution for this research's double goals. The first was to apply a descriptive-analytical approach to estimate the proportionate contribution of urban farming, calculate its contribution to household income, and identify patterns of contribution across income classes. This stage provided insight into how urban farming contributes to household livelihoods across different economic statuses.

Second, a multiple linear regression was applied in order to estimate the determinants of the contribution of urban farming. The dependent variable was the contribution of urban farming (%) and the independent variables were (i) other household income and (ii) household income group, which was measured using a dummy variable (0 = low–middle income, 1 = middle–high income). The regression model is as follows:

$$\text{Contribution}_i = \beta_0 + \beta_1 (\text{Other Income}_i) + \beta_2 (\text{Dummy Income Group}_i) + \epsilon_i$$

This model was selected to assess whether membership in an income group has a significant impact on contribution levels and whether other income lowers the relative share of urban farming. Dummy regression is in line with previous studies that looked at socioeconomic group differences (Gertler et al., 2011), and the inclusion of other income as a predictor is in line with theoretical predictions that a higher non-farming income would reduce the relative importance of farming (Zezza & Tasciotti, 2010).

## RESULTS AND DISCUSSION

### Result

To provide an overview of respondents' economic characteristics, Table 1 presents the descriptive statistics of household income components according to income group.

Urban farming income among the surveyed households varied widely, ranging from IDR 2,100,000 to IDR 125,000,000. However, these gross figures do not reflect the actual earnings, as operational costs particularly fertilizer and electricity must be deducted. Fertilizer costs ranged from IDR 60,000 to IDR 2,100,000, while electricity expenses ranged from IDR 113,000 to IDR 3,172,000. After accounting for these inputs, net urban farming income ranged between IDR 1,707,000 and IDR 123,038,000. This variation illustrates differences in production scale, efficiency, and cost management across households.

The contribution of urban farming to total household income also showed diverse patterns. For lower-income households, urban farming typically provided less than 15% of income, suggesting a supplementary role. In middle-income households, its share rose to between 20% and 60%, indicating greater reliance on farming as a significant livelihood activity. Among higher-income households, urban farming sometimes contributed more than 60%, with the highest share exceeding 80% of total household income. These results highlight three key insights: higher farming income generally translated into higher net income despite rising costs, operational expenses significantly influenced profitability margins, and urban farming often served as an economic buffer, particularly for households with limited income from other sources.

The descriptive statistics highlight substantial differences in household income components between the low–middle income and middle–high income groups. On average, households in the low–middle income group earned IDR 731,190 from urban farming, while their counterparts in the middle–high income group reported a much

higher mean of IDR 32,483,626. After accounting for fertilizer and electricity costs, the mean net income from urban farming was IDR 535,960 for low–middle income households and IDR 30,231,780 for middle–high income households. This shows that urban farming contributes at a far larger monetary scale among wealthier households.

In terms of household income structure, the low–middle income group relied heavily on income from other sources, with a mean of IDR 38,373,016, compared to their net urban farming income of less than one million rupiah. Conversely, the middle–high income group had a more balanced distribution, with mean income from other sources (IDR 30,153,846) nearly equal to net urban farming income. Consequently, the average total household income amounted to IDR 38,908,976 for the low–middle group and IDR 60,385,626 for the middle–high group.

**Table 1. Descriptive Statistics of Household Income Components by Income Group**

<b>Statistic</b>	<b>Income Urban Farming</b>	<b>Cost of Fertilizer</b>	<b>Electricity Bill</b>	<b>Net Income Urban Farming</b>	<b>Income Other Source</b>	<b>Total Income</b>
<b>Mean (Low–Middle)</b>	731,190	115,667	79,563	535,960	38,373,016	38,908,976
<b>Mean (Middle–High)</b>	32,483,626	1,005,780	1,246,066	30,231,780	30,153,846	60,385,626
<b>Median (Low–Middle)</b>	700,000	60,000	68,500	503,000	34,500,000	35,123,000
<b>Median (Middle–High)</b>	29,200,000	1,200,000	1,181,000	27,107,000	28,000,000	56,769,000
<b>Mode (Low–Middle)</b>	780,000	60,000	47,000	–	21,000,000	–
<b>Mode (Middle–High)</b>	58,000,000	240,000	731,000	–	28,000,000	–
<b>Max (Low–Middle)</b>	1,900,000	1,300,000	967,000	1,667,000	120,000,000	120,299,000
<b>Max (Middle–High)</b>	125,000,000	2,100,000	3,172,000	123,038,000	54,000,000	144,038,000
<b>Min (Low–Middle)</b>	0	0	0	0	8,000,000	8,189,000
<b>Min (Middle–High)</b>	2,100,000	60,000	113,000	1,707,000	13,000,000	20,050,000
<b>STDEV (Low–Middle)</b>	431,273	170,025	85,654	373,193	21,006,820	20,979,042
<b>STDEV (Middle–High)</b>	24,686,204	640,925	741,546	23,732,486	8,885,598	24,796,506
<b>TOTAL (Low–Middle)</b>	67,531,000	–	–	–	–	–
<b>TOTAL (Middle–High)</b>	2,751,092,000	–	–	–	–	–

The median values reinforce this disparity. The median net income from urban farming was IDR 503,000 for the low–middle group, compared with IDR 27,107,000 for the middle–high group. Similarly, the median total household income reached IDR 35,123,000 and IDR 56,769,000 for the respective groups, confirming higher central tendencies among wealthier households. The maximum reported income from urban farming also illustrates the gap, with the middle–high group reaching IDR 125,000,000, far above the IDR 1,900,000 maximum in the low–middle group.

Variation across households, as measured by the standard deviation, was relatively modest in the low–middle group compared with the middle–high group. For example, the standard deviation of net urban farming income was IDR 373,193 for the low–middle group and IDR 23,732,486 for the middle–high group, reflecting both the larger scale and greater heterogeneity of urban farming income among higher-income households.

Overall, these results indicate that while urban farming generates only a marginal share of household income for low–middle income households, it represents a substantial and more variable source of income among middle–high income households. This suggests that higher-income households may be better positioned to capitalize on urban farming as a significant economic activity.

Income contribution from low to middle income : Net Income in Urban Farming/  
Total Income x 100%  
: (535,960 IDR / 38,908,976 IDR) x  
100% = 1.38%

Income contribution from middle to high income : Net Income in Urban Farming/  
Total Income x 100%  
: (30,231,780 IDR / 60,385,626  
IDR) x 100% = 50.06%

Total Income Contribution : Net Income in Urban Farming/ Total Net Income x  
100%  
: (535,960 IDR + 30,231,780 IDR) / (38,908,976 IDR +  
60,385,626 IDR) x 100% = 30.98%

Table 2 presents the calculation of urban farming's contribution to the total income fore urban farming participants.

**Table 2. Urban Farming Income Contribution**

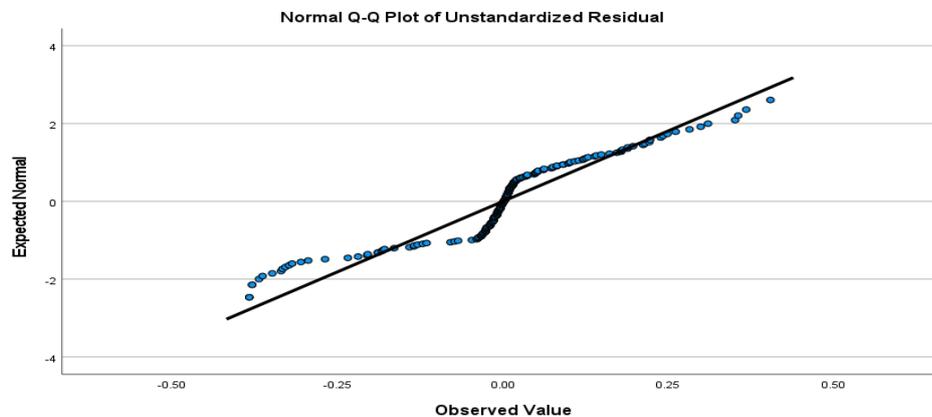
Category	Income Contribution (%)	Classification of Income Contribution
Low to Middle-Income Households	1.38	Small Contribution
Middle to High-Income Households	50.06	Large Contribution
Overall Contribution Across All Households	30.98	Moderate Contribution

The contribution of urban farming to household income shows a stark contrast between low–middle income and middle–high income households. For the low–middle income group, net urban farming income accounted for only 1.38% of total household income. Based on the classification by Pratiwi and Suhatmini (2011), this falls into the

category of a small contribution, indicating that urban farming plays only a marginal role in supporting the livelihoods of these households. Their income structure is therefore dominated by other sources outside of farming activities.

In contrast, the middle–high income group derived 50.06% of their total household income from urban farming, which is classified as a large contribution. This suggests that, unlike lower-income households, urban farming constitutes a core component of economic activity for higher-income households and contributes significantly to sustaining their household finances.

When both groups are considered together, the overall contribution of urban farming to household income reached 30.98%, which is classified as a moderate contribution. This aggregate figure highlights the unequal role of urban farming across socioeconomic groups: while it remains peripheral for low–middle income households, it becomes a major income source for middle–high income households.



**Figure 1. Normality Test Result**

Figure 1 shows Q-Q Plot Result: The Normal Q-Q Plot shows that the residuals closely track the diagonal line, only deviating minimally at the tails. This implies that the residuals are approximately normal, which supports the validity of the regression model.

**Table 3. ANOVA Results for the Regression Model**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	F	Sig.	
1	Regression		9.343	3	242.633	.000b
	Residual		4.12	214		
	Total		13.463	217		

a Dependent Variable: Y  
b Predictors: (Constant), X2, X1

From table 3, the overall regression model is statistically significant, according to the ANOVA results ( $F = 242.633$ ,  $p < 0.001$ ). This supports the utility of the regression model by indicating that the independent variables (X1 and X2) together account for a sizable amount of the variance in the dependent variable Y.

**Table 4. Regression Model Summary**

Model Summary <sup>b</sup>							
Model	R	R Square	Adjusted R Square	Change Statistics	F	Sig. F	Durbin-Watson
1	.833a	0.694	0.691	R Square Change	Change	Change	
1	.833a	0.694	0.691	0.694	242.633	0	0.197

a Predictors: (Constant), X2, X1  
b Dependent Variable: Y

The regression model fits well based on the information on table 4, with  $R = 0.833$  and  $R^2 = 0.694$ , which implies that approximately 69.4% of the variability of the dependent variable Y is explained by the independent variables X1 and X2. The adjusted  $R^2 = 0.691$  suggests minimal or no bias due to the number of predictors. F change = 242.633 ( $p < 0.001$ ) suggests the model is statistically significant. The Durbin-Watson statistic of 0.197 indicates positive autocorrelation, and this needs to be kept in mind when interpreting the results.

**Table 5. Multiple Regression Test Result**

Model	Coefficients <sup>a</sup>						Correlations		Collinearity Statistics		
	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
	B	Std. Error	Beta								
1 (Constant)	0.059	0.025			2.381	0.018	0	0.197			
X1	-1.098E-9	0.000	-0.077		-1.975	0.050	-0.266	-0.134	-0.075	0.946	1.057
X2	0.410	0.020	0.812		20.877	0.000	0.830	0.819	0.789	0.946	1.507

a. Dependent Variable: Y

Table 5 provides the regression coefficients for the contribution of urban farming to total household income. The intercept ( $\beta_0 = 0.059$ ,  $p = 0.018$ ) reflects a level of base contribution of 5.9% at the level of independent variables being zero. Other Income (X1) provides a negative impact ( $\beta_1 = -1.098E-9$ ,  $p = 0.050$ ), reflecting that those households with higher other income have a very small reduction in contribution by urban farming, as hypothesized. Dummy Income Group (X2) has a highly significant positive impact ( $\beta_2 = 0.410$ ,  $p < 0.001$ ), i.e., middle–high income households contribute 41 percentage points more to urban farming income than low–middle income families, holding other variables constant. The standardization coefficient ( $\beta = 0.812$ ) and t-statistic ( $t = 20.877$ ) both indicate the strength of this association. These results confirm that income category is a strong force behind the contribution of urban agriculture, with the effect of other income being negligible but significant.

These findings are consistent with the livelihood diversification theory (Ellis, 1999), which posits that wealthier households possess greater capacity to diversify their income sources, including through urban farming. From an urban resilience perspective, income diversification through urban agriculture enhances adaptive capacity against external shocks, particularly among middle–high income groups that can reinvest profits into productive activities.

## Discussion

The findings of this study confirm that urban farming's contribution to household income in Yogyakarta is strongly influenced by economic status, production scale, and income composition. For low- to middle-income households, urban farming contributed only 1.38% to total household income, a proportion classified as small by Pratiwi and Haryastuti (2011). This suggests that urban farming primarily serves as a supplementary livelihood activity, with most household income derived from non-agricultural sources. This pattern aligns with the livelihood diversification theory, which posits that households adopt multiple income-generating activities to reduce vulnerability and stabilize consumption in the face of income uncertainty (Ellis, 1999). In this context, small-scale urban farming serves as a diversification strategy for low-income groups, providing minor yet stable support for financial and food security rather than serving as a dominant source of cash income. This interpretation is consistent with that of Abdoellah et al. (2023), who observed that lower-income households in Indonesia mainly engage in urban farming to strengthen food security and reduce food expenditures.

In contrast, urban farming contributed 50.06% of total household income for middle- to high-income households, indicating a significant contribution and reflecting a shift in function from supplementary to primary livelihood activity. Wealthier households benefit more due to their greater capital capacity, which allows them to invest in higher-quality inputs, larger production areas, and better technologies, such as hydroponics and vertical farming, that yield higher productivity. This supports the economic principle of economies of scale, where increased production size reduces unit costs and raises profitability. This is why richer households are "more advantaged" in urban farming: they can efficiently manage operational costs, effectively access markets, and reinvest profits to sustain production cycles. Similar findings were reported by Ammatillah, Tinaprilla, and Burhanudin (2018) in Jakarta and in Addis Ababa where higher-income urban farmers achieved greater profitability due to their ability to increase production and expand their market reach (Ebissa, Desta and Fetene, 2024; Alene & Aga, 2025).

Overall, urban farming contributed 30.98% to total household income, which is considered a moderate contribution. This aggregate result underscores the disparate economic roles of urban agriculture among different socioeconomic groups. For lower-income households, urban farming mainly serves as a risk management and subsistence mechanism. For higher-income groups, however, it becomes a core business component. These dynamics demonstrate how urban farming contributes to urban resilience, which is the capacity of urban households to withstand and adapt to economic shocks through diversified, locally based livelihood systems (Meerow & Newell, 2016; Rodina, 2018). Thus, urban agriculture enhances household income and strengthens adaptive capacity and social-ecological stability within the urban environment.

The regression results further reinforce these interpretations. Other household income ( $X_1$ ) had a small yet significant negative impact on urban farming contributions ( $\beta_1 = -1.098E-9$ ,  $p = 0.050$ ). This suggests that households with higher non-agricultural earnings tend to devote fewer resources to urban agriculture. This finding is consistent with the livelihood diversification framework, which posits that households substitute low-return activities with more profitable ones as their economic capacity improves (Stephen et al., 2016; Almagthani, et al., 2022). Conversely, the income group variable

( $X_2$ ) was positive and highly significant ( $\beta_2 = 0.410$ ,  $p < 0.001$ ), suggesting that middle- to high-income households earn 41 percentage points more from urban farming than low- to middle-income households. This substantial difference reflects variations in capital endowment, production efficiency, and market integration, which are key drivers of income disparities in urban agricultural systems.

Importantly, the model's constant term of 5.9% indicates an underlying economic benefit of urban farming for all households, regardless of income class. This consistent positive contribution reinforces the idea that urban farming is a way to diversify livelihoods and strengthen urban resilience by providing stable supplementary income and food resources during economic downturns or disruptions. This finding aligns with the work of Wijayanti and Bandesa (2019) and Gupito et al., (2014), who emphasized the dual economic and social functions of small-scale farming in urban Indonesian communities.

Overall, the study shows that a household's economic status, income composition, and production scale significantly impact the contribution of urban farming to a household's total income in Yogyakarta. Wealthier households benefit from higher profitability and integration into the urban market system due to their capital capacity and scale economies, while lower-income households rely on urban farming as a financial and food buffer that enhances their resilience. Thus, these findings bridge the gap between empirical results and theoretical perspectives. Livelihood diversification explains the motivation for engagement across income groups, and urban resilience theory explains the broader socioeconomic value of urban farming in sustaining household stability in an increasingly uncertain urban environment.

## CONCLUSION AND SUGGESTION

This study concludes that urban agriculture plays different roles in households' economies in Yogyakarta. It functions as a complementary livelihood activity for lower-income households and as a primary source of income for higher-income groups. These differences reflect how socioeconomic status, production scale, and access to resources influence the extent to which households can benefit from urban farming. Empirical results reaffirm that household income structure and economic capacity are key determinants of urban farming's contribution to overall household income.

From a policy perspective, the findings underscore the necessity of targeted interventions to improve productivity, increase access to resources, and strengthen market connections among lower-income households. Simultaneously, these interventions should support technological innovation and value-chain integration for higher-income practitioners. These dual strategies could improve inclusiveness and sustainability in urban agricultural development programs.

This research contributes to the theoretical discourse on livelihood diversification and urban resilience. It does so by illustrating how urban agriculture functions as both an adaptive strategy and an economic specialization. The results support the livelihood diversification framework (Ellis, 1999) by showing that urban farming provides income stability and risk mitigation for vulnerable groups. Concurrently, the findings broaden the concept of urban resilience (Meerow & Newell 2016; Rodina, 2018) by showing that a household's socioeconomic capacity determines its ability to transform urban agriculture into a sustainable, resilient livelihood system.

Due to its cross-sectional design and single-city focus, this study is limited in its ability to capture temporal dynamics or spatial variations in income contribution. Future studies should use longitudinal or panel data to track changes in household adaptation over time and use spatial or comparative analyses across multiple cities to better understand regional diversity in urban farming systems. Incorporating institutional factors, policy support, and environmental variables would also enhance our understanding of how urban agriculture contributes to resilient and inclusive urban economies.

This study ultimately reinforces the idea that urban agriculture is a vital component of sustainable urban development, not just a food-producing activity. By combining economic opportunity with adaptive capacity, urban farming can serve as a practical approach to creating more resilient, inclusive, and environmentally responsive cities.

## REFERENCES

- Abdoellah, O. S., Suparman, Y., Safitri, K. I., Basagevan, R. M., Fianti, N. D., Wulandari, I., & Husodo, T (2023). Food security of urban agricultural households in the area of North Bandung, West Java, Indonesia. *Sustainability*, 15(24), 1-15. doi: 10.3390/su152416683.
- Alene, F. D., & Aga, M. A. (2025). The roles of urban agriculture to household food security: A case study in Kirkos Sub-City, Addis Ababa, Ethiopia. *Frontiers in Sustainable Food Systems*, 9, 1-18. doi: 10.3389/fsufs.2025.1444320.
- Almagthani, S.N., Winarno, K., Irham, I., & Pranyoto, A. (2022). *Contribution of vegetable urban farming to household income in the city of Yogyakarta*. Proceedings of the International Symposium Southeast Asia Vegetable 2021. doi: 10.2991/978-94-6463-028-2\_59.
- Ammatillah, R., Tinaprilla, N., & Burhanudin, B. (2018). Peran pertanian perkotaan terhadap pendapatan rumah tangga tani di DKI Jakarta. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*, 21(2), 177-187. doi: 10.21082/jpntp.v21n2.2018.p177-187
- Badan Pusat Statistik (BPS). (2022). Tingkat Pengangguran Terbuka (TPT) sebesar 5,86 persen dan rata-rata upah buruh sebesar 3,07 juta rupiah per bulan. Retrieved from: <https://www.bps.go.id/id/pressrelease/2022/11/07/1916/agustus-2022--tingkat-pengangguran-terbuka--tpt--sebesar-5-86-persen-dan-rata-rata-upah-buruh-sebesar-3-07-juta-rupiah-per-bulan.html>
- Christopher A. S. (2019). *The Causes of poverty*. Canada: Fraser Institute. Retrieved from: <https://www.fraserinstitute.org/sites/default/files/causes-of-poverty.pdf>
- Dobbins, C.E., Cox, C.K., Edgar, L.D., Graham, D.L., & Perez, A.G.P. (2020). Developing a local definition of urban agriculture: Context and implications for a rural state. *The Journal of Agricultural Education and Extension*, 26(4), 351-364. doi: 10.1080/1389224X.2020.1726779.
- Ebissa, G., Desta, H., & Fetene, A. (2024). Assessing economic sustainability and resilience of tomato farming ventures in Addis Ababa: A project-based evaluation. *Heliyon*, 10(5). doi: 10.1016/j.heliyon.2024.e27250.
- Ellis, F. (1999). Rural livelihood diversity in developing countries: Evidence and policy implications. *Natural Resource Perspectives*, 40(1999), 1-10.

- Food and Agriculture Organization (FAO). (2014). *Growing greener cities in Latin America and the Caribbean*. Rome: FAO. Retrieved from: <https://openknowledge.fao.org/server/api/core/bitstreams/e246828b-e2bf-4a8e-b279-5115140760e8/content>.
- Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., & Vermeersch, C. M. J. (2011). *Impact evaluation in practice*. Washington, DC: The World Bank. Retrieved from: <https://documents1.worldbank.org/curated/en/823791468325239704/pdf/Impact-evaluation-in-practice.pdf>
- Gupito, R. W., Irham, Waluyati, L.R. (2014). Analisis faktor-faktor yang mempengaruhi pendapatan usahatani sorgum di Kabupaten Gunungkidul. *Agro Ekonomi*, 24(1), 66-75. doi: 10.22146/agroekonomi.17383
- Hodgson, K., Campbel, M.C., & Bailkey, M. (2011). *Urban agriculture: Growing healthy sustainable places*. Chicago, USA: American Planning Association.
- Kurniawan, K. F. B., & Kuncoro, M. (2016). The impact of poverty alleviation programs on poverty at district level in Indonesia: Case study of Sleman. *Journal of Indonesian Applied Economics*, 6(1), 90-106. doi: 10.21776/ub.jiae.2016.006.01.5.
- Kwiringira, J., Mohling, E. W. P., Mathias, A., Ariho, P., Mugisha, J., Zakumumpa, H., Rujumba, J., & Tumwebaze, I. K. (2024). Urban agriculture as an evolved sustainable urban livelihood: Evidence from Kampala city, Uganda. *Agricultural & Food Security*, 13(1), 1–15. doi: 10.1186/s40066-024-00507-y.
- Mariyah, M., & Nugroho, A. E. (2021). Role of the agriculture sector in poverty reduction in East Kalimantan. Samarinda: *International Conference on Tropical Agrifood, Feed and Fuel (ICTAFF), Advances in Biological Sciences Research*, volume 17.
- Meerow, S. & Newell, J. P. (2016). Urban resilience for whom, what, when, where, and why? *Urban Geography*, 40(3), 309-329. doi: 10.1080/02723638.2016.1206395.
- McEldowney, J. (2017). Urban agriculture in Europe: Patterns, challenges and policy. In-Depth Analysis. *Report European Parliament, EPRS (European Parliamentary Research Service), Brussels*. Retrieved from: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2017/614641/EPRS\\_IDA\(2017\)614641\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2017/614641/EPRS_IDA(2017)614641_EN.pdf)
- Mlozi, M. (1996). Urban agriculture in Dar es Salaam: Its contribution to solving the economic crisis and the damage it does to the environment. *Development Southern Africa*, 13(1), 47-65. doi: 10.1080/03768359608439873.
- Mougeot, L. J. A. (2000). Urban Agriculture: Definition, presence, potentials and risks., growing cities, growing food: Urban agriculture on the policy agenda (pp. 1–42). *Feldafing: DSE*.
- Pratiwi, L.F.L., & Haryastuti, S. (2011). Analisis ekonomi rumah tangga petani nelayan dalam mendukung strategi penghidupan berkelanjutan Kawasan pantai Baron Kabupaten Gunungkidul. *Agro Ekonomi*, 18(1), 91-104. doi: 10.22146/agroekonomi.16702.
- Pribadi, D. O., & Pauleit, S. (2015). The dynamics of peri-urban agriculture during rapid urbanization of Jabodetabek Metropolitan Area. *Land Use Policy*, 48, 13–24. doi: 10.1016/j.landusepol.2015.05.009.
- Rodina, L. (2018). Defining “water resilience”: Debates, concepts, approaches, and gaps. *Wiley Interdisciplinary Reviews: Water*, 6(2). doi: 10.1002/wat2.1334.

- Sachs, J. D. (2005). *The end of poverty: Economic possibilities for our time*. New York: Penguin Group. Retrieved from: [https://www.economia.unam.mx/cedrus/descargas/jeffrey\\_sachs\\_the\\_end\\_of\\_poverty\\_economic\\_possibilities\\_for\\_our\\_time\\_\\_2006.pdf](https://www.economia.unam.mx/cedrus/descargas/jeffrey_sachs_the_end_of_poverty_economic_possibilities_for_our_time__2006.pdf)
- Stephen, I., Shaibu, U. M., Sake, F. A., & Frank, O. E. (2016). Assessment of the influence of urban agriculture on household income in Kogi State, Nigeria. *International Journal of Agricultural Economics and Rural Development*, 2(3),107-115. doi: 10.18819/ijavs.2016.1558.
- Turnšek, M., Skar, S-L. G., Piirman, M., Thorarinsdottir, R. I., Bavec, M., & Junge, R. (2022). Home gardening and food security concerns during the covid-19 pandemic. *Switzerland: MDPI*, 8(9), 778. doi: 10.3390/horticulturae8090778.
- United Nations Development Programme (UNDP). (1996). *Human Development Report 1996*. Oxford University Press: New York. Retrieved from: <https://hdr.undp.org/system/files/documents/hdr1996encompletenostats.pdf>.
- Wijayanti, N. K. H., & Bendesa, I. K.G. (2019). Analysis of factors affecting farmer revenues in Indonesia. *International Journal of Economics, Commerce and Management*, 7(5) 491-516.
- Wulandari, R., Witjaksono, R., Innekewati, R., & Dzikri, H. F. (2021). The motivation of farmer group members in utilizing urban yards in covid-19 pandemic in Yogyakarta City, Indonesia. *E3S Web of Conferences 316, 02040, EDP Sciences*. doi: 10.1051/e3sconf/202131602040.
- Zeza, A., Tasciotti, L. (2010). Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries. *Food Policy*, 35(4) 265–273. doi: 10.1016/j.foodpol.2010.04.007.