Study on Food Security in Rice Production Centre (Survey in Buahdua Sub-district West Java-Indonesia)

Lies Sulistyowati
Lecturer, Department of Socio-economic, Faculty of Agriculture, Padjadjaran University, Indonesia
Ananda Putri Sari
Student, Agribusiness Study Program, Faculty of Agriculture, Padjadjaran University, Indonesia
Trisna Insan Noor
Lecturer, Department of Socio-economic, Faculty of Agriculture, Padjadjaran University, Indonesia

Abstract:
Food is a basic need of human sufficiency a top priority for the Indonesian government. Buahdua subdistrict is a major contributor to rice production in Sumedang District. But ironically, it is also a Subdistrict with an allocation of Raskin (rice for the poor) is quite large; it means that the level of food security of farmers is low. This phenomenon is very interesting for this study because food security begins with the smallest level of the household; moreover, farmers are the producers of the food itself. This study examines: how the food security of farmers in Buahdua Sub-district, and the factors that affect food security at the farmers' household level. The research design is quantitative with survey techniques. Stratified random sampling used and selected 48 rice farmers. Using logistic regression analysis tools and descriptive techniques. Results from this study showed that 58 percent of farmers classified as food secure while 42 percent classified as less food secure. While the factors that impact significantly on the level of food security is the education level of farmers, land area and household expenditure on food.

Keywords: Food security, rice farmers, socio-economic factors

1. Introduction

1.1. Study Background

Food is a basic human need that sufficiency is a top priority for the Indonesian government. Buahdua subdistrict is the main contributor of rice production in West Java Indonesia. Ironically, however, it is also a sub-district with a fairly large allocation of raskin (rice poor), meaning that the level of food security is low. According to Law No. 7 of 1996 on food, food security as a condition of fulfillment of food for households as reflected by the availability of adequate food in quantity and quality, safe, equitable, and affordable. Based on this definition, food security is not only at the global, national and regional levels but also at the household level. National and regional food availability does not guarantee household or individual food security because food availability and food security are determined by access to food (Lakollo, E.M. et al., 2007).

There is no guarantee that a country capable of self-sufficiency, food security is guaranteed. Many definitions explain food security. A person who has physical, social, and economic aspects of food sufficiency, is safe and nutritious for his nutritional needs according to his taste for productive and healthy living is a concept of food security (Maxwell, S, 1992). Here is a fundamental difference between self-sufficiency and food security:

Indicator	Food Self-Sufficiency	Food Security
Scope	National	Households and Individuals
Target	Food Commodities	Human
Strategy	Import Substitution	Increased availability, access and absorption of food
Output	Food Increase	Nutritional status (decreased hunger, malnutrition, and malnutrition)
Outcome	Food sufficiency by domestic product	Healthy and productive people (high life expectancy)

Table 1: Differences in Food Self-Sufficiency with Food Security
Source: Hanani, Nuhfil.2012

Buahdua is one of the sub-districts located in Sumedang Regency with potential as the main rice producer in Sumedang Regency. Based on data from the Agriculture Office of Sumedang Regency that Buahdua Sub-district produces about 54 tons of rice and is the

largest production result compared to 25 other districts in Sumedang Regency (Sumedang Regency Agriculture Office, 2014). According to data in 2013 Buahdua subdistrict has a food insecurity ratio of about 24% it is still fairly high compared to other sub-districts in Sumedang. This phenomenon is very interesting to study, because the Buahdua Sub-district contributes the largest rice in Sumedang, but the vulnerable areas are also large. Whereas food security begins from the smallest level of households, plus farmers are producers of the food itself.

1.2. This Study Examines
1) What is food security at farmer household level in Buahdua Sub-district.
2) What socio-economic factors affect food security at the farm household level.

2. Methodology
The research design used is quantitative and qualitative design. Quantitative research is a scientific approach that views a reality that can be classified, concrete, observable and measurable, variable relationships are causal where the research data in the form of numbers and analysis using statistics. Qualitative research is a research procedure that produces descriptive data in the form of written or oral words of people and behaviour that can be observed (Neuman, W. Laurence. 2006).
Techniques in this study using descriptive survey research techniques that take cases in subdistrict Buahdua, Sumedang Regency. According to Rusidi (2006) survey is a method of collecting data by using instruments to solicit responses of respondents about the sample consisting of interviews and questionnaires.
The sample in this study is the household of rice farmers in Buahdua Subdistrict, Sumedang Regency. The number of rice farmers in the Buahdua Subdistrict is 853 people who are farmers with private land ownership and recorded in farmer groups. Respondents were selected by stratified sampling method. Farmer groupings are based on land ownership. The basis of determining the sample is done using the Slovin formula (Sugiyono, 2013), namely:

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

Where:
N: Number of samples (people)
N: Population size (people)
E: The limit of errors (no more than 15%)
The number of samples of rice farmers is 48 people. The number of samples to be taken at random from each farmer group based on land area. To know the factors that have a significant influence on the level of household food resilience of rice farmers then used logistic regression analysis. Logistic regression method is a general linear model used for binomial regression. As with regression analysis in general, this regression uses some free variables (numerical or category).
In this study, we will calculate the relationship of household food security level with several socio-economic factors. In this case, the level of household food security is an independent variable ($g(x)$) and is influenced by several independent variables such as land area (X_1), farmer age (X_2), farmer education level (X_3), farm household income X_4), and household food expenditure of farmers (X_5). If in multiple linear regression formula can be written as follows:
$$g(x) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i$$

3. Result and Discussion

3.1. Farmer's Characteristics
From the research results revealed that the majority of petanit farmers are farmers land owners. Farmers cultivate rice twice a year. So to know the income of farms obtained by calculating the reduction of revenue (revenue) with the amount of fixed costs (fixed cost) and variable costs (variable cost) issued by farmers in one season. For the source of family income, the majority as farmers (80%), 10% as farm labour, 4% as traders, civil servants and private (3%), craftsmen (1%) and others (1%). From the income analysis, the results obtained as the following table.

3.2. Farm Household Income

Type of Income	Narrow land (Rp.)	Medium land (Rp.)	Extensive land (Rp.)	Total Income (Rp.)
Rice Farming	636.140	1.768.796	4.204.242	6.609.179
Non Rice Farming	1.505.263	566.667	45.455	2.117.384
Total	**2.141.404**	**2.335.463**	**4.249.697**	**8.726.563**

Table 2: Contribution of Farm Household Income According to Land Area (Average/ Month)

From table 2, it can be seen that the contribution of rice farming has a big effect on the amount of income for rice farmers with medium and wide land. Only about 25% of income comes from non-farming. Usually the contribution is a contribution of household members with livelihoods outside of rice farming and some of them have home-based businesses such as food processing.

In contrast to moderate and wide-ranging farmers, agricultural output from smallholder farmers has a low contribution to household incomes. Therefore, most of them (the head of the family) only consider rice farming as a side job and choose to find a job that can support daily needs such as trade, labour, or village apparatus.

Income	Narrow land		Medium land		Extensive land		Total	
	Rp.000	%	Rp. 000	%	Rp.000	%	Rp.000	%
Head of household	1.348,7	63	1.994,7	85	3.958,1	93	7.301,7	84
Household member	792,6	37	340,7	15	291,5	7	1.424,8	16
Total	2.141,3	100	2.335,4	100	4.249,6	100	8.726,5	100

Table 3: Revenue of Rice Farmer (Owner) by Land Strata (Average / month)

From table 3, the head of household income ranged from Rp 1,348,772 to Rp 3,958,120 per month and the contribution of household head to household income was 83.67%. This shows that the role of the head of the family in contributing to family income is quite large. If viewed based on the size of land, it can be concluded that the more agricultural land owned then the contribution and the average income of the head of the family is greater. Conversely, the more land owned by the smaller family member income contribution.

3.3. Farm Household Expenditure

The amount of household expenditure is directly proportional to the area of land owned. Farmers with high land area have high cost of living as well. In table 4 it can be seen that the amount of non-food demand tends to be higher than food demand, this is due to the variation of non-food needs of farm households in accordance with the needs of each member of the farm household.

Expenditure Type	Narrow land	Medium land	Extensive land	Total Expenditure
Food expenditure (Rp.000)	863,7	930	1.110	2.903,7
Non-Food expenditure(Rp.000)	1.045,7	891,3	1.135	3.072,1
Total (Rp.000)	1.909,4	1.821,3	2.245	5.975,8
Food spending share (%)	45,23	51,06	49,44	48,59

Table 4: Contribution of Farm Household Expenditure by Land (Average per month)

In table 4 it can be seen that household food expenditure on average consumes 48.59% of total income per month. When compared to the strata of the land owned, farmers with narrow land issue an average of 45.23% of income, households with land ownership are issuing an average of 51.06% of income, and households with large land ownership - 49.44% of revenue. When compared, there is no significant link between the amount of food expenditure and the area of land owned because of the fact that households with a large area of land are issuing the highest average income compared with others.

Some villages in Buahdua sub-district can be categorized as having difficult access to food supplies although there are still a few small shops to purchase daily necessities in small quantities. In addition to the location of the market far enough, the way to travel that distance is also not easy because of the access road is damaged. This makes accommodation costs high. However, with these conditions residents realize the need to store food reserves and produce their own foodstuffs for example by planting vegetables and raising for daily meals. For the basic needs of rice all farmers get it from the land they have.

3.4. Food Security of Farm Households

3.4.1. Availability of Household Food of Paddy Farmers

The availability of household food is one of the benchmarks in the calculation of food security. Food availability describes the adequacy of food that can be consumed by households. Based on the National Food Resilience Agency statement that the minimum rice availability is 105 kg per year per capita. The results show that 100% off farmers have rice availability> 105 kg per capita per year. This proves that the farmers have met their rice supply well. It is also indicated because the farmers produce their own rice and prioritize the supply of rice for households rather than for sale. Based on the provisions of LIPI in 2004, households are stable if they have availability above 105 kg per year per capita with a feeding frequency ≥3 times a day, whereas families with rice availability of more than 105 kg per year per capita with twice daily feeding frequency are categorized Less stable households. Of the total farmers there are 28 people or 58.33% which is classified as stable households and there are 20 people or 41.67% of farmers with household category less stable.

Adequacy of Food Availability	Eating Frequency						Total	
	≥ three		twice		once			
	n	%	n	%	n	%	N	%
>105 kg rice	28	58.3	20	41.7	0	0	48	100
1-105 kg rice	0	0	0	0	0	0	0	0
No inventory	0	0	0	0	0	0	0	0
Total	28	58.3	20	41.7	0	0	48	100

Table 5: Stability of Farmers Household Food

From the table above can be seen that there is no correlation between farmers landed narrow, medium, or broad with food stability. Of the three strata, the group of moderate farmers is the group with the highest amount in terms of less stable food. While the other two groups tend to respond to stable food. This causes some farmers to be categorized as less stable food because they choose to sell crops in the form of grain or rice rather than storing for household consumption. The farmers chose to sell to meet other needs outside of food, in the case of Buahdua subdistrict most of the farmers tend to sell crops for their children's education and accommodation costs for their mobility. Accessibility of food or the affordability of food in food security can be measured from the way households get their food in this case especially staple food (rice). The accessibility is divided into two categories, namely, direct access where the household owns its own land and indirect access where the household has no land to obtain food. This way can also be divided into two other categories namely own production and purchase. In this study, all farmers have direct access in obtaining their food, moreover all farmers are farmers of land owners.

How to Get Food	Land						Total	
	Narrow land		Medium land		Extensive land			
	n	%	n	%	n	%	N	%
Own production	19	39,5	18	37,5	11	23	48	100
Buying	0	0	0	0	0	0	0	0
Total	19	39,5	18	37,5	11	23	48	100

Table 6: Food Accessibility on Farmer's Household

As mentioned before, all farmers have direct access to obtain food or own wetland with private ownership, so in this case the grouping is focused on how to obtain their own food production or purchase. As illustrated in Table 6, all farmers produce their own food to meet their household needs. Inventory owned by farmers was above the minimum. Although there are some farmers who are still less stable food, but access them more easily. Food continuity can be measured with the accessibility and stability of household food. Based on these indicators if a person has direct access to stable food conditions then the availability of food is called continuous and if someone has direct access but food unstable then the availability of food is stated less continuous.

Continuity Level	Land						Total	
	Narrow land		Medium land		Extensive land			
	n	%	n	%	n	%	N	%
Continuos	12	25	8	16,6	8	16,7	28	58,3
Less Continuous	7	14,6	10	20,8	3	6,3	20	41,7
Not continuous	0	0	0	0	0	0	0	0

Table 7: Level of Continuity of Food Availability on Farmer's Household

In table 7 can be seen the level of continuity of household food availability of farmers. Overall there are 58.33% of farmers stated continuous with and 41.67% stated less continuous. Of the three land tenure groups, farmers with land ownership have the highest percentage in the case of less sustainable households. Continuity means the extent to which households need their daily needs whether they are continuous or not, whether their food is guaranteed or not. Although farmers have direct access to food, it does not guarantee continuity of availability.

3.4.2. Household Consumption Subsistence of Rice Farmers
Measures of food quality are only seen from the presence or absence of foodstuffs containing animal protein and / or vegetable protein in household consumption, in this case it is not taken into account the nutritional value of the food consumed. Based on the conditions in the field, the expenditure allocated by farmers to buy / get the side dishes in the form of animal protein and vegetable protein or vegetable protein / animal only. Animal proteins that are often consumed by farmers include salted fish, eggs, and freshwater fish. This is because how to get it tend to be easy and the price is cheaper than other sources of animal protein. While the source of vegetable protein is often obtained from tofu, tempeh, and red beans. Soybean as a raw material of tempeh / tofu is widely grown in District Buahdua itself, the culture in the sub-district is to plant soybeans as a rotation of rice planting. Therefore, many people who are also producers of tofu /"tempe".The reason for the consumption of these proteins is more because of the household habits that have been done continuously and affordability of their purchasing power. According to LIPI's reference to measures of household food resilience of rural farmers, it can be stated that households have good food quality.

Expenditure Value of Protein	Land			Total
	Narrow land	Medium land	Extensive land	
Animal Protein (Rp)	215.920	326.000	444.000	309.292
Vegetable Protein (Rp)	647.760	605.000	666.000	635.750
Total (Rp)	863.680	930.000	1.110.000	945.042

Table 8: Expenditure Value of Protein Animal and Vegetable Protein Based on Farmer Land Area (Average per month)

From table 8 it can be seen that expenditure to buy the largest protein is issued by farmers with large area. It can also be concluded that there is a relationship between protein expenditure and the area of land owned. The more land that the farmers have, the higher the costs incurred to obtain protein for household consumption needs. The higher the expenditure allocated for the source of protein, the better the quality of the protein. Food security index is calculated by combining the four indicators of food security namely availability, stability, continuity, and food quality. As explained earlier, the adequacy of food availability and the frequency of feeding, provides an indicator of food stability. Food stability with food access provides an indicator of food continuity. While the food security index will be measured by combining food continuity with food quality.

Based on analysis, households can be grouped into three:

1) Household food insecurity

Household food insecurity is a household with continuous food availability and has expenditures for animal and vegetable protein or animal protein alone. Also, it can be seen that there are 58.33% of farm households classified as food resistant. There is no significant relationship between the strata of land owned and the food security. On a land basis, 25% of farmers with narrow land ownership, 16.67% of farmers with medium land ownership, and 16.67% of farmers with large landholdings are classified as food resistant.

2) Household is less food resistant

Less food-resistant households are households with continuous food but only have expenditure on vegetable protein alone and households with less continuous food continuity but have expenditures on vegetable and animal protein or animal protein alone. In this study found 41.67% of farm households classified as less food resistant. Indicated that it is classified as less food resistant because it has a continuity of food that is less continuous despite having expenditure for vegetable protein and animal or animal protein only. Based on the structure, there are 14.58% of farmers with narrow land ownership, 20.83% of medium-sized farmers, and 6.25% of farmers with large landholdings are classified as less food resistant. From the data it is also seen that land ownership farmers have the highest number of food insecure groups.

3). Households are not food resistant

Non-food-resistant households are households with four main characteristics:

    a. It has continuous food continuity but has no expenditure for animal or vegetable protein.

    b. Has a continuous continuity of food and only has expenditure for animal or vegetable protein only and / or not both.

    c. It has continuous food continuity although it has expenditure for animal or vegetable protein.

    d. It has continuous food continuity and only has expenditure for vegetable protein only or not both.

In this study, no farmers were found to be unsustainable. This is not due to the high level of living, but due to the arrangement of a good lifestyle and tailored to the needs. Not that a person with a narrow area can be indicated as not being food-resistant, a person with large ownership has that potential, although in the case of Buahdua Sub-district represented by the sample, there is no indication of food insecurity.

Thus, the level of income and the level of expenditure on the whole household strata does not guarantee the household is resistant or unstable. Because there could be other factors in the household that encourage the household to care about household food needs. Because if they can manage their income appropriately, their food stability and continuity are well met.

3.5. Socio-Economic Factors Affecting Household Resilience of Rice Farmers

In this study, there are several socioeconomic factors that are considered as factors influencing the resistance of one's household food and which factors have a significant influence on household food security. These factors include land ownership, age of farmers, farmer education level, household income, and household food expenditure (Herdiana, Eka. 2009). By logistic regression analysis, the results are obtained from table 10. Where independent variables are land ownership (X_1), farmer age (X_2), farmer education level (X_3), household income (X_4), and household food expenditure (X_5) That affects the dependent variable that is the resistance or not of the household food of the farmer, where 1 is food resistant and 0 is other than food resistant.

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	17,740	10	,060
	Block	17,740	10	,060
	Model	17,740	10	,060

Table 9: Logistic Regression Analysis

H_0 from this research is there is no independent variable that influence level of household food resistance, hence is there at least one of independent variable have significant influence to household food security. It can be seen from table 10 that the significance value is 0.06, less than the predetermined degree of error of 0.15. If the value of significance is smaller then H_0 is rejected, it means there is one or more independent variables that have a significant influence on household food security of farmers.

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	47,463[a]	,309	,416

Table 10: Logistic Regression Analysis (continue)

Negalkerke R-Square has a similar interpretation as determination on linear regression. The value of Negalkerke to R-Square is 41.6% or has the meaning of all the factors tested, the factor has an influence of 41.6% in determining household food security and 58.4% influenced by other factors not taken into account in research this. To know which factors have a significant influence on household food security, it can be seen based on the partial analysis table of the following variables.

Variables in the Equation							
		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1[a]	Land	,425	1,263	,113	2	,125	1,236
	Age	,536	1,613	,110	1	,740	1,709
	Education	,525	1,637	,,150	1	,123	2,080
	Income	,700	1,223	,327	1	,156	2,013
	Food expenditure	,707	1,225	,333	1	,144	1,493
	Constant	2,883	2,140	1,815	1	,178	17,871
a. Variable(s) entered on step 1: Land, Age, Education, Income, Food expenditure							

Table 11: Logistic Regression Analysis (continue)

As the previous analysis, that the variable has a significance value smaller than 0.15 then the variable has a significant influence on household food security. The table above is a table of independent variable analysis partially or one by one, can be seen that has a significance value smaller than 0.15 is the level of education and food expenditure. Thus, it can be concluded that the level of education of farmers and household food expenditure has a significant influence on the level of household food security. Other variables such as age, land area, and income do not mean have no relationship or are not factors affecting food security, but these factors have influence but not significantly determine the level of household food security.

In the income variable, its significance value is close to the criteria as the significant factor. Revenue affects household expenditure, such as food expenditure and non-food expenditure. It can be seen from the regression analysis that food expenditure has significant influence over the income itself, this can be caused by the portion of income itself which is partly not intended for food purposes, hence the value is not significant because it is represented by the variable of food expenditure.

Another significant factor is the level of education, the results of analysis in accordance with the reality of the field because a farmer with a high level of education has an awareness to regulate his food. Starting from their consideration to have a supply of food within a certain time until the type that must be met for food.

Other variables such as land area and age influence the smallest to the level of food security. No significant correlation between land ownership and food security has been established, some examples of farmers with narrower land holdings are more resilient than those with large landholdings, in which case farmers with narrow land only focus on production the adequacy of family food is different from the large farmers who focus on buying and selling. However, the level of food security can be influenced by household habits itself, how the pattern of daily consumption. While the variable age is not very influential because the average farmer has an age that is not much different, i.e. at age 50 years and over, this is what causes the age factor has no significant effect on food security.

4. Conclusions and Suggestion

4.1. Conclusion

1). Characteristics of socio-economic households of paddy farmers in Buahdua subdistrict are as follows:

a). The average characteristic of agricultural farm household area is 0,75 ha classified as medium land. The average age of the head of the family in all strata is 51 years and is a productive enterprise. The average education of the head of household is at the level of Senior High School and classified as higher education.

b). The average family income is Rp. 32,367,917 per year with a range of Rp. 14,840,000 to Rp. 84,000,000 per year. The contribution of head of household income was 81.15% to total household income. Family with narrow land ownership have an average income of Rp. 25,696,842 per year, land-owning families have an average income of Rp. 28,025,556 per year, and Families with large landholdings have an average income of Rp. 50,996,364 per year.

c). Average expenditure for household food needs per month is Rp. 948,750. The contribution of expenditure on food per month is 48.48% of the total expenditure. The average household expenditure of smallholding land holdings is Rp. 863,684 per month, average household expenditure on medium land ownership is Rp. 930,000 per month, and the average household food expenditure has a land area of Rp. 1,100,000 per month.

2). Household food security in Buahdua subdistrict can be grouped: 58.33% belong to food and 41.67% other classified as less food resistant. Food security can be realized with a good lifestyle that can be built within a household or family scope by managing food availability, managing expenses, and a good understanding of the importance of maintaining household food.

3). Socio-economic factors that have a significant influence on household food security are the level of education of farmers, land area and the amount of household food expenditure on food.

4.2. Suggestion

1). For the local government, should pay more attention to household food security especially in access to obtain food. Because there are several factors that cause difficulty of food access in the research location, one of them is the access road that is difficult to pass

because damaged. The government also can provide counselling to the citizens about the importance of maintaining the resilience of households, not just quantity but also the quality of food that must be met.

2). For the development of science, in the measurement of food quality indicators is a good comparison between the standardization of protein content (animal /vegetable) with calories needed by the community to get more accurate results and better results. The research processes and procedures can also be directed to findings on how to formulate a model of food security management to address the presence or absence of household vulnerability to food in the research area.

5. Acknowledgment

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