

YULIAN JUNAI
Sriwijaya University, Indonesia

PARTICIPATION OF WOMEN FARMERS IN RICE FARMING AND FOOD SECURITY OF FARMERS HOUSEHOLD IN SWAMP LAND-INDONESIA

Abstract:

Swamp land have great potential to be a strategic choice for the development of agricultural production area to the front of the face of increasingly complex challenges, especially to compensate for shrinkage of arable land and an increase in production demand, including food security. During this time, swamp land have been used for agricultural production areas, such as used for rice farming. Rice farming is the main livelihood for the people living in the swamp lands to earn income for their household. With the increased income earned through farming activities outside the farm and household food needs are met daily, so as to improve household food security. Associated with household income and resilience can not be separated from the contribution and participation of women. Women have employment opportunities that can generate additional income for their household, which in turn can improve household food security. The purpose of this study was to (1) identify the level of participation of women farmers in rice farming in swamp land, (2) assess the condition of the level of household food security of women farmers in the rice swamp land seen from Share of Food Expenditure (PPP) and (3) analyze relationship with the level of participation wanitatani household level food security of women farmers in the rice swamp land. This research was conducted in Ogan Ilir, South Sumatra Province, Indonesia. The results showed that the level of participation of women farmers in rice usatani in the high category. The level of household food security of women farmers in the rice swamp land, which is 69 percent food secure and 31 percent food vulnerable. From the results of the research can be seen also that there is a positive relationship between the participation of women farmers in rice farming with the level of their household food security.

Keywords:

participation, women farmers, food security, rice, swamp

I. INTRODUCTION

Swamp land have great potential to be a strategic option for the development of future agricultural production area, which will face increasingly complex challenges, especially to compensate for shrinkage of fertile land and an increasing of production demand, including food security and agribusiness development (Alihamsyah, 2002). During this time, swamp land has been used for agricultural production areas, such as used for rice farming. Rice farming is the main livelihood for the people living in the swamp lands for their household income.

Income variable is one of the factors that significantly influence the level of food security of farmers household (Januarti, 2012). With the increased income through farming activities and non farming activities household food needs are met daily and household food security levels will increase.

The relation of the income and food security cannot be separated from the women's contribution and participation. Women have the employment opportunities to earn additional income for their household which can improve the household food security. Therefore, it can be said that women farmers have major role in income and effort to achieve the level of household food security.

Based on the descriptions above, there were three issues in this study (1) to identify and quantify the level of participation of women farmers in rice farming in swamp land, (2) to assess the condition of the level of household food security of women farmers in the rice swamp land and (3) to analyze the relationship between the participation level of women farmers with household level food security of women farmers in the rice swamp land.

II. LITERATURE REVIEW

There are numbers of study about food security which conducted in some areas in Indonesia. One of the studies was conducted by Irawan (2010) which entitle "Food Security and Farmer Household Prosperity in Sleman, Bantul and Kulonprogo District". The study which conducted in 3 districts in Yogyakarta used 2 approaches to measure the level of food security. (1) food security indicator I, which is obtained by doing the cross classification between share of food expenditure and percentage of energy consumption sufficiency, (2) food security indicator II, which obtained by doing cross classification between percentage of energy sufficiency and exchange rate of farmer household income.

Using the first indicator, the results of the study showed that in these 3 districts in Yogyakarta were 55 percent household in food security category, 22,78 percent in vulnerable food category, 17,22 percent in less food category and 5 percent in food insecurity category. If the food security was measured using the second indicator, the result showed that there were 37,78 percent in stable food security category, 28,33 percent in unstable food security category, 10,56 percent in stable food insecurity category and 10 percent unstable food insecurity category.

The analysis of the affecting factors measurement as well as food security policy was also investigated by Pankomera et al (2009), the result indicates that 26% households is categorized as food insecurity and 74% is categorized as food security. The affecting factors of the food security level are land ownership, education of household head, off-farm business ownership, number of livestock, gender head of household, number of family members and access of roads. The samples were 11,280 households with different socio-economic levels.

A study which conducted by Omotesho et al (2007), showed that the factors that affect the level of food security in Kwara Nigeria is the size of the households agricultural area, gross income from agriculture, the total income from non-farming activities, and the number of family member. The analysis used primary data from 165 sample which randomly chosen.

III. METHOD

The basic method used in this research was descriptive analytical method. The Implementation techniques used in this research was methods of survey. The primary and secondary data were used in this study. The study conducted in Lebung Jangkar and Sembadak village which located in Pemulutan Sub-district also Ulak Segelung and Sakatiga Village which located in Indralaya Sub-district, Ogan Ilir District, South Sumatera Province, these locations were decided using purposive method. According to Nazir (2009), Purposive is deliberately choosing the location with specific considerations.

The consideration in choosing the location using purposive method was because most of the people in that area are doing the rice farming in swamp area. The samples of this study were 120 respondents.

The score was given to each indicator in order to answer the first issue of this study, to identify and quantify the level of participation of women farmers in rice farming in swamp land. The given scores were 1, 2 and 3, respectively for the categories of low, medium and high. The assessment indicators including activities of women farmers in rice farming in swamp land were (1) the preparation or land management, (2) the preparation of seed or nursery, (3) the planting, (4) the maintenance, (5) the harvest and post-harvest. There were 21 questions out of five indicators, so that the score range of participations of women farmers were 21 to 63. The result was presented in the form of class interval. According Nasution (1998), the formula that is used to make the class interval is:

$$RS = HS - LS$$

$$LCI = RS : NCI$$

where:

RS = range score

HS = the highest score

LS = the lowest score

LCI = the length of class interval

NCI = the number of class interval

The score of class interval of participation of women farmers in rice farming in swamp land were:

$$RS = HS - LS = 63 - 21 = 42$$

$$LCI = RS : NCI = 42 : 3 = 14$$

Based on the calculation, the score of class interval and the score per indicator can be seen in the Table 1.

Table 1. The Score of Class Interval.

No	The Score of Sclass Interval	The score per indicator	Criterion
1	21.00 – 35.00	$1.00 \leq x \leq 1.67$	Low
2	35.01 – 49.01	$1.67 < x \leq 2.34$	Medium
3	49.02 – 63.00	$2.34 < x \leq 3.00$	High

To answer the second issue, to see the condition of the level of household food security of women farmers in the study area, can be determined using Jonsson and Toole Model but the calculation about household consumption of the women farmers should be calculated before the level of farm households security was categorized using a model of Jonsson and Toole:

a. The Real Household Energy Consumption (Kert)

To measure the real household energy consumption can be formulated as follows:

$$KErt = \frac{BM_j}{100} \times \frac{BD_j}{100} \times KZG_{ij}$$

where:

KErt = the real household energy consumption (kcal)

BM_j = food weight-j which consumed (grams)

BD_j = edible portion (in % or grams from 100 grams food or food-j)

KZG_{ij} = content of certain nutrients (i) of the food or food consumed according to the unit (cal)

b. Adult Equivalent Units (JUED)

Calculations for Adult Equivalent Units (JUED) is as follows:

$$JUED = \frac{JEAU}{JKEA}$$

where:

JUED = number of adult equivalent units

JEAU = amount of activity by age group energy (kcal),

Obtained from a list of factors the unit energy consumption by age published by WNPG IX in 2008.

JKEA = the amount of energy sufficiency recommendation (kcal),

amounting to 2.000 kcal, is recommended in accordance with the Dietary Pattern of Hope WNPG IX published in 2008.

c. Energy Consumption per Adult Equivalent (KED)

Calculation of energy consumption per adult equivalent can be calculated as follows:

$$KED = \frac{KErt}{JUED}$$

where:

KErt = real household energy consumption (kcal)

JUED = number of adult equivalent units (soul)

KED = energy consumption per adult equivalent (kcal)

d. The sufficiency rate of energy (AKE)

To find out the Intake of Energy (AKE), it can be estimated by comparing the Energy Consumption per Unit of the Adult Equivalent Amount of Energy Adequacy Recommendation (JKEA), amounting to 2,000 kcal.

$$AKE = \frac{KED}{2000} \times 100\%$$

where:

AKE = the sufficiency rate of energy (%)

KED = energy consumption per adult equivalent (kcal)

The results of the calculation of percentages are then categorized with the following conditions:

Quite category = AKE > 80% of energy adequacy requirements

Category Less = AKE ≤ 80% of energy adequacy requirements

e. Share of Food Expenditure (PPP)

To determine the share of Food Expenditure (PPP) farmer households used the following equation:

$$PPP = \frac{FE}{TE} \times 100\%$$

where:

PPP = share of food expenditure (%)

FE = expenditure on food shopping needs (Rp/ year)

TE = total household expenditure (Rp/ year)

The result of the calculation will have the percentage that can be categorized with some conditions as follows:

- The category of total low expenditure, if PPP < 60% of total expenditure

- The category of total high expenditure, if PPP ≥ 60% of total expenditure

After farming households were classified based on the value share of the Food Cost and sufficiency rate of energy, Jonsson and Toole model can be obtained by cross-classification between Share of Food Expenditure (PPP) and the sufficiency rate of energy (AKE), as shown by Table 2 as follows :

Table2. food security: Share of Food Expenditure and the sufficiency rate of energy

The sufficiency rate of energy (AKE) per adult equivalent unit	The Share of Food Expenditure(PPP)	
	LOW (< 60% total cost)	HIGH (≥ 60% total cost)
SUFFICIENT > 80% sufficiency rate of energy	Food Security	Vulnerable Food
DEFICIENT ≤ 80% sufficiency rate of energy	Less Food	Food Insecurity

After the cross classification between Share of Food Expenditure (PPP) and the sufficiency rate of energy (AKE), it can be said that a farmer households are categorized into food security category, vulnerable food category, less food category, Food insecurity category

a. households in food security category, if the proportion of the households was at the low cost (< 60% of households cost) and sufficient in energy consumption (>80% of nutritional adequacy requirement).

- b. households in vulnerable food category, if the proportion of the households was at the high cost ($\geq 60\%$ of households cost) and sufficient in energy consumption ($>80\%$ of nutritional adequacy requirement).
- c. households in less food category, if the proportion of the households was at the low cost ($< 60\%$ of households cost) and insufficient in energy consumption ($\leq 80\%$ of nutritional adequacy requirement)
- d. households in Food insecurity category, if the proportion of the households was at the high cost ($\geq 60\%$ of households cost) and insufficient in energy consumption ($\leq 80\%$ of nutritional adequacy requirement)

To answer the third objective, namely to analyze the correlation between the participation level of women farmers with food security level of women farmers in the swamp land use Spearman's rank correlation (r_s) with the following hypotheses:

H_0 : The two independent variables

H_a : There is a positive relationship between the two variables

The formula used is:

$$r_s = 1 - \frac{\sum_{i=1}^n d_i^2}{n^2 - n}$$

$$\sum_{i=1}^n d_i^2 = \sum \{R(X_i) - R(Y_i)\}^2$$

where:

r_s = Spearman rank correlation
 n = number of samples
 d_i = the difference between x_i and y_i

Rules in decision making:
 r_s hit $>$ r_s α : Reject H_0
 r_s hit $<$ r_s α : Accept H_0
 where: α = 0.05

Accept H_0 : means there is not a positive relationship between the participation of women farmers in rice farming in swamp land by the food security level.

Reject H_0 : means that there is a positive relationship between the participation of women farmers in rice farming in swamp land by the food security level.

IV. ANALYSIS AND FINDING S

A. Identity of Women Farmers Example

In this study, the age of women farmers is calculated based on the year of birth to the research conducted. Age distribution of women farmers example can be seen in Table 3. Based on Table 3 it can be said that most women who seek rice farmer in swamp land in this study belong to the working age group, because of their age ranged from 15 years to 64 years, so they are still able to the power to work.

Table 3: Age Distribution of Women Farmers Sample

Age (year)		Number (people)	Percentage (%)
Not yet productive	< 15	0	0
Productive	15 – 64	111	92,5
Not Productive	> 64	9	7,5
Total		120	100,00

The education level of women farmers in this study is a formal education that is expressed in units of years. The characteristics of women farmers sampel who do rice farming in swamp land by educational level can be seen in Table 4. Based on Table 4, it can be seen that the education level of women farmers who do rice farming in swamp land is still relatively low. Most of them are primary graduated from elementary school and did not go to school as much as 87.5 percent. For upper-level education in primary schools were 9.17 percent graduated Junior High School and 3.33 percent Senior High School, and there are no samples of women farmers in college education.

Table 4. The distribution Education Level Women Farmers Sample

Education Level	Number (people)	Percentage (%)
Not school (< 6 years)	9	7,50
Graduated from Elementary School or equivalent (6 years)	96	80,00
Graduated from Junior High School (9 years)	11	9,17
Graduated from Senior High School (12 years)	4	3,33
Bachelor Degree (> 12 tahun)	0	0
Total	120	100,00

The number of household members are the number of people who exist and live together in one farmer household. Member of households that have not lived in a house of women farmers in the sample households were not included in the calculation of the study, for example children who are already married. Number of women farmers households members who do rice farming in swamp land can be seen in Table 5. Based on Table 5 it can be seen that most woman farmer households sample have a number of members between 1-2 people, amounting to 8.33 per cent, have the number of household members between 3-4 people, amounting to 36.67 percent and as much as 55 percent of households have a number of members of women farmers more than 5 people.

Tabel 5. Number of Women Farmer Household Members Distribution

Number of Household Members	Number (people)	Percentage (%)
1 – 2 people	10	8,33
3 – 4 people	44	36,67
> 5 people	66	55,00
Total	120	100,00

B. Participation Level of Women Farmers in Rice Farming in Swamp Land

The participation level of women farmers in rice farming in swamp land ranging from the preparation or processing of land, preparation of seeds or nursery, planting, maintenance, harvesting and post-harvest can be seen in Table 6. The total score of the participation level of women farmers in rice farming activities in the Swamp Land from the analysis is at 50.62, so that is included in criteria High.

Table 6. Participation Level of Women Farmers in Rice Farming activities in Swamp Land

Participation of Women Farmers	Score	Criteria
1. Preparation/ Land Management	1,50	Low
2. Preparation of Seed/ Nursery	2,79	High
3. Planting	2,49	High
4. Maintance	2,33	Medium
5. Harvest and Postharvest	2,69	High
Number	11,80	
Average	2,36	High

From Table 6, it can be seen that the participation of women farmers in the preparation or land management activities in rice farming in the swamp land of 1.50. It shows that the participation of women farmers in these activities is low. Preparation or land management activities are usually done by men (farmers) or labor from outside the family.

Preparation of seed or nursery activities, consisting of activities soaking the seeds, seedlings and seeds in the field of decision-making. From the analysis, the participation of women farmers in preparation seed activities or nursery worth 2.79 so it is at a high criteria. At rice farming in swamp land, women farmers participate more during nursery activities than men (farmers). Participation of women farmers in planting activities are also in high criteria with a score of 2.49. While on maintenance activities including the medium criteria.

Participation of women farmers at harvest and post-harvest activities, which consists of harvesting activities, drying or drying, packaging, transport, storage and decision-making, at 2.69. It shows that women's participation in the harvest and post-harvest activities, including the high criteria.

C. Food Security of Women Farmers Household in Land Swamp

Food security analysis can be known share of food expenditure (PPP) and the minimum sufficiency rate of energy (AKE) households.

C.1 Share of Food Expenditure (PPP)

Most of women farmers household in Swamp Land included in the share of food expenditure by category of low (less than 60 percent) as much as 69.17 percent. The peasant woman with household food expenditure share of the category of high (> 60 percent), which is about 30.83 percent.

Table 7. Share of Food Expenditures of Women Farmers Household in Swamp Land

Share of Food Expenditure Category	Number of Household	Percentage (%)
Low < 60 %	83	69,17
High \geq 60 %	37	30,83
TOTAL	120	100,00

C.2 Sufficiency Rate of Energy

46.67 percent of the women farmers household in the swamp lands belonging to the category in the sufficient of energy, while the deficient category are approximately 53.33 per cent.

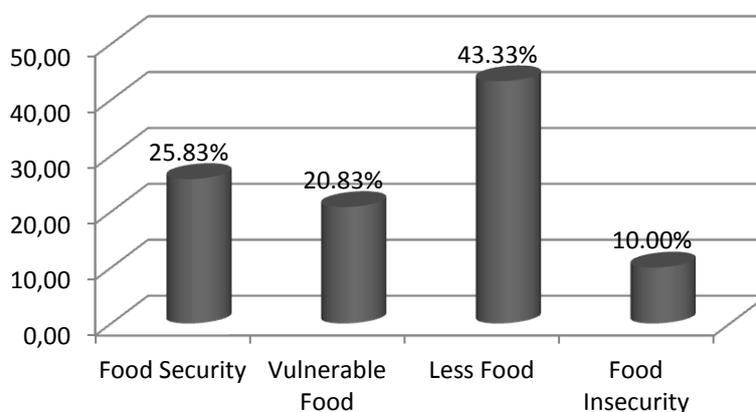
Table 8. Sufficiency Rate of Energy of Women Farmers Household in Swamp Land Distribution

Category	Sufficiency Rate of Energy	Number Farmer Household	of Percentage (%)
Sufficient	> 80 %	56	46,67
Deficient	≤ 80 %	64	53,33
TOTAL		120	100,00

C.3 Food Security Level

Having in mind the share of food expenditure and the minimum sufficiency rate of energy, then the second is cross-classifying these calculations will be obtained every level of household food security of women farmers. Sufficiency rate of energy is directly proportional to food security, while share of food expenditure is inversely proportional. Thus, a household would be better if sufficiency rate of energy is high (more than 80 percent from 2000 cal / capita minimum limit) and share of food expenditure is low (less than 60 percent of total household expenditure). The food security level of women farmers household in swamp lands can be seen in Figure 1. From Figure 1, it is known that women farmer households in swamp lands belongs to the category of food security as much as 25.83 percent. Households that belong to the vulnerable households and food as much as 20.83 percent of households belonging to the house by 43.33 percent less food. While households who belong to the household food insecurity as much as 10 percent.

Figure 1. Food Security Level of Women Farmers Household in Swamp Lands



D. Relationship Women Farmers Participation Rate by Household Food Security Level of Women Farmers in Land Swamp

Relationship between the participation level of women farmer household and food security level statistically analyzed by Spearman's rank correlation test with results r_s count of 0.956 and 0.165 for r_s table. This means that the value of r_s count is greater than r_s tables, so it can be concluded Reject H_0 . It can be concluded that there is a positive relationship between the participation of women farmers in rice farming in swamp land by food security level. That condition is caused increased participation of women farmers in rice farming in swamp lands can increase revenue which in turn can improve their household food security.

V. CONCLUSION

Based on these results we can conclude some of the following:

1. The Participation level of women farmers in rice farming in swamp lands are at high criteria.
2. The food security level of women farmers households in the swamp lands, which hold the food security as much as 25.83 percent, 20.83 percent were vulnerable food, less food by 43.33 percent and food insecurity as much as 10 percent.
3. From the analysis, it can be seen that there is a positive relationship between the participation of women farmers in rice farming in swamp lands by the food security level.

ACKNOWLEDGEMENTS

The author would like to thank the Directorate General of Higher Education (Higher Education) on Competitive Grant funding research that has been given to the author. The author also would like to thank all those who have helped in this study for the advice, information and data that has been given.

REFERENCES

- Alihamsyah, T. 2002. *Prospek pengembangan dan pemanfaatan lahan pasang surut dalam perspektif eksplorasi sumber pertumbuhan pertanian masa depan*. Monograf Balai Penelitian Pertanian Lahan Rawa. Banjarbaru.
- Irawan, N.C. 2010. *Ketahanan Pangan dan Kesejahteraan Rumah Tangga Tani di Kabupaten Sleman, Bantul dan Kulonprogo*. Tesis Ekonomi Pertanian, Universitas Gadjah Mada. Yogyakarta.
- Nasution. 1998. *Metode Research (Penelitian Ilmiah)*. Bumi Aksara. Jakarta.
- Nazir, M. 2009. *Metode Penelitian*. Ghalia Indonesia. Jakarta.
- Omotesho, O.A., Adewumi M.O., and Fadimula K.S. 2007. *Food Security and Poverty of the Rural Household in Kwara State, Nigeria A.A.A.E. Conference Proceedings*. Department of Agricultural Economics and Farm Management, Faculty Agriculture, University of Ilorin, Nigeria.
- Pankomera, P., Houssou N., and Zeller M. 2009. *Household Food Security in Malawi: Measurement, Determinant, and Policy Review*. Conference on International Research on Food Security, Natural Resources Management and Rural Development.