AN ANALYSIS OF FARMER HOUSEHOLD FOOD SECURITY: CASE STUDY IN PATUK VILLAGE, WAJAK, MALANG REGENCY

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ABSTRACT: Food security is a priority in Indonesia at this time specially to achieve food security of households to reduce food-insecure communities. According Sumarwan and Sukandar (1998), household food security and household welfare can be determined from the aspect of Adequacy Rate of Energy (ARE) and Adequacy Rate of Protein (ARP). This paper presented (1) the food security situation among farmer households in Patuk Village using Adequacy Rate of Energy (ARE) (2) factors affecting Adequacy Rate of Energy (ARE) of farmer household. Primary data were used in this study and these were obtained using in-depth interview and 2x24 food recall survey to measure farmer household food pattern. The analytical tools used include tables, percentages and analyzed using 2-SLS regression model. The result showed that 18.75% were very food secure, 21.88% were food secure enough and the rest 59.38% were food insecure. From these results, it can be seen that the majority of the farmer household in this study still food insecure. Based on the regression analysis method, the result shows that the adequacy rate of energy is positively related to the value of food consumption, mother education level, income per capita, and negatively related to the value of non-food consumption.

Keywords: food security, farmer households, adequacy rate of energy

INTRODUCTION

Food security is an important issue in the development activities of a country because it involves basic human needs, which also related to political stability. Indonesia's success in the food self-sufficiency in rice commodities are not always followed by a reduction in food-insecure communities. Therefore, the focus of food security is a priority in Indonesia at this time is not solely from the aspect of food supply through the efforts of self-sufficiency, but more important is to achieve food security of households to reduce food-insecure communities. In year 2008, the percentage of food insecure population was approximately 34% of the total population of Indonesia (Food Security Council, 2010).

The concept of food security refers to the ability of a household to make sure all members have ongoing access over a sufficient quantity and quality of food to be active and healthy life (Kabeer, 1990). The concept refers to the ability of a household to manage economic resources at their disposal, in order to meet the needs of non-food and its food so that households have good status of food security. Each group of households has their own way to organize the acquisition of its food, including farm households.

Farmer household has its unique characteristics, as well as the manufacturer of the results of their farming, farm households also act as consumers. Farmer households should be able to allocate economic resources at their disposal for production activities and their consumption. This decision making related to resource allocation optimization problems that they have. Resources include human resources and capital resources. The decision is related to the resource allocation hierarchy optimization of resources, for production decisions, farm households will maximize output with minimum input. For consumption decisions, farm households will minimize costs and maximize satisfaction. Therefore, the achievement of household food security of farmers is an interesting topic to be discussed, because the current farm households in Indonesia faces considerable problems related to the decision of their farming activities as well as non-farming.
The problems facing farmer household decisions related to farming activities include the reduction of agricultural land due to land conversion, structural shift in employment out of agriculture, as well as declining farm productivity. In addition the majority of farming households live in rural areas, the majority of the population is poor. Poverty becomes a major problem for peasant households in making decisions for non-farming activities. Based on data from the World Bank, the International Food Policy Research Institute (IFPRI) and the United Nations (UN) Centre for Human Settlements in M.Renkow (2000) showed that 47% of the world's poor live in rural areas lagging behind, 36% rural areas developed and 17% in urban areas. Poverty makes peasant households have less access to capital, its limit their productive activities, so that makes them vulnerable to access food. Problems in the farming and non-farming are certainly affecting decisions in allocating economic resources.

Patuk Village is an example of a village whose majority are farmers. As well as many agricultural villages, the changes happening in the village, changes in socio-economic conditions for the mobilization of the population from rural to urban areas, as well as the orientation of farmers who are not only farmed to meet their own needs (subsistence) but also for sale to the market (semi-subsistence). These changes make the change on the decision of farmer households in allocating economic resources in achieving household food security. This change should also change the level of household food security of farmers in the Patuk Village.

According to Sumarwan and Sukandar (1998) in the study Analysis of Food Security and Family Welfare determines the level of family food security from the aspect sufficiency level of energy and protein sufficiency level. So that the adequacy of value Score Energy (AKE) can determine level of a household food security. The achievement of household food security is strongly influenced by the allocation of economic resources of the household.

Farmer household resource allocation follows the concept of production and consumption, it based on dual role of farmer household, which not only as a producer but also as consumers. As producer, farmer households must maximize output by the allocation of a minimum input. On the other hand, consumer attempt to maximize the satisfaction gained by the allocation of costs to a minimum.

Economic resource allocation decisions of households are affecting levels of household food security, hence the importance of an analysis of the allocation of economic resources peasant households in realizing food security of households. In addition, it is also necessary alternative policy recommendations to improve the level of household food security of farmers.

Food security is a multidimensional concept that includes the chain of food and nutrition system from production, distribution and consumption. Household food security system is determined by the size of the various indicators.

Food availability aspect depends on natural resources, physical and human as well as agricultural and non-agricultural production. In this case, the indicators used to explain natural resources are rainfall, soil quality, water availability and access to forest resources; physical resources include livestock ownership, access to infrastructure, ownership of agricultural inputs, land ownership; human resources include the ratio of dependency, education, family size and age of the head of the family. Production indicators are planting area, irrigated land area, access to and use of inputs, cropping pattern, crop diversity, food production and the production of non-farm product.

The aspect of food access include income from both farm and non-farm. The indicators used are the total Income, Income from crops, income from livestock, wages, food prices, market access and street access.

The aspect of food utilization includes the consumption of both food and non-food consumption and nutritional status of both children and adults. Consumption indicators used are total expenditure, food expenditure, non-food expenditure, food consumption and frequency. Include anthropometric indicators of nutritional status, serum content, sickness, death, birth, access to health care, access to clean water and access to sanitation. Assessment of nutritional is determined from food consumption, physical examination and laboratory (Harper, Deaton and Driskel, 1985). Meanwhile, according to Riyadi (2004), assessment of nutritional status can be done by way of food consumption, how biochemical, anthropometric or clinical
The measurement approach of household food security

Frankenberger (1992) stated that various indicators could measure the achievement of household food security. The indicators are divided into two groups: process indicators and outcome indicators. Process indicators describe the food situation shown by supply and food access. Outcome indicators can be used as a reflection of food consumption.

Indicators that reflect food supply are weather data, information resource, the data of agricultural production, agro-ecological models, balance of foodstuffs, information distribution, plant pests and diseases, market structure and institutional support. Food access indicatoes include sources of income, access to capital loans. Indicators of food access of households also include strategies to meet food shortages. These strategies are vary per region, community, social class, ethnic, household, gender, and season. The other indicators could be considered are household budgets and consumption, households' perception on food security.

Khomsan (1999) in his research entitled indicators of food security in Java using linear regression models to analyze the model of family food security. The first model uses the level of energy consumption (E) as the dependent variable and the second model using protein consumption level (P) as the dependent variable.

Food security is measured by the level of energy and protein consumption. The level of energy consumption is the ratio between the amount of energy consumed per capita and per capita energy sufficiency and expressed as a percent. The level of protein consumption is comparation between the amount of protein consumed per capita and the adequacy of protein per capita. This measurement is also in percentage unit.

The classification of food security level is also important point to be mentioned clearly. It is high food security level if E > 100 and P > 100, the medium level of food security if E <100 or P values <100 then the household does not hold food securely.

In terms of food consumption, household food security can be gauged from the level of consumption of energy and protein. According to Sumarwan and Sukandar (1998) in the study of food security and family welfare found that family welfare determines the level of family food security from the aspect sufficiency level of energy and protein sufficiency level.

The level of food security (energy) family is divided into three groups. They are (1) the family that consumes energy <75% of energy sufficiency. This group is considered as low food security; (2) a family consumes between 75-100% energy adequacy. This group is medium food security; (3) the family that consumes energy >100% energy adequacy. This group is grouped as high food security.

According to Maxwell and Smith (1992), if energy needs are achieved and it tends that other nutrients are also attained. Chung, et al (1997) used the figure of 80% of adequacy rate as the limit of the minimum energy requirements. Haddad, et al., (1991) used 70% rate of adequacy rate as the limit of the minimum energy requirements. This study added some alternative indicators for this aspect. They are: (a) total expenditure per capita, or per capita income; (b) dependency ratio of households; (c) land ownership.

Braun, et al. (1992) distinguished the level of food security at the country level and at the household level. At the household level the indicator used are: (a) food intake compared to the recommended dietary allowance; (b) the level of real wages; (c) the work; (d) the price ratio; and (e) status of anthropometry.

Maxwell and Smith (1992) stated that the insecurity of food access was an indirect factor of the problem of malnutrition among children than caused by infectious diseases, especially diarrhea. The number and quality of the resource reflected by the availability and food production will determine the ability of households to access food.

Nutritional needs are vary among individuals, influenced by gender, age, body size (weight, height), physiological state (pregnant or breastfeeding), physical activity and metabolism. In Indonesia since 1978 every 5 years is made a figure of nutritional requirements (RDA) nationally, which is recommended by the forum of Widya Karya National Food and Nutrition (WKNPG). The last revised document was conducted in 2004.

The average energy per capita recommended by WKNPG 1998 set at 2,500 kcal per capita per day consumption level and 2,550 kcal in the availability (Muhilal, Jalal and Hardinsyah, 1998). Afterward, Widyakarya National on Food and Nutrition in 2004 set at 2,000 kcal per capita per day consumption level and 2,200 kcal in the level of availability, which lower than previous measurement.
The nutritional needs of the family is the sum of the nutritional needs of family members. Figures nutritional needs (AKG) is usually used as a base assessment of food consumption and food planning at the level of individuals, families and local levels.

Hardinsyah (1996) developed the concept of measuring household food security status. The measurement was based on the quality of consumption by using a score of diversification. The calculation is done by giving a score of actual consumption of households on the amount of food needed per unit of consumption for adult men (UK) in each food group, i.e., (1) of rice, cereals and tubers; (2) animal and vegetable side dishes; (3) vegetables; (4) fruit; (5) milk. Hardinsyah developed a relatively simple and easy on measuring food security at household level.

Those of arguments related to food security are converge in certain measurement related to what is available, what the family has ability to access, and in what amount of the food has been consumed. Moreover, the indicators construct food security are also considering a specific location where the analysis is conducted. It means that there are always adjustments needed for representing food security especially in household level (Frankenberger 1992, Haddad, et al 1991).

RESEARCH METHODS
Method of measuring household food security

This study is conducted in Mlorah village, Rejoso Sub-district, Nganjuk Regency, East Java Province, Indonesia. There are 32 households are selected for this study, which are chosen randomly.

There are four methods to obtain information of food consumption of the family, such as food recall method, food weighing method, food inventory method, food list method and food record method. Each method has strengths and weaknesses in terms of accuracy, time, and costs.

Food recall method is done by recording the type and amount of food consumed in the past (usually within the last 24 hours) through interviews. Estimating the amount of food consumed is by asking in the form of household size (URT) such as pieces, bundle, cup, or bowl commonly used in households. Subsequently, the data are converted into units of grams. In order to obtain accurate results, then, the enumerators need to be trained in advance in using URT and convert them to a unit of weight. This method has a drawback in the precision, because the particulars obtained is the result of the memory of the respondents. However, this weakness can be overcome by extending the time of the survey (greater than 1 x 24 hours). The advantage of this method is inexpensive and simple.

Sa’diyah and Briawan (1999) stated that food recall method does not require a lot of funds and time. According to Hardinsyah (2002), this method is recommended for food consumption survey in order to obtain a picture of the population. Food recall method suitable for this particular purposes in this study. Food recall method can be recommended on the condition that surveyors are trained properly in the collecting data (Sa’diyah and Briawan, 1999).

Household food security measure

Household food security can be determine from the level of energy consumption.

\[
AKE = \frac{\sum \text{Household Energy Consumption}}{\text{AKE recommended}} \times 100\%
\]

The level of food security (energy) family is divided into three groups:
1. The family that consumes energy <75% of energy sufficiency is considering low food security level
2. The family that consumes energy between 75-100% of energy sufficiency is considering low food security level,
3. The family that consumes energy> 100% energy adequacy is considering high food security level.

Factor affecting energy consumption

OLS is applied in order to find factors affective energy adequacy score (AKE). The model is below.

\[
AKE = f (NCP, NCNP, PDIBU, PKPT)
\]

Where:
- AKE : Number of energy adequacy (kcal)
- NCP : Food consumption value (IDR)
- NCNP : Non-food consumption value (IDR)
- PDIBU : The educational status of mother
- PKPT : Income per capita (IDR)

RESULTS AND DISCUSSION

Food security measure in household level

From the calculation, there are 18.75% of respondents in high food security level, 21.88% of
respondents in moderate food insecurity level and the remaining 59.38% of respondents in low food security level. It means that the most farmers’ household in the location are food insecure. This study gives early signal for the local government for more attention in applying food security programs in this region.

Table 1. Food security status of respondents

| Status of food security | Percentage of respondents (%) |
|------------------------|-----------------------------|
| High                   | 18.75                       |
| Moderate               | 21.88                       |
| Low                    | 59.38                       |

Source: Survey Data, 2012

Factors Affecting Food Security Approach Adequacy Score Energy (AKE)

Based on linear regression analysis results indicate that the Number of Energy Adequacy (AKE) is positively related to the value of food consumption (NCP), education of mother (PDIBU) and income per capita (PKPT) and negatively related to the value of non-food consumption (NCNP). The results of the estimation is presented in Table 2.

The determination coefficient is equal to 0.1315. It shows that the 13.15% variable AKE can be explained by the variable value of food consumption (NCP), the value of consumption of non-food (NCNP) Mother’s education level (PDIBU) and income per capita (PKPT) are included in the model, while the remaining 86.85% is explained by variables others not included in the model. Significant at 51%, so that further research improves this value.

Tabel 2. The OLS results

| Variable                        | Parameter Estimators | T Count |
|--------------------------------|----------------------|---------|
| Intercep                       | 1312.02              | 3.859   |
| Food expenditure (NCP)         | 4.266 E-05           | 0.658   |
| Non-food expenditure (NCNP)    | -3.348 E-05          | -0.784  |
| Mother’s Education Level (PDibu) | 209.588             | 0.718   |
| Income per capita (PKPT)       | 3.976 E-05           | 1.226   |

Source: Analysis Result, 2011
Dependent variable: AKE

Based on t test, the factors that affect AKE is as follows:

1. The value of food consumption (NCP)
Based on t-test, variable food consumption values obtained t count equal to the probability-t 0658 and amounted to 0.5161 where a probability value is greater than 0.4 (α = 0.4 or 60% confidence interval), so that could mean that the value of food consumption (NCP) has no significant effect on the minimum level of dietary energy (AKE). Thus, regardless of changes in the value of food consumption will not cause a change in AKE.

2. The value of non-food consumption (NCNP)
Partial test on the variable value of non-food consumption indicates that this variable has no significant effect on the AKE. It can be seen from the t value at -0.784 and t probability value of 0.4398 where a probability value is greater than 0.4 (α = 0.4 or confidence interval 60%). With results that are not real, then regardless of the changes in the value of non-food consumption does not cause any change to AKE.

3. Education of the mother (PDibu)
T-test results to variable obtained t count the mother’s education and the value of 0.718-t probability of 0.4789. These results indicate that Mother’s education level did not significantly affect AKE at the level of 60% or α = 0.4 for the t-value greater probability α (0.4789> 0.4), so that regardless of the changes that occur in the mother’s education then it will not cause a change in AKE
CONCLUSION

Based on the analysis and discussion in the previous description, we can conclude some of the following:

1. Condition household food security of farmers respondents in Patuk Village based on numbers sufficient energy (AKE) indicates that 18.75% of respondents are food secure, 21.88% of respondents are food insecure moderate and the remaining 59.38% of respondents are food insecure severe.

2. Adequacy Score Energy (AKE) is positively related to the value of food consumption, Mother’s education level, income per capita, and negatively related to the value of non-food consumption. Where four indicators have low effect to the model. So for further research is recommended to add indicators and multiply respondents.

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