The Influence of Welfare Level on Food Security in Farmer Households

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Abstract. Food security for a country is very important, especially for a country with a very large population like Indonesia. However, Indonesia is still faced with the problem of farmer welfare, most of whom are poor or low-income, which is only around 30% of total family income and a decrease in agricultural production and productivity. This study was conducted with the aim of determining the effect of welfare levels on food security in Indonesia. This study uses quantitative analysis methods with cross-sectional data to determine the main objectives of the study. Data were collected using questionnaires through face-to-face interviews from a random sample of 75 farmer households in Java and Sulawesi. The results of the study showed that the level of farmer welfare was in a fairly high category with the food security of farmer households being quite food secure. The level of farmer welfare has a positive effect on the food security of farmer households. This shows that government policies that focus on improving the welfare status of farmer households in terms of health, material wealth, and farmer knowledge can improve food security.

1 Introduction

Agriculture is the utilization of resources carried out by humans to produce food [1]. Agriculture is a substantial part of development, namely as a fulfillment of food needs, a provider of raw materials for industry, a provider of employment, and a contributor to the country's foreign exchange [2]. The agricultural sector is one of the main factors in forming food security and is a fundamental issue concerning the survival of humanity [3]. An integrated food economic system made up of different subsystems is called food security, namely food availability, food distribution and food consumption which have a strong relationship with each other [4-5]. The most phenomenal threat to national food security today is the narrowing and shrinking of agricultural land [6]. One of the causes is the low level of welfare in the agricultural sector, which has an impact on the high conversion of

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agricultural land. Based on BPS data in 2023, the Farmer Exchange Rate (NTP) of 114.14 is still in the category of not ideal with fluctuating conditions, where the level of farmer welfare in Indonesia is still not safe.

Indonesia is one of the developing countries with the agricultural sector as the main source of livelihood for its population, so that most of the land in its territory is designated as agricultural land and almost 50% of the total workforce still depends on their fate working in the agricultural sector [7]. According to the Central Statistics Agency (BPS), there were 40.64 million workers in the agriculture, forestry, and fisheries sectors in February 2022. In addition, a nation's ability to secure food is crucial, particularly for one with as big of a population as Indonesia. [8]. However, Indonesia is still faced with the problem of most farmers being poor or low-income, which is only around 30% of the total family income and a decrease in agricultural production and productivity. Various efforts have been made by the government through strategic programs such as food security improvement programs, agribusiness development programs, and farmer welfare improvement programs. The goal of the food security program is to make farmers self-sufficient in terms of local resources. This is operationally accomplished by initiatives to boost food production, guarantee that there is always enough safe, halal food available in every area, and prevent food insecurity.

Survey models [9] and structural equations [10] can be used to investigate the relationship between dimensions and food security in the context of farmers' households. The age of the head of the household, the number of employees, the income, and the area of agricultural land all have a major role in determining the level of food security in the home [11]. Although several empirical studies have examined the effects of agriculture on productivity, income, and the reduction of poverty, little is known about how agriculture affects food security [12]. Improving food security and improving welfare will be conflicting goals that need to be addressed simultaneously [13]. The welfare of farmer households and food security have been studied by several researchers, because these topics are interrelated [14-21]. However, there hasn't been a lot of research done on how farmer welfare affects food security. Therefore, more research is required to ascertain how welfare levels affect the availability of food in Indonesian farmer households. Policy makers will benefit from the study's findings in identifying the most appropriate welfare indicators to enhance food security in farmer households.

2 Research method

The primary aims of this study are ascertained by employing cross-sectional data and quantitative analysis techniques. Utilizing questionnaires and in-person interviews, data were gathered from 75 randomly selected farmer households in Java and Sulawesi (Fig. 1.). Where there are 4 research locations on Java Island, namely Larangan District, Brebes Regency, Tempeh District, Lumajang Regency, Nglegok District, Blitar Regency, and Rawamerta District, Karawang Regency. The research location on Sulawesi Island is Dumoga District, Bolaan Mongondow Regency. Research sites are chosen based on a number of factors, including agricultural regions like Java and Sulawesi, which can be interesting locations to study food production, socio-economic diversity, and the welfare of farmer households. Villages in remote areas can be locations to study traditional agricultural practices, food security of farmer households, and access to markets.

The level of welfare is assessed using the poverty indicator version of the Central Statistics Agency (BPS), while the level of food security of farmer households is assessed using the indicator version of the National Food Agency (Bapanas). Each attribute will be measured using a scoring method following the Likert scale method by giving an odd score,

in this case the score is given with an interval of 1 - 5. Table 1. explains the category score of welfare level and food security in farmer households.

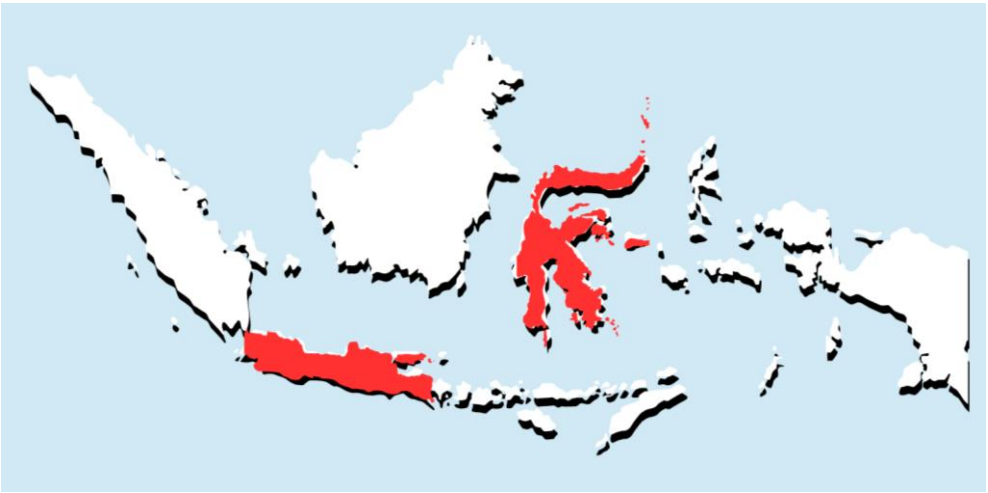

Fig. 1. Map of research locations in Indonesia

Table 1. Category score of welfare level and food security in farmer households

Category welfare level	Category food security level	Score
Very low	Very food vulnerable	1.00 – 1.67
Low	Food vulnerable	1.68 – 2.33
Quite low	Moderately food vulnerable	2.34 – 3.00
Quite high	Moderately food secure	3.01 – 3.67
High	Food secure	3.68 – 4.33
Very high	Very food secure	4.34 – 5.00

The influence of welfare level (independent variable) on food security of farmer households (dependent variable) was analyzed using linear regression method, with the following regression equation model:

$$Y = \alpha + \beta.X \quad (1)$$

where, Y was level of food security in farmer households (%); α was Constant; β was regression coefficient; and X was welfare level (%).

3 Results and discussion

Table 2 lists the specific socioeconomic details of farmer households, such as age, education, number of family members, employment status of family members, income, and land area. The oldest farmer is eighty-seven years old, and the youngest is twenty. Farmers are 50.66 years old on average. Formal education is available for students at ages 0 to 16, with an average duration of 8.52 years, or junior high school. Farmers' knowledge and insight will undoubtedly be impacted by their comparatively low level of education, although money and education levels positively influence farmers' knowledge levels [22].

A farmer's household typically consists of 1–7 individuals, with an average of 3.65 family members. There are 2.56 family members that work on average, with approximately 76% of them being men. According to a descriptive analysis of categorical criteria, men make up about 84% of breadwinners [21]. A household led by a farmer typically makes

IDR 3,134,000. Household income comes from farming activities or other businesses outside of agriculture such as laborers, traders, self-employed, etc.

Table 2. Descriptive characteristics of farmer households.

Factors	Min	Max	Average	S.D.
Age (year)	20	87	50.66	12.76
Education (year)	0	16	8.52	3.61
Family members (people)	1	7	3.65	1.20
Family members work (people)	1	6	2.56	1.08
Income (IDR)	300,000	15,000,000	3,134,000	2,440,524
Land area (m^2)	62	20,000	1,872.09	2,793.93

Farmer households have agricultural land that is cultivated ranging from the smallest, which is 62 m^2 to the largest, which is 20,000 m^2. The status of agricultural land ownership comes from self-owned or rented from land owned by others or village land. There are several agricultural commodities cultivated by farmer households, including rice, corn, shallots, peanuts, and soybeans. Where around 81% of farmer households cultivate rice.

3.1 Level of welfare in farm households

The description of the level of welfare of farmer households studied uses a composite score of three indicators, namely: (1) Health and nutrition indicators; (2) Material wealth indicators; and (3) Knowledge indicators. The level of welfare of farmer households based on Table 3, it is known that the average score is 3.39 which means it is quite high. The knowledge indicator is the indicator with the highest score achievement, followed by the health nutrition and material property indicators.

Table 3. Level of welfare in farmer households.

Indicator	Score	Category
Health and nutrition	3.46	Quite high
Materials property	3.24	Quite high
Knowledge	3.48	Quite high
Average	**3.39**	**Quite high**

The health and nutrition indicator scored 3.46, which means it is quite high for the level of welfare of farmer households. This condition is due to the fulfillment of health service needs, food needs, and clean water needs by farmer households, as well as having good home sanitation. Where the average distance from home to health services (Puskesmas) is quite close, which is around 1.41 km. In addition, most farmers are able to meet their food needs independently, especially for rice production through rice harvests.

The material property indicator scored 3.24, which means it is quite high for the level of welfare of farmer households. This condition is due to the fairly high average income of farmer households, which is above the Regional Minimum Wage (UMR). In addition, the sufficient fulfillment of housing, clothing, and other economic assets makes the material property of farmer households quite high.

With a score of 3.48, the knowledge indicator is highly indicative of the welfare level of farmer households. Even while farmer households, especially those of today—have relatively low average levels of education, farmers' children have been able to attend college. In addition, informal education of farmers is quite high because they have attended farmer field schools several times.

Of the total sample, 78.67% have a quite high level of welfare, while around 9.33% and 1.33% of the sampled farmer households have high and very high levels of welfare. While

the remaining 10.67 samples of farmer households have a quite low level of welfare (Fig. 2).

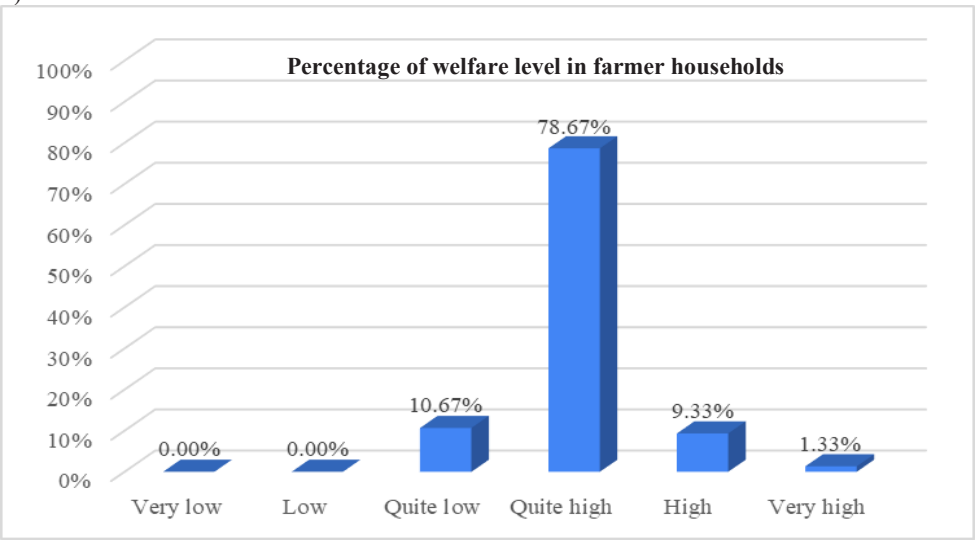

Fig. 2. Percentage of welfare level in farmer households.

3.2 Level of food security in farmer households

Description of the level of food security of farmer households studied using a composite score of three indicators, namely: (1) Food availability indicators; (2) Food access indicators; and (3) Food utilization indicators. The level of food security of farmer households based on Table 4 is known to have an average score of 3.25, which means that they are moderately food secure. The food access indicator is the indicator with the highest score, followed by the food availability and food utilization indicators.

Table 4. Level of food security in farmer households.

Indicator	Score	Category
Food Availability	3.28	Quite high
Food Access	3.36	Quite high
Food Utilization	3.10	Quite high
Average	**3.25**	**Quite high**

One of the most significant objectives of sustainable development is achieving food security [21]. The state of food security can be improved in a number of ways, such as through government support, agricultural output, a focus on socioeconomic aspects, the expansion of infrastructure, an increase in household income and food expenditure, etc. [23-25].

Of the total sample, 82.67% of farmer households have a moderately food secure level of food security, while around 2.67% of the sampled farmer households have a food secure category of food security. While the remaining 14.67% of farmer household samples have a moderately food vulnerable level of food security (Fig. 3). This means that most farming households are generally able to meet their daily food needs sufficiently, both in terms of quantity and quality. These results indicate that the efforts that have been made to improve the food security of farming households have so far produced positive results. This can be a strong basis for continuing and strengthening existing programs. If the majority of farming households are already food secure, it means there is potential to increase their productivity

and income. This could open up opportunities for the development of a more advanced and sustainable agricultural sector.

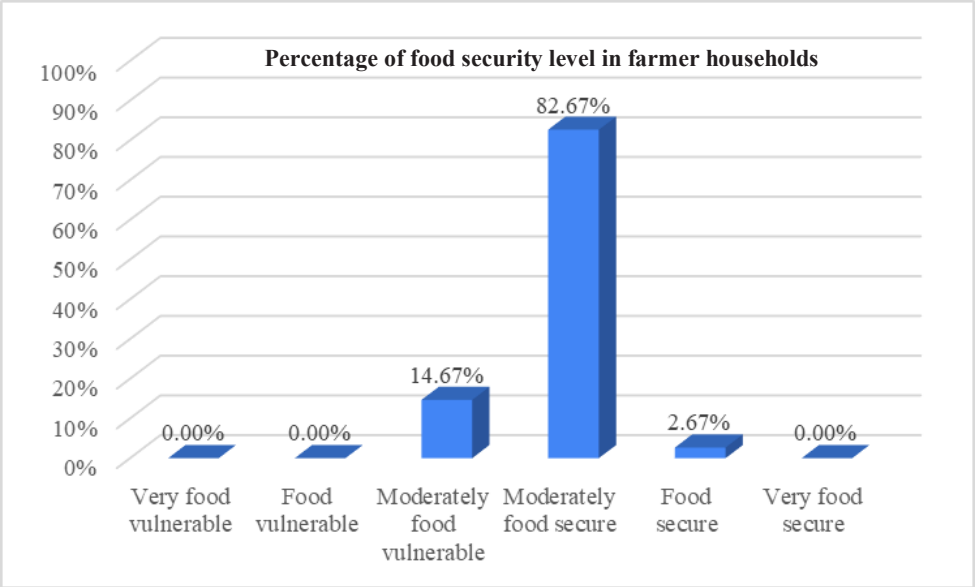

Fig. 3. Percentage of food security level in farmer households.

The food security conditions of each farmer household are certainly different, due to differences in socio-economic conditions. families without children had a better level of food security (48%) than families with children (6%), according to research from the past [10]. Similarly, rising food demand is driven by population growth, rising per capita income, and capital formation, all of which have a beneficial impact on the results of food security [26].

In an effort to increase food security, the government must of course make supportive policies, such as diversifying local foods, increasing domestic productivity, and reducing dependence on food imports. Agricultural diversification increases the food security of farmer households [27]. In addition, the government also needs to prioritize food self-sufficiency to expand agricultural exports and reduce dependence on imported food, thereby realizing food security [28].

3.3 The influence of welfare levels on food security in farmer households

Before conducting regression testing, it is necessary to conduct a classical assumption test as a requirement for the regression model to be fulfilled and can be said to be BLUE (Best Linear Unbiased Estimator). In this study, the data can be said to be BLUE, with the following regression equation model obtained:

$$Y = 28.135 + 0.542X \quad (2)$$

Table 5 displays the findings of the examination of the wellbeing levels that affect the food security of farmer households. The adjusted R2 score shows how accurate the regression model is. The ability of the independent factors to explain the dependent variable's minimal variation is indicated by a tiny adjusted R2 value. An increased adjusted R2 value suggests that the employed regression model is improving since the independent variables' capacity to account for the variation in the dependent variable is growing. The

food security variable of farmer households (dependent variable) can be explained by the welfare level variable (independent variable) in the model by 59.3%, with the remaining 40.7% being explained by variables outside the regression model, according to Table 5's adjusted R2 value of 0.595.

Table 5. Results regression analysis of welfare levels on food security in farmer households.

Variable	Regression Coefficients	t-count	Probability t
Constant	28.135*	7.952	0.000
Welfare levels	0.542*	10.436	0.000
Adj R^2 Value	0.593		
F count	108.917*		
Probability F	0.000		

Information: * significant on α = 1%

To find out how much each independent variable in the regression model contributes to a significant effect on the dependent variable, the F test is used. Making decisions is accomplished by contrasting the estimated F probability with the designated error tolerance, α. If the calculated F probability <α, then there is a significant effect. Based on Table 4, the calculated F value is 108.917 with a significant F probability of 0.000 with an error rate of 1%, which means that the welfare level variable simultaneously affects the food security of farmer households.

Based on Table 5, it is known that the estimated linear regression equation obtains an intercept or constant value of 28.135, namely the farmer household food security variable of 28.135% if the independent variable (welfare level) is zero. The analysis's findings indicate a significant value of 0.000 or less than α, which indicates that, at a 1% confidence level, the constant value significantly affects farmer households' food security.

A partial regression coefficient test called the t-test is used to assess whether or not the independent variable significantly affects the dependent variable. The variable significantly affects farmer households' food security if the probability of t is less than α. The welfare level variable has a probability value of 0.000, which is significant with an error rate of 1%, according to the results of the t-test analysis. This suggests that the wellbeing level influences farmer households' food security to a partially. The welfare level variable's coefficient value is 0.542, meaning that for every 1% increase in welfare level, there will be a corresponding increase in food security of farmer households by 0.542%.

The study's findings are consistent with other research demonstrating a direct and substantial relationship between food security and household welfare [21]. Similar findings from previous research demonstrate that availability, accessibility, and absorption all have a statistical impact on food security, with the impact growing with increased availability, accessibility, and absorption. Furthermore, there is a statistical relationship between food security and community welfare, with the relationship increasing with food security levels [29].

4 Conclusion and recommendation

Based on the results and discussion, it can be concluded that the level of farmer welfare is in a quite high category with the food security of farmer households being moderately food secure. The level of farmer welfare has a positive effect on the food security of farmer households. This shows that government policies that focus on improving the welfare status of farmer households in terms of health, material wealth, and farmer knowledge can improve food security in Indonesia. Recommendations for further research are to analyze the effect of food security with other variables outside the model in this study, such as socio-economic variables of farmer households. In addition, it can also be done by

analyzing its influence based on the category of the level of food security of farmer households.

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