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Food Security Level of Farmer Households in Rice Field Agroecosystem

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Abstract. Food security at the household level essentially shows the ability of households to meet the food adequacy. This ability is influenced by complex factors but generally related to socio-economic aspects, food production behavior, consumption and allocation of household resources. The objectives of the research are 1) to identify the social and economic characteristics, 2) to identify the food consumption pattern, and 3) to analyze the level of household food security based on the quality of food consumption. This research was conducted in Lanrisang Sub-district, Pinrang District, South Sulawesi Province. This research is a depth survey research in 50 farm households in rice field agroecosystem that were chosen through *simple random sampling*. The analysis method was descriptive analysis, farm activities analysis and food consumption quality. The results showed that the description of socio-economic conditions of farmer household is 60% low educated, 58% had < 7 years of working experience on farm, 52% have ≥ 3 family members, 74% with the income of $\geq$ IDR 1,800,000, 86% of household expenditure on food, and only 9 people (18%) have alternative job. The level of household food security of farmers in rice field agroecosystem is categorized as "food insecure."

1. Introduction

Food security for a country is paramount, especially for a country with a large population like Indonesia. The population of Indonesia is projected to be 270 million by 2025. [1] stated that the history of Indonesia's development shows that food security issues are closely linked to economic stability (particularly inflation), living costs, and national political stability. Therefore, food security becomes an absolute requirement for national development [1].

Poverty and food security are two interrelated phenomena. In this case, the unsafe food security condition becomes the source of poverty; on the contrary, because of poverty, oneself does not have food security [2]. Indirect poverty is an indication of the weakness of the fulfillment of food needs at the household level either because of the low income of the community or the uneven distribution of food, thus making them as food-prone communities. Poverty has become the fundamental problem so that households are unable to access food well. Besides, poverty has also caused households unable to meet the needs of adequate food, both in quantity and quality.

The local government of South Sulawesi Province has succeeded in increasing the production of various types of food crops. Data during four years (2011-2014) showed that the production of almost all types of food crops has increased considerably [3]. However, the income of the community, especially the farmers' households, is still low, thus affecting the consumption pattern and household food security. This is very ironic considering the principal livelihood of farmers as food producers [4].



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The increased food security is directed at self-reliance of resource-based local communities/farmers through improving food production programs, maintaining food adequate, safe and halal food availability in every area at all times, and also preparing anticipation to avoid food insecurity.

As a basic need and one of the human rights, food has a meaning and a significant role for the life of a nation. The availability of food that is smaller than its needs can create economic instability. Various social and political upheavals can also occur if food security is disrupted. This critical food condition can even endanger economic stability and national stability. For Indonesia, food is often identified with rice for it is as the primary staple food. Food security disturbances such as skyrocketing rice prices can lead to multi-dimensional crises. This condition occurred in 1997/1998 and could trigger social vulnerabilities that endanger economic stability and national stability. Indonesia was predicted to experience a food crisis in 2017 when it sees the imbalance between the population and the increasingly unbalanced availability of food today. The high number of percentage of households that have not been prosperous, the consumption rate which decreases each year and the high nutritional status of children under five years will enable the occurrence of food insecurity at the household level [5].

Samaulue Village is one of the villages located in Pinrang District that area belongs to the type of agro-ecosystem of rice field. This village is located in Lanrisang Sub-district. There are 432 households that work as farmers. The social life of the community in rice field agro-ecosystem is usually low educated; productivity is very dependent on seasons, limited business capital, lack of supporting facilities, poor market mechanism and long transfer of technology and communication [6]. These things resulted in low income of farmers. Therefore, this research aims: (1) to identify the socio-economic characteristics of farm households, (2) to identify the pattern of household food consumption of farmers, (3) to analyze the level of household food security of farmers based on the quality of food consumption in rice field agroecosystem.

2. Research Method

2.1. Population and Sample

Population in this research was all farmer households who live in Samaulue Village, Lanrisang Sub-district, Pinrang District, South Sulawesi Province, as many as 502 households. Then, the sample was determined by simple random sampling by taking 10% so that the total sample is 50 households.

2.2. Data Analysis

2.2.1. Descriptive Analysis. Descriptive analysis is used to describe socio-economic characteristics of respondents consisting of education, knowledge of respondents about nutrition and food, experience as farmers, number of family dependent, side job, household income and household expenditure.

2.2.2. Farm Activities Analysis.

Analyzing the household income [7], applied the following formula:

$$P_{RT} = P_{UT} + P_{LUT} + P_{ART} \quad (1)$$

Where:

P_{RT} : a total of household income (Rp/month)

P_{UT} : income from farming activities

P_{LUT} : income from other activities (alternative income)

P_{ART} : the income of a household member

In analyzing household expenditure [7], applied

$$C_{RT} = \sum_{i=1}^n C_P + \sum_{j=1}^m C_{NP} \quad (2)$$

Where:

C_{RT} :a total of household consumption (Rp/month)

C_P :Expenditure for food (Rp/month)

C_{NP} :Expenditure for non-food (Rp/month)

$i_{1..n}$:Consumption for some types of food

$j_{1..m}$:Consumption for some types of non-food

2.2.3. Analysis of Household Food Security. Measuring the level of household food security of farmers on the type of agro-ecosystem rice was determined based on the quality of food consumption using the method of Food Diversification Score (SDP) [8]. The scoring of actual household consumption on the amount of food needed per unit of the consumer for adult men (UK) in each food group (staple food, side dishes, vegetables, fruits and milk).

Table 1. Measurement of Household Food Security Based on Quality of Food Consumption

Type of Food	Total of needed food per unit consumption of one man (UK) ²⁾	Score ¹⁾
Rice, cereal, sweet potatoes ³⁾	500 g	0 1 2
Animal & Vegetable Side Dishes	200 g	0 1 2
Vegetable	150 g	0 1 2
Fruits	200 g	0 1 2
Milk	25 g	0 1 2
Total maximum score		10

In which:

¹⁾ 0 = if the portion of factual consumption: < 0,5 UK

1 = if the portion of factual consumption: 0,5< UK < 1

2 = if the portion of factual consumption: > 1

²⁾Medium activities

³⁾ 500 g = if the portion of sweet potatoes < 20%, corn < 10%

600 g = if the portion of sweet potatoes 20 – 50 %

700 g = if the portion of sweet potatoes > 50 %

Criteria for assessment of household food security:

- If Score of Food Diversification (SDP) $\geq$ five so it is included as criteria for food-secure households, and
- If Score of Food Diversification (SDP) < 5 so it is included as criteria for food-insecure households.

3. Result and Discussion

3.1. Socio-economics Characteristics

The socio-economics characteristics of the respondents can be seen in Table 2 below.

Table 2. Respondents' Socio-economics Characteristics in Samaulue Village, Lanrisang Sub-district, Pinrang District, South Sulawesi Province, 2018

No.	Characteristics	Number of Respondents	Percentage (%)
1.	Education		
	• Lower level	30	60
	• Higher level	20	40
2.	Farming experience		
	• < 17 years	29	58
	• ≥ 17 years	21	42
3.	Family members		
	• < 3 people	24	48
	• ≥ 3 people	26	52
4.	Household income		
	• < IDR 1,800,000	13	26
	• ≥ IDR 1,800,000	37	74
5.	Household expenditure		
	• on food		86
	• on non-food		14
6.	Alternative job		
	• Yes	9	18
	• No	41	82

Table above shows that 60% of the total respondents has lower educational level; 58% have worked as farmers for < 7 years; 52 % have ≥ 3 family members; 74 % gain ≥ IDR1.800.000 of income; household expenditure on food as much as 86 %; and only 9 people have alternative job beside farming.

3.2. Food Consumption

The purpose of food consumption is to obtain the nutrients the body needs [8]. In general, the type of food consumed by the farmer households was less varied, i.e., only two basic foods (rice and corn), other main food consumption such as cassava and sweet potato generally consumed by respondents only as a distraction. Types of side dishes consumed by respondents and their families were animal side dishes (fish and eggs) and vegetable side dishes (tofu and tempe). Furthermore, the types of vegetables consumed by household respondents were spinach, kangkung, beans, and eggplant. Types of fruits consumed by respondents were only two types, i.e. banana and papaya. All respondents did not consume milk as a complement to four healthy dishes five (milk) to make it perfect. The average of staple food consumption is 255.37 grams/person/day, while the standard food requirement according to [9] is 500 grams/person/day. It indicates that the food consumption of staple foods have not met the standard of staple food needs yet. Average of side dishes consumption was 229.74 grams/ person/day, while the standard needs of side dishes according to [9] is 200 grams/person/day. The results showed that the consumption of side dishes had met the standard side dishes needs. The average of vegetable consumption is 129.03 grams/ person/day, while the standard needs according to [9] is 150 grams/capita/day, so the result did not meet the standard of vegetable needs. The average of fruits consumption is 55.54 grams/person/day, while the standard needs of fruits according to [9] is 200 grams/ person/day. These results indicate that the consumption of fruits in the household respondents did not meet the standard needs of fruits. Consumption of milk in Samaulue Village did not meet the milk standard needs either, because no respondents consumed milk in the menu of household consumption. Food consumption can be seen in the following table 2.

Table 3. Average of Food Consumption in Respondent's Household in Samaulue Village, Lanrisang District, Pinrang Regency, 2018

No	Description	Average of Food Consumption (gram/day)	Average of Food Consumption per person (gram/person/day)*	Standard of Food Needs(gr/person/day)
1.	Staple	766.10	255.37	500
2.	Side Dishes	684.25	229.74	200
3.	Vegetables	387.09	129.03	150
4.	Fruit	166.59	55.54	200
5	Milk	0	0	25

Source: Primary data, 2018

In which : *Average of households member : 3 people

3.3. Status of Food Security

Household food security status was analyzed using Food Diversification Score (SDP) by [9]. SDP was calculated based on the Quality of Food Consumption (MKP) by using the actual household consumption score on the amount of food needed per unit of consumption (UK) in each food group. The criteria for assessment of household food security are assessed based on the value of Food Diversification Score.

Based on Table 3 it showed that the status of household food security in Samaulue village is mostly in the category of "food insecure", which is 34 households with a percentage (68%), and households that are categorized as "food secure" are 16 households with percentage 32%). This condition becomes a specific finding considering Pinrang Regency is one of the areas of food barn especially rice in South Sulawesi. This finding is in line with the study of [10] stated that although at the regional level food security status is assured, it is not enough to ensure food security at the household level. Food security at the household level essentially shows the ability of households to meet their food needs. This ability is influenced by complex factors but generally related to changes in the aspects of food production behavior, consumption and allocation of resources in the family.

Table 4. Distribution of Farmers Household Based on Food Security Status in Samaulue Village, Lanrisang Sub-district, Pinrang District, 2018

No	Status of Food Security	Total of Households	Percentage (%)
1	Food Secure households	16	32.00
2	Food Insecure households	34	68.00
Total		50	100.00

Source: Primary data, 2018

4. Conclusion

From the results of research on farm households on the rice fields agroecosystem in Samaulue Village, Lanrisang Sub-district, Pinrang District, concluded as follows:

1. Description of social condition of farmer household was 60% low educated; long experience as a farmer in average of 17 years; household member was 52% in high category (≥ 3 people); 74% have low income which is IDR 1,800,000; household expenditure allocation was 86% on food, and only 18% of the respondents had an alternative job.
2. Food security level of farmer household in the rice field agro-ecosystem in Samaulue Village, Lanrisang Sub-district, Pinrang District included as "food insecure".

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