The Impact of Social Conditions and Regional Differences on Urban Farmer Household Income in Makassar City

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ABSTRACT

The existence of erratic seasonal changes and the increasingly narrow area of agricultural land has caused changes in agricultural commodities production, which have decreased in Makassar City. The decrease in production also causes a decrease in farm income, thus affecting farmers' household income. This research was conducted in Makassar City, Indonesia, aims to estimate the impact of social and regional differences on household income. An econometric model approach with a qualitative independent variable regression estimation method is used in this analysis. We used the explanatory method with sample areas in the sub-districts of Tamalate, Biringkanaya, Manggala, and Tamalanrea as centers of food commodity production in Makassar City. Based on the time dimension using cross-sectional data. The sample of research respondents purposively were 165 farmers. The results showed that farmers' household income in Makassar City came from the agricultural and non-agricultural sectors. The social variables (wife's education and farmer group) and regional differences significantly affect farmers' household income. In contrast, a farmer's age and household size as a social variable have no significant effect. The involvement of agricultural households in urban areas will significantly support food availability, even though farming families consume more products than sell them. Therefore, the application of technology and innovation as well as farmer regeneration can increase agricultural production and impact the household economy. In addition, food availability can overcome food insecurity and security towards sustainable urban agriculture.

INTRODUCTION

There are erratic seasonal changes (Amfo & Ali, 2020; Wossen et al., 2018), less agricultural land (Diehl et al., 2020; Valley & Wittman, 2019), urbanization (Ayambire et al., 2019; Azunre et al., 2019; Boudet et al., 2020), and other more profitable non-agricultural activities (Li et al., 2020) cause changes in the production of agricultural commodities. It also applies to both the outskirts and the center of Makassar City. The decline in production also causes a decrease in

farming income (Wastfelt & Zhang, 2018), thus impacting farmer household income. However, there has been an increase in suburban farming (Biddle & Hamermesh, 2020; Pribadi & Pauleit, 2015) in recent years, with higher production for areas near cities (Zhen et al., 2020) due to various reasons related to food security (Biddle & Hamermesh, 2020; Vandercasteelen et al., 2018), household economics (Barthel & Isendahl, 2013), even the resilience of the city itself (Gren & Andersson, 2018; Hallett et al., 2016; Vandercasteelen et al., 2018; Yuan et al., 2021).

The involvement of households in urban agriculture is closely related to increasing food security (Fletcher & Collins, 2020; Galli et al., 2020). Until now, food supply in urban areas has heavily relied on provisions from both urban and rural areas (Crush et al., 2017), which costs higher due to transportation costs, especially in rural areas are very far from cities. Besides, urban food production results are consumed mainly by themselves (Crush et al., 2017; Nagib & Nakamura, 2020) rather than sold. This distance creates opportunities for farmers in urban areas, especially in Makassar City, to plant agricultural commodities in the food and horticultural sub-sector, since it provides benefits, especially transportation (Doernberg et al., 2019; Ecker, 2018; Vermeiren et al., 2013) and health (Crush et al., 2017; Doernberg et al., 2019) by providing a variety of vegetables (Vermeiren et al., 2013) so that it has an impact on

household income even without formal planning (Nagib & Nakamura, 2020). Food commodities are fundamental problem and solution for urban food security in terms of production (Abokyi et al., 2020) and food security (Galli et al., 2020; Mcdougall et al., 2020; Sroka et al., 2019), especially during the pandemic (Laudia et al., 2017; Pham & Turner, 2020).

Researching farmers' household income in urban areas is crucial because agriculture is still attractive for some people in Makassar City, even though it is constrained by limited land and resources. Moreover, agricultural households in urban areas play a vital role in ensuring food availability, despite the fact that they tend to consume more produce than what they sell. Food availability can overcome food insecurity and security towards sustainable urban agriculture.

Apart from providing food, urban agriculture will provide economic value by increasing income (Azunre et al., 2019; Zezza & Tasciotti, 2010) by up to 75.5% in commercial urban agriculture (Abdoellah et al., 2023) and 62.7% in small farming (Ammatillah et al., 2018). It can also create jobs (Azunre et al., 2019; Cook et al., 2015; Goodman & Minner, 2019), increase the number of micro entrepreneurs (Jassem & Razzak, 2021), and taxes (Azunre et al., 2019). In Indonesia, urban farming has helped improve food security and supply chains during the pandemic (Hanifa et al., 2023). Like other cities, Makassar also employs 6,308 workers in this sector (Badan Pusat Statistik Kota Makassar, 2020), which helps reduce

household expenses (Munir et al., 2017).

Farmers' income often falls during a pandemic as do other sectors (Kansiime et al., 2021). It was shown by (Sarni & Sidayat, 2020), which could see a drop of up to 58%. However, with the end of the social restrictions imposed by the pandemic, urban agriculture is no longer just for the consumption of farming households (Grigorescu et al., 2022). Farmers have sought to increase their production for sale to increase household income.

Many researchers research farmers' household income in various countries, such as urban agricultural households' impact on food security status (Fei et al., 2020). Food insecurity (Mcdougall et al., 2020) in Ibadan Metropolis, agricultural and non- agricultural diversification on household income (Kansiime et al., 2021), the existence of urban agricultural households in Maseru can support food security (Galli et al., 2020), the contribution of integrated urban agriculture to household income in Kinondoni Municipality (Yusuf et al., 2015), as well as determinants of household income between urban and rural areas with different characteristics in terms of poverty in India (Ampaw et al., 2017). However, there has not been a study that investigates the household income of urban farmers by utilizing a qualitative independent variable regression, which analyzes the relationship between different agricultural production areas and its impact on household income.

Using a certain approach called qualitative independent variable regression estimation model is crucial in analyzing the variation of highest household income among urban farmers in different areas through estimation or analyzing relationships. Therefore, this study aims to analyze the impact of farmers' social conditions and regional differences (as qualitative variables) on their household income.

METHODS
Study Area
Makassar City is between $119°24'17'38"$ East Longitude and $5°8'6'19"$ South Latitude (Badan Pusat Statistik Kota Makassar, 2021). Based on its geographical position, Makassar City has boundaries, namely to the north (Maros Regency), south (Gowa Regency), west (Makassar Strait), and east (Maros Regency). The area of Makassar City is recorded at 175.77 km² covering 15 sub-districts, namely Mariso, Mamajang, Tamalate, Rappocini, Makassar, Ujung Pandang, Wajo, Bontoala, Ujung Tanah, Sangkarrang Islands, Tallo, Panakukkang, Manggala, Biringkanaya, and Tamalanrea.

The research method employed was explanatory, with purposive selection of sample areas located in the sub-districts of Tamalate, Biringkanaya, Manggala, and Tamalanrea, which are the primary production hubs for food commodities in Makassar City. It can be seen that rice farming persists in suburban areas. Based on the time dimension of data collection, we use cross-sectional

data. The sample of respondents for the research was a purposive selection of 165 male farmers who always have food crops every planting season.

Data Analysis Method

To analyze the factors affecting the household income of urban farmers in Makassar City, we employ a dummy variable regression estimation model (Heshmati et al., 2019) as follows:

$$FHI = \beta_0 + \beta_1 FAge + \beta_2 WfEd \\ + \beta_3 HS + Dm_1 Tmlt + \\ Dm_2 Bky + Dm_3 Mggl + \\ Dm_4 FG + \mu$$

where is *FHI* farmer household Income (IDR); β_0 is intercept; β_1 ,..., β_3 are independent variable regression coefficients, Dm_1 ,..., Dm_4 are dummy variable coefficients; *FAge* is farmer age (year); *WfEd* is wife's education (year); and HS is the household size (people). *Tmlt* is 1 for the Tamalate sub-district and 0 for the other; *Bky* is 1 for the Biringkanaya sub-district and 0 for the other; *Mggl* is 1 for the Manggala sub-district and 0 for the other; Tamalanrea sub-district is the control variable; *FG* is 1 for farmer group and 0 for others; μ and is disturbance error.

RESULTS   AND   DISCUSSION

In theory, households increase their welfare by maximizing the utility of various consumptions with constraints on potential income, time resources, and production functions (Waglé & Koirala, 2014). Potential income is endogenous as the first constraint in the household budget of farmers in Makassar City, which is used to buy agricultural production inputs. Consuming the produce rather than selling it can satisfy urban farming families and help overcome their food insecurity.

In addition, leisure time is the second obstacle urban farmers allocate to relax and cooperate with the total time resources owned by their households. Despite consuming the majority of their agricultural output, farmers benefit from using family labor input. Increasing labor input through technology in agricultural work will affect the time available for household work and leisure time, especially for women in rice farming households (Addison et al., 2020).

The third constraint is in the implicit form of the production function, between one agricultural commodity using two types of inputs, which are labor (in the family and outside the family) and the use of fertilizers (urea, NPK, ZA, and manure). The aim is to boost production and farm income, which in turn impacts household income; however, income can decrease even under pandemic conditions (Annisa et al., 2022). Household decisions on labor allocation impact the absorption and long-term use of both agricultural and non-agricultural activities (Nalunga et al., 2019). Urban areas, including Makassar, are facing the problem of land conversion which affects the

livelihoods of farmers, as highlighted by (Azadi et al., 2018).

The average household income of farmers in Makassar City is IDR 72.78 million/year, from farm income of IDR 31.13 million/year and non-farm income of IDR 41.65 million/year (**Table 1**). The non-farming income comes from work as employees, laborers, online motorcycle taxis, selling fruit, trading, security, and raising livestock. Makassar City farmers consume the majority of their crops and engage in non-farming work to fulfill other necessities, which affects household agricultural choices, income, development, welfare, and food security (Osarfo et al., 2016). Diversifying non-farm income is a survival strategy (Weltin et al., 2017), especially for poor farmers (Edirisinghe, 2015).

When calculating farm income, it is assumed that the entire harvest for the year is sold and not used for personal consumption, distributed to family and neighbours, or saved for the next planting season as seed.

Farmers typically sell a portion of their crops, ranging from 5% to 21%, for household non-food consumption and between 3% to 50% for labour wages and harvesting costs. The farming family consumes the remaining crops.

Although empirical data has calculated the difference in household income with previous studies descriptively, it has yet to be analyzed in terms of relationship analysis through regression estimation. Undoubtedly, this will result in qualitative variations of income among urban farming households in different regions (sub-districts) due to independent variables.

The multicollinearity test does not show multicollinearity because of VIF <10. Then the heteroscedasticity test shows that the Glesjer test coefficient (β) is not significant, which means that there is no heteroscedasticity. Measuring the model's accuracy with the adjusted R^2 shows that the independent variable contributes 64.88% to farmers' household income, while 35.12% of the model cannot explain others. The F-test results show that the independent variables simultaneously significantly affect farmer household income (**Table 2**). Furthermore, we use a t-test to know the partial effect of each independent variable.

Table 1. Makassar City farmer household income

Sub-district	Farm income (IDR/ year)	Non-farm income (IDR/ year)	Household income (IDR/ year)
Tamalate	22,986,005.26	41,315,789.47	64,301,794.73
Biringkanaya	31,613,379.55	40,159,090.91	71,772,470.46
Manggala	56,054,997.69	41,461,538.46	97,516,536.15
Tamalanrea	13,848,680.00	43,680,000.00	57,528,680.00
Average	31,125,765.63	41,654,104.71	72,779,870.34

Source: Analysis data (2020)

Table 2. Estimation of farmer household income with dummy variable regression

Independent Variable	ES	β_i	t-test	VIF
Farmer age	-	-135462.00^{ns}	-1.1280	1.0491
Wife education	+	2336716.00***	6.7196	1.0746
Household size	+	-57014.32^{ns}	-0.0925	1.0541
Dummy of Tamalate sub-district	+	6861982.00**	2.3182	2.2399
Dummy of Biringkanaya sub-district	+	13706890.00***	4.5096	2.0427
Dummy of Manggala sub-district	+	39521669.00***	12.5494	2.0240
Dummy of farmer group	+	9628909.00***	3.9048	1.0748
Intercept				34681686
F-test				44.2806
Adjusted R^2				0.6488
Glejser test				0.5947^{ns}
n				165

Note: *** is a level error significance of 1%; * is a level error significance of 10%; ^{ns} is not significant, and ES is an expectation sign. If the VIF value is less than 10 there is no multicollinearity and vice versa. If the Glesjer test probability value is not significant then there is no heteroscedasticity and vice versa.
Source: Analysis data (2023)

Social Variables

Changes in social conditions can lead to an increase in both income and free time which can be utilized to meet the demands for food and aesthetics as well as recreational needs in urban areas (Hastuti et al., 2021). In this study, the farmer's age, wife's education, household size, and participation in farmer groups are social variables in farmers' household income in Makassar City. The farmer's age as the head of the household has no significant effect on the Makassar City farmers' household income. These results are in line with the findings in Kinondoni Municipality (Victor et al., 2018) and China (Li et al., 2020) but differ from the findings in Ghana (Kansiime et al., 2021). In the research area, the farmers' age ranged from 31 - 68 years, with the average age of the farmer as the head of the household is 47 years old, so it is still in the productive age group. This result is similar to the average age of farmers in the Ibadan Metropolis of 46.9 years (Mcdougall et al., 2020) and Akwa Ibom State with an average age of farmers of 51 years (Okon et al., 2018). The findings (Guo et al., 2015) in Jianshu City, China found that an elderly population of farmers with reduced productivity levels mainly produces agricultural production. It is also supported by the regression results (**Table 2**), which show that the older the farmer, the lower the

household income.

The education of a farmer's wife is a significant variable that affects at a 99% confidence level. Wives play a crucial role in regulating household consumption, including both food and non-food items. The benefits of education for individuals as an investment increase income and welfare (Mariana, 2015). A farmer's wife's average level of education in the study area is a high school or equivalent to 10-12 years of education. This finding differs from that in Tanzania, which was only two years (Anderson et al., 2017). Referring to the wife's education level, we can predict an additional increase in household income of IDR 2.36 million/year because a high enough education level will provide innovation to increase farm production through technology and better non-farm work. As in Malaysia, applying technology and innovation from various methods will increase food production in urban areas (Li et al., 2020). Education level, availability of facilities and infrastructure can impact household income, especially when wives bring in additional income (Rahim & Hastuti, 2018) leading to changes in urban farmers' consumption patterns (Hastuti et al., 2021). Women are central to the success of poverty alleviation efforts in the short, medium, and long term. Empowerment has a crucial role in redistributing socio-economic power and resource mastery, which benefits women and is recognized worldwide as a vital element in achieving rogress in all fields (Meetei et al., 2016).

The average number of household members is four people. Although it has a negative relationship with income, it is not significant. It means that the larger the household members, the lower the household income. In reality, family members of unproductive age groups do not contribute to increasing household income. These results are similar to the findings (Li et al., 2020) in China and differ from (Chinh & Cuong, 2023) findings. Similarly, in Bangladesh, it was found that household income from agriculture and the non-agricultural sector was positively influenced by family size (Rahman, 2017). The role of family members who work like wives acts as a housewife in a member's family and performs productive activities to increase family income (Rahim & Hastuti, 2018), such as farming vegetables, while the husband acts as a rice farmer in Makassar City. In the decision-making process, women are equal to men in the household and society in general (Osmani, 2018). According to (Eskander et al., 2018) family size is a key determinant of income diversification for households to increase earnings. A larger household can significantly influence diversified agricultural production (Baba & Abdulai, 2021), leading to increased farm and non-farm incomes.

Participation of farmers in farmer groups has proven to be effective in increasing household income. It happens naturally because it motivates farmers to acquire information and subsidies for fertilizers, seeds, and even hand

tractors. Still, 19.4% of farmers in this study have yet to join a farmer group. This, in turn, leads to enhanced farmer productivity, as found by (Arsyad et al., 2018; Rahmadanih et al., 2018) . Additionally, with access to market information, especially prices, farmers can get fair prices for their produce, which ultimately increases their income, as confirmed by (Arsyad et al., 2018; Pramono & Yuliawati, 2020).

Region Difference

The dummy variable distinguishes variations in intercepts and constant slopes among individuals and has categorical variables (Smith, 2015), including sub-districts in Makassar City for this study. We aimed to conduct a dummy variable analysis to determine if there were any differences between the four main agricultural production sub-districts. The estimation results show that regional differences in each sub-district positively affect farmer household incomes in Makassar City (**Table 2**). Empirically, it follows the expectation sign: farmers' household income in the Manggala sub-district is higher than in the Tamalanrea sub-district (control variable) and Biringkanaya and Tamalate sub-districts (**Table 1**). Manggala sub-district has the most significant influence, which is IDR 43.14 million/year. The high income in the Manggala sub-district is inseparable from the high income from farming as a center for food crop production, which reaches 57.48% of household income (**Table 1**). The

subsequent most considerable regional influence is Biringkanaya, Tamalate, and Tamalanrea sub-districts. Therefore, it is necessary to protect this area from land conversion.

One welfare indicator is income or profits from the difference between revenues and costs (Rahim & Hastuti, 2018). The high income of farming in the area is due to the Fisheries and Agriculture Office of Makassar City making this area a pilot area. Using the best quality inputs, such as superior seed varieties, fertilizers, and spacing methods, can help achieve optimal production. The yield is also high, as in the (Zella, 2018) findings in Dodoma City that urban agriculture contributes to reducing poverty through a significant increase in income.

Makassar City's agricultural income contribution is also obtained using idle land or river banks and reservoirs, such as land on the banks of the Tallo River and Jene'berang River, as well as the edges of other reservoirs and waterways. This farming activity usually stops during high rainfall between December - April. It happened in Makassar City, where the area of rice fields decreased by 4.11% in 2021, leaving 2,789.1 ha (Badan Pusat Statistik Sulawesi Selatan, 2023). This condition results from widespread land conversion, especially in urban areas. In southern states, agriculture's role in urbansustainability is often overlooked, leading to temporary land abandonment due to uncertain sustainability, which may occur when landowners aim to use or sell their land (Azunre et al., 2019). The case of

using space available for urban agriculture in Malaysia is also carried out in maintaining food needs (Ngahdiman et al., 2017), including to improve the household economy (Surya et al., 2020).

CONCLUSION AND SUGGESTION

Farmer household income in Makassar City comes from farming and non-farming. The variables that significantly affect household income are the wife's education, farmer group, and regional differences, whereas the age of the farmer and household size are not significant. The involvement of agricultural households in urban areas strongly supports food availability at lower prices, reaching consumers, although most of it is consumed by themselves. To increase agricultural production, it is possible to use technology and innovation and to maintain agricultural production centers. Food availability will overcome insecurity and create food security for sustainable urban agriculture. Similar to agriculture as a whole, it is necessary to revitalize farmers in order to boost production and ultimately raise their household income, especially motivating farmers to join farmer groups.

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