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LAND AND LABOR INSTITUTION IN URBAN AGRICULTURE IN SUPPORTING FOOD SECURITY IN MAKASSAR CITY

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ABSTRACT

Limited land in urban areas shifts agricultural land to land belonging to institutions, which are increasingly narrow and uneven, resulting in the use of vacant land in several corners of urban areas. Meanwhile, some farmers use hired labor to harvest their crops. Both of these are considered to affect the food security of farmer households. This study used an explanatory method in which the collection of 165 farmer households was carried out using the snowball method. The data is then analyzed using a logit model. Based on the analysis results, household income, wife's education, land area, and land ownership institutions will increase household food security. Conversely, the number of family members and labor institutions will increase the chances of farmer households experiencing food insecurity. Therefore, policies are needed to protect agricultural land, especially those with ownership status.

Keywords: *food security, labour institutions, land institutions, urban agriculture*

BACKGROUND

Urban agriculture is an agricultural activity located in and around urban areas (Andrianyta & Mardiharini, 2015; Ashari et al., 2016; Cahya, 2014). It has a role in dealing with urban food insecurity issues, such as on land yards and vacant land in large urban areas (Zezza & Tasciotti, 2010; Andrianyta & Mardiharini, 2015; Ashari et al., 2016; Cahya, 2014; Rauf et al., 2013; Grewal & Grewal, 2012). In addition to having economic benefits, urban farming also has social and environmental benefits (Cahya, 2014; Mitchell & Hanstad, 2004). According to Cahya (2014) and Slabinski (2013), urban agriculture can be a solution because it not only makes empty land useful but also provides a cheap and flexible solution for people with financial difficulties. It can impact the urban household economy by providing for the family and additional income (Kehlenbeck et al., 2007; Egal et al., 2001; Nugent, 2000).

Furthermore, the problem of limited land ownership, unequal distribution of land ownership, and heavy population pressure on land give rise to cooperation between large landowners and farmers

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with narrow land or landless farmers in a land institution that is agreed upon and obeyed by the community (Fujimoto, 1996; Hartono et al., 2001; Hayami & M. Kikuchi, 1981; Suwarto, 2007). The increase in population every year from 1,342,800 people in 2010 to 1,526,677 people in 2019 is a challenge in itself to meet food needs (Badan Pusat Statistik Sulawesi Selatan, 2020a; Cook et al., 2015). Considering that paddy fields have decreased from 2,700 ha (2010) to 2,636 ha in 2019 with the primary production being rice (Badan Pusat Statistik Sulawesi Selatan, 2020a; Badan Pusat Statistik Kota Makassar, 2020). It cannot be denied because rice is the main product of farmers in South Sulawesi, including Makassar (Zain, 2015). Meanwhile, land use will directly affect food availability (Lattre-Gasquet et al., 2018). In this case, land institutions in Makassar City can be differentiated into owners, leases, and profit-sharing.

In contrast to labour institutions whose existence is under the needs of society, Kanazawa (1986) and Suwarto (2007), explains that using non-paid labour, such as splice, krubutan, and prayaan. Farmers can obtain labour with small cash outlays, this very assists farmers in achieving food subsistence (Suwarto, 2007).Likewise, in Makassar, farmers use more family labor or *mapparele* (work together). Only a tiny proportion use labor outside the family as wage labor. The diversity of these institutions allows farmers and rural residents to use labour outside the family in their communities at a relatively low cost (Kanazawa, 1986; Suwarto, 2007). However, the more commercial farming is carried out, the relationship follows the market mechanism through the wage system (Hartono, 2003; Hayami & M. Kikuchi, 1981; Kasryno, 1984).

The institutional forms of land and labour that develop are thought to follow market mechanisms. According to Newbery (1975), land institutions are categorized as perfect competition markets with the level of productivity that will determine the choice of institutional form so that the higher the level of productivity, the land owner will work on it himself (Kasryno, 1984). Apart from that, it is a means for owners to obtain benefits from land and labour to meet food needs in urban areas (Suwarto, 2007). Meanwhile, the choice of farmers to use hired labour is seen as weakening non-wage labour institutions (Hartono, 2003; Hayami & Kikuchi, 1981).

Makassar, as the capital of South Sulawesi Province, has an agricultural land area of 40.4% of its entire area (17,577 ha) consisting of 2,636 ha of paddy fields (2,596 ha planted with rice and 40 ha planted with other crops) and 4,458 ha non-paddy fields. Only 2.7% of the land planted with rice was planted three times because 74.3% was still non-irrigated land (Badan Pusat Statistik Sulawesi Selatan, 2020b).

Table 1. Area of Paddy Fields Planted with Rice in Three Cities of South Sulawesi (ha)

City	Irrigation			Non-irrigation		
	2014	**2015**	**2016**	**2014**	**2015**	**2016**
Makassar	722	795	895	1,801	1,754	1,714
Pare-Pare	240	240	240	592	579	577
Palopo	2,092	2,097	2,423	258	256	248

Source: Badan Pusat Statistik Sulawesi Selatan, 2019

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In the study area (Table 1), the area of paddy fields with irrigation has increased, except in Pare-Pare. In contrast, the area of non-irrigated paddy fields has decreased for the three cities. The decline in land is due to land conversion to the non-agricultural sector. Changes in urban land use impact the disintegration of agricultural institutions. So, farmers convert agricultural land caused by external factors, such as experiencing crop failure, problems with agricultural production facilities that are not affordable, and experiencing fluctuations in agricultural prices. In addition, there are internal factors, namely workers who work in agriculture for less than eight hours, get low yields, earn higher non-agricultural income, and find it increasingly difficult to find agricultural workers (Setiawan et al., 2018).

According to Fauzi et al. (2016), several studies have stated that urban agriculture not only solves problems of access and availability of food but also creates new jobs and reduces poverty, as well as supports the nutritional needs of families (Egal et al., 2001; Kusharto & Hardinsyah, 2012). In addition, the development of urban agriculture in Indonesia, especially Makassar, has obstacles, including low levels of community participation, small land ownership, and lack of government support. The affordability of food or community accessibility to food is largely determined by purchasing power, and this purchasing power is determined by the amount of income and commodity prices especially in Makassar (Purwaningsih, 2010).

Food security is popular through the World Food Conference organized by the United Nations (UN) and FAO in 1974. This conference was inspired by the global crop failure incident that occurred in 1972 and became a global food crisis in 1974, which caused widespread famine in South Asia and Africa (Purwaningsih, 2010; Simatupang, 2016). Concerning the diversification of food security, the aim is not only to reduce dependence on rice but to increase nutrition improvement for the quality of human resources (Darma, 2014). It can be said that as an indicator of people's welfare today, the consumption of carbohydrates is no longer rice but sago, tubers, and others because the feeling of fullness with rice is an unhealthy feeling of fullness due to malnutrition (Darma, 2014; Rungkat & Zakaria, 2006). Land area, access to land, and management will affect food security (Prasada et al., 2020; Dwiartama et al., 2022; Pranadji, 2005). Likewise, the use of labour (Nwaiwu & Onyeneke, 2021). Based on these matters, land and labour institutions on the urban agricultural food security level in Makassar City are interesting to study. Furthermore, this study will combine the two using the logit model approach. Therefore, this study will examine the influence of land and labour institutions on the food security of farmer households.

RESEARCH METHODS

This research was carried out in Makassar purposively because it has the largest rice fields for irrigated and non-irrigated rice fields (Table 1). Then it was carried out in March-October 2022. The type of research used in this study is the explanatory method (Singarimbun & Effendi, 1989). Namely estimating the effect of household income, number of household members, land institutions, and labour institutions on the level of agricultural food security in urban areas in Makassar City. In addition, qualitative analysis was used to analyze land and labour institutions by applying an inductive

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research perspective and translating the complexity of a problem (Creswell, 2014). The research respondents were selected based on a snowball sampling of 165 farmers. To answer the objective, we collected farmer households' socio-economic data through interviews.

Furthermore, to estimate the effect of household income, the number of household members, the wife's education, land area, age, land institutions, and labour institutions on the urban agricultural food security level in Makassar City, a logit model estimation is used. The qualitative dependent variable response or logit model is based on the logistic distribution. In most cases, the dependent variable model describes a dichotomous or probabilistic distribution. It explains the qualitative response of the dependent variable (Borooah, 2002; Demaris, 1992). The cumulative logistic probability function model is written as follows:

$$Pi = F(Zi) = (\beta_0 + \beta_0 X_i) = \frac{1}{1 + e^{-Zi}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_i)}}$$

Information:

1. e : The natural logarithm with a value of 2.718.
2. Pi : A probability with a value between 0 and 1.
3. Z : Located between – ∞ and + ∞.

Equation above can be manipulated by multiplying $1 + e^{-z_i}$ on both sides, resulting in the following equation:

$$(1 + e^{-z_i})P_i = \frac{1}{1 + e^{-z_i}} \times (1 + e^{-z_i})$$
$$(1 + e^{-z_i})P_i = 1$$

If equation above is divided by Pi which is reduced by 1, it will produce the following equation:

$$\frac{(1 + e^{-z_i})P_i}{P_i - 1} = \frac{1}{P_i - 1}$$
$$e^{-z_i}\frac{1}{P_i - 1} - 1 = \frac{(1 - P_i)}{P_i}$$
$$\frac{1}{e^{-Zi}} = \frac{(1-Pi)}{Pi} \text{ or } e^{-Zi} = \frac{Pi}{(1-Pi)}$$

The latest equation can be transformed into a natural logarithmic model to produce new equation as follows:

$$Z_i = ln\left(\frac{p_i}{1 - p_i}\right)$$

If $e^{-Zi} = Z_i$ then equation can be written as:

$$Z_i = ln\left(\frac{p_i}{1 - p_i}\right) = \beta_0 + \beta_i X_i$$

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Based on this equation, then the estimation model for this research is with the multiple regression equation by referring to the logit model estimation as follows:

$$TKPM = \left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 \pi RTPP + \beta_2 JART + \beta_3 PendI + \beta_4 L + \beta_5 U + \delta_1 DmKLPm + \delta_2 DmKLPb + \delta_3 DmKTK + \mu_i$$

Information:
1. $TKPM$ is the level of food security in Makassar with probability $P1 = P(Y = 1)$ if the household is food secure and probability $P2 = P(Y = 0)$ if the household is food insecure.
2. β_0 is an intercept/constant
3. β_i is the regression coefficient of the independent variable
4. δ_i is the coefficient of the dummy variable
5. $\pi RTPP$ is urban agricultural household income (Rp per month)
6. $JART$ is the number of household members (people)
7. $PendI$ is the wife's education (year).
8. Institutional dummy of urban agricultural land with $DmKLPm$ is 1 if ownership and $DmKLPb$ is 1 if for profit-sharing.
9. Institutional dummy of urban agricultural labor, $DmKTK$ is 1 for wages; μ_i is the confounding error.

RESULT AND DISCUSSION

Social Conditions of Farmers, Land, and Labour Institutions

The social conditions of farmers and land and labour institutions in Makassar City are shown in Table 2, with 165 farmers as research respondents. In the age group, it can be seen that the respondents are still in the productive group, except for four respondents who are in the non-productive age. Productive age will affect the work productivity of farmers based on their physical strength (Zaman et al., 2020). Furthermore, it will increase household food security through increased income. Although some countries, such as China, have an aging agricultural workforce (Guo et al., 2015). However, it is not without challenges the problem of farmer regeneration, given the goal of making Indonesia a world food barn in 2045.

Table 2. Social Conditions of Farmers, Land and Labor Institutions

Respondents Characteristics	Sum (People)	Percentage (%)
Age (years)		
31 – 40	30	18.18
41 – 50	84	50.90
51 – 60	36	21.82
≥ 61	15	9.09

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Wife's formal education (years)		
0 – 3	25	15.15
4 – 6	42	25.45
7 – 9	53	32.12
10 – 12	39	23.64
≥ 13	6	3.64
Member of family (people)		
≤ 2	18	10.91
3 – 5	98	59.39
6 – 8	48	29.09
≥ 9	1	0.61
Institutional own land (people)	103	62.42
Institutional profit-sharing land (people)	59	35.76
Institutional labor wages (people)	83	50.30

Source: Primary Data, 2022

Meanwhile, from the wife's education perspective, it can be seen that 40.60% only have primary school education and have never even attended school. Level of education influence the success of a business with skills in managing it because the higher the level of education, the more responsive in accepting and implementing innovations (Rahim et al., 2019). Even Abokyi et al. (2020) said it would ease access to the market. Thus, this variable will positively affect income. That is, the higher the education level, the higher the farm income level will be. One was founded by Victor et al. (2018) in Tanzania. Likewise, the number of family dependents is around 3-5 people. It implies that the ownership of children in a farming family in the city is between 1-3 children, unlike the case with farmers in rural areas (Hastuti et al., 2022). The number of family members will have an impact on the number of mouths that must be fed each day—the more family members, the greater the household food consumption.

Furthermore, the processed institutional land is divided into land ownership, profit-sharing, and temporarily unused land use. More than 62% have their status passed down from their parents. The ownership is still maintained to meet the family's food needs. It cannot be separated from rice as the staple food of farmers in the study area. Only 36% apply profit-sharing. They are a group of farmers who no longer have land to cultivate, so they are willing to cultivate other people's land. Therefore, there is a mutually beneficial relationship. At the same time, using wage labour is around 50%. Although most crops are consumed by themselves, farmers still use labour outside the family. Wage workers are only used during the harvest with a wage system in the form of newly harvested grain, with no transactions using money.

Income, Consumption, and Household Food Security

Household income is obtained from the farm and non-farm income (Table 3). Calculation of farm income in Table 3 with the assumption that all farm crops are sold. However, in reality, only 5% is sold, the rest is consumed by themselves or used as payment for labour. Farmers consider this behavior to be more rational than selling their crops and then having to buy back rice for household

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consumption. Farmers think that the rice they buy is more expensive and may not suit their taste. This take-home income is equivalent to Rp 106,385/month. Unlike the non-farming income, which comes from the husband's and wife's income, Rp 2,833,333.33 and Rp 616,666.67.

Table 3. Farm Household Income

Income type	Average (Rp/month)	Percentage (%)
Farm income	2,643,209	43.38
Non-farm income	3,450,000	56.62
Household income	6,093,209	100

Source: Primary Data, 2022

Furthermore, the income earned is used to finance his family's needs (Table 4). Non-food expenditure accounts for 59% of the total consumption of farmer households. Non-food expenditure consists of spending on electricity (8.3%), water (1.1%), household fuel (4.4%), telephone/pulse (3.5%), body care needs (3.6%), household needs (13.7%), recreation and entertainment (2.9%), transportation (13.5%), social gathering and social activities (9.1%), education (4.6%), health (2.6%), debt installments (10.4%), religion (4.9%), and others (17.3%). The average expenditure of this group reaches Rp 2,105,109/ month.

Table 4. Farmer Household Consumption Expenditures

Expenditures Type	Average (Rp/month)	Percentage (%)
Food expenditures		
a. staple food	39,657.53	1.12
b. vegetables	142,872.73	4.03
c. fruits	44,529.41	1.26
d. dry food	53,818.18	1.52
e. meat	570,127.27	16.09
f. other side dishes	20,748.15	0.58
g. milk/egg	85,957.32	2.43
h. seasoning	67,878.79	1.91
i. drinks and others	442,093.94	12.48
Non-food expenditures	2,105,109.09	59.41
Total	3,543,148.48	100

Source: Primary Data, 2022

It differs from food consumption, where the meat group, including fish, takes the largest proportion, 16%. This fact cannot be denied because of the general habit of the Makassar people to consume fish, both in fresh and processed form. Next is the consumption of beverages and others, where cigarettes are the biggest expense, with an average expenditure of Rp 345,568/month. Meanwhile, the consumption of staple foods only takes 1.12% of total consumption. It is not surprising because of the high consumption of crops, namely rice. Farmers do not make purchases of this staple food. Expenditures are made to consume yellow corn/pulut, sweet potato, and cassava.

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In another case, the proportion of food expenditure is used to determine household food security, which is classified into two groups: food secure and food insecure (Table 5). The distribution and status of household food security in Makassar City farmers are as much as 90% in the food security group. Meanwhile, 17 food-insecure households have an average income of Rp 3,124,038.60/month with five family members. The proportion of food expenditure reached 54%. It is a fact that many farm households are assisted in food expenditure by consuming their farming products. They consider this more rational than selling their crops but returning to buying rice for their daily needs. Other evidence is shown in Table 4, which shows that the proportion of food expenditure is only 40.59% of total household expenditure.

The average household income for food-secure households is Rp 3,606,046.35/ month, which is higher than food insecure households, Rp 3,124,038.60/ month. However, the average number of family members is four compared to 5 people in food-insecure households. The wife's education, which also supports the family's economy, is two years higher for food-insecure households than in food-insecure households who have only graduated from elementary school. The institutionalization of own land, profit sharing, and utilizing unused land in secure food households is 101, 46, and 1, respectively. It differs for food insecure households with 10, 4, and 3 households. Meanwhile, there are also more outside labor institutions in food-secure households (51%) compared to 35%.

In contrast to the findings of Zakari et al. (2014) in a West African country provides evidence that food insecurity continues to affect the population of Nigeria. The main factor causing food security is the factor of food availability, and the main factor causing food insecurity is socioeconomic factors which have been studied by (Hapsari & Rudiarto, 2017). This statement can be strengthened by Damayanti & Khoirudin (2016) research that the factors of access to food and livelihoods, nutrition and health, and food vulnerability have a significant effect on food security in Malang Regency.

Table 5. Food Security Status of Farmer Households

Food Security Status	Household Number	Percentage (%)
Secure	148	89.70
Insecure	17	10.30
Total	165	100

Source: Primary Data, 2022

Household Food Security Determination

Many households with food-secure status cannot be separated from several influencing factors (Table 6). The odds ratio value shows the trend of household food security where a value less than one indicates a form of household food insecurity and vice versa. Two variables have an odds ratio value of less than one, namely the number of family members and labour institutions. Both significantly affect the food security level of farmer households, at 1% and 10%, respectively. The more family members that are covered, the more mouths that must be fed, so the chances of food security will be even smaller. Families will spend more of their income to buy food consumption. Likewise, labour institutions will make families more food insecure. 50% of farmers use labour

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outside the family during harvest (Table 2). It is due to reduced yields that can be used for household consumption. As a result, farmers have to buy rice shortage for household consumption.

It is different in variables with an odds ratio of more than one. These variables will increase the food security of farmer households. Household income, land area, and institutional land ownership are significant at the 90% confidence level. The higher the household income, the lower the proportion of food expenditure as found by Hastuti et al. (2021) or the more food security. These findings reinforce research by Purwaningsih (2010) in Central Java Province, Damayanti & Khoirudin (2016) in the Special Region of Jogjakarta, Hanisah et al. (2022) in Langsa City, and Hastuti et al. (2022) in Bone Regency that income affects household food security. It follows Engel's theory. In urban areas, households will divert their food expenditure to meet their non-food and secondary needs. Table 4 supports this phenomenon, where the proportion of non-food expenditure is almost 60%. The food-secure household group is 61%, and only 46% in food insecure households supports.

Table 6. Determination of Food Security

Variable	Coefficient	Probability	Odds ratio
Household income	1.38e-06	0.0866*	1.0000
Number of family members	-0.9887	0.0023***	0.3718
Wife's education	0.5500	0.0014***	1.7339
Land area	2.5935	0.0612*	13.3984
Farmer age	0.0792	0.1681ns	1.0825
Institutional land ownership	3.6380	0.0578*	38.1032
Institutional profit-sharing land	0.5650	0.7484ns	1.7601
Labour institutions	-1.7537	0.0753*	0.1729

Source: Primary Data, 2022
*,**, and *** significant 10%, 5%, 1% respectively, and ns not significant

Meanwhile, a wider land area is expected to increase crop yields as stated (Edgerton, 2009; Mora et al., 2020; Viana et al., 2022). In addition, it can reduce household food expenditure for subsistence farmers, likewise with institutional land ownership Holden & Ghebru (2016), which indicates that farmers have full authority over their crops. It is like a hereditary custom to first secure the family's food needs. This food security cannot be separated from the wife's role as a gatekeeper. Table 6 clearly shows that the wife's education level significantly affects household food security. As many as 27.28% of the respondents' wives have an educational level above the nine-year educational requirement (Table 2). This high level of education can be used to work as a source of income outside of farming and to help the wife choose food according to household needs. According to Engel's theory, earning revenue will increase family food security. This finding in line with Hidayah &

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Fikawati (2021), but differs from those Tanziha & Herdiana (2009) that there is no significant relationship between the wife's education and household food security in Banten Province.

Meanwhile, age and profit-sharing institutions are insignificant even though they secure farmer households' food. As many as 31% of farmers are in middle age, which will affect their productivity level. However, several studies show that older farmers still work, and even younger groups are two times more food-vulnerable (Guo et al., 2015; Syafiq et al., 2022). Likewise, profit-sharing institutions are only 36% (Table 2). Farmers can still meet their basic food needs from the yield for the harvest. It differs from the number of family members and labour institutions, which increase household food vulnerability by 37% and 17%, respectively. The number of family members means increasing the number of mouths that must be fed to increase food expenditure. Likewise, an increase in family labor will increase the wages that must be paid where farmers pay comes from their crops. It will reduce yields in the form of staple food.

CONCLUSION AND SUGGESTION

Makassar City farmer households are mainly in the food secure, where more than half of their income is used to meet non-food needs. The level of food security increases with household income, the wife's formal education level, land area, and institutional land ownership, unlike the case with the number of family members and labour institutions that have a role in increasing the chances of households experiencing food insecurity. Therefore, efforts to create food security at the household level require cooperation from various parties. One of the efforts that require the government's role is to protect existing agricultural land from being converted to other uses. Increasing the need for food stocks can be done by expanding the agricultural area by utilizing yards or land that is temporarily not or has yet to be used. This concept can change conventional agriculture, which requires large areas of land through limited land use, such as optimizing yards by planting food crops and vegetables to meet the needs of households in urban areas. Hopefully, this will reduce the threat of a food crisis from disruptions to the food supply chain, especially during a pandemic. Farming in the yard as the smallest landscape unit can be carried out as a strategy to sustain food self-sufficiency. The same goes for the farmer's family to look after their land and pay attention to education to do other businesses.

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