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# STUDY ON FOOD SECURITY AMONG FARM HOUSEHOLDS PARTICIPATING IN THE SUSTAINABLE FOOD YARD (SFY) PROGRAM IN SEMARANG CITY

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## *ABSTRACT*

*Food security in Indonesia can realized when the population's food needs are met. One of the efforts to increase food security carried out by the Food Security Agency under the Indonesian Ministry of Agriculture is implementing the Sustainable Food Yard (SFY) program or Pekarangan Pangan Lestari (P2L) in Indonesia. The SFY program utilizes yards, idle land, or empty land for agricultural activities. Semarang City includes the regions that have received the SFY program since 2020. This research aims to determine the status of food security and the role of the SFY program on the food security of farm households participating in the SFY program in Semarang City—the research conduct using a survey method on 130 farm household samples. The data collection technique is in the form of interviews using a 24-hour food recall questionnaire. The data obtained was then processed using cross-tabulation analysis between energy sufficiency percentage and food expenditure shared with the Microsoft Excel application to determine the food security status of farm households. The role of the SFY program on the food security of participating farm households was analyzed descriptively. The research results show that the distribution of food security status of farm households participating in the SFY program in Semarang City is 88.46 percent food secure, 3.08 percent vulnerable, and 8.46 percent questionable. The role of the SFY program in the food security of farm households is not very significant in increasing energy consumption and reducing household food expenditure.*

***Keywords:*** ***food security, food expenditure share, sustainable food yard, energy sufficiency percentage***

## INTRODUCTION

Semarang City is Central Java Province's capital and the fifth-largest metropolitan city in Indonesia (Fadilla et al., 2017). As the center of government and economy in Central Java, food security must be considered because it is closely related to the stabilization of the economic and political sectors (Chaireni et al., 2020). The food condition of Semarang City can be measured using the Food Security Index (FSI) with indicators that reflect aspects of food availability, affordability, and utilization and provide an overview of the ranking of food security achievements.

Semarang City's FSI is in good condition, but there are fluctuations between 2018 and 2020 (The Indonesian Ministry of Agriculture, 2021). The fluctuations need special attention in the context of stabilizing the food security of Semarang City. Khairati and Syahni (2016) emphasize that food availability in an area is vital to support the growth, maintenance, and improvement of the population's health status. Meanwhile, the Food and Agriculture Organization of the United Nations (2020) notified the threat of a food crisis in the future, and that risk mitigation needs to be taken, one of which is through farming activities.

Agricultural mobilization in urban areas is an effort implemented to independently meet urban residents' food needs (Fauzi et al., 2016). Semarang City still has the potential to develop urban agriculture because it has dry land that can be used for yards, covering an area of 13,396 hectares (Statistics of Indonesia for Semarang City, 2020). According to Tornaghi (2014), urban agriculture involves varying community participation in each city and country, including agriculture in Semarang City.

One of the urban agricultural activities implemented by the people of Semarang City is Sustainable Food Yards (SFY) or Pekarangan Pangan Lestari (P2L) in the Indonesian language. This program was previously called the Sustainable Food House Area (SFHA) or Kawasan Rumah Pangan Lestari (KRPL). It changed to SFY in 2020 with a broader range of participants. The essence of the SFY program is the utilization of yard land, idle land, and empty non-productive land for farming activities (Food Security Agency under the Indonesian Ministry of Agriculture, 2021). The SFY program is expected to encourage socio-economic independence while meeting community nutritional adequacy (Vebronia et al., 2022). The implementation of the SFY program in various regions in Indonesia has shown positive results on the food security aspects of participating households (Oktarina et al., 2023; Sukmawani et al., 2022; Tama & Priyanti, 2022). However, the food security of farm households participating in the SFY program in Semarang City has yet to be studied. This is the basis for carrying out this research to determine the status of food security and the role of the SFY program on the food security of farm households participating in the SFY program in Semarang City.

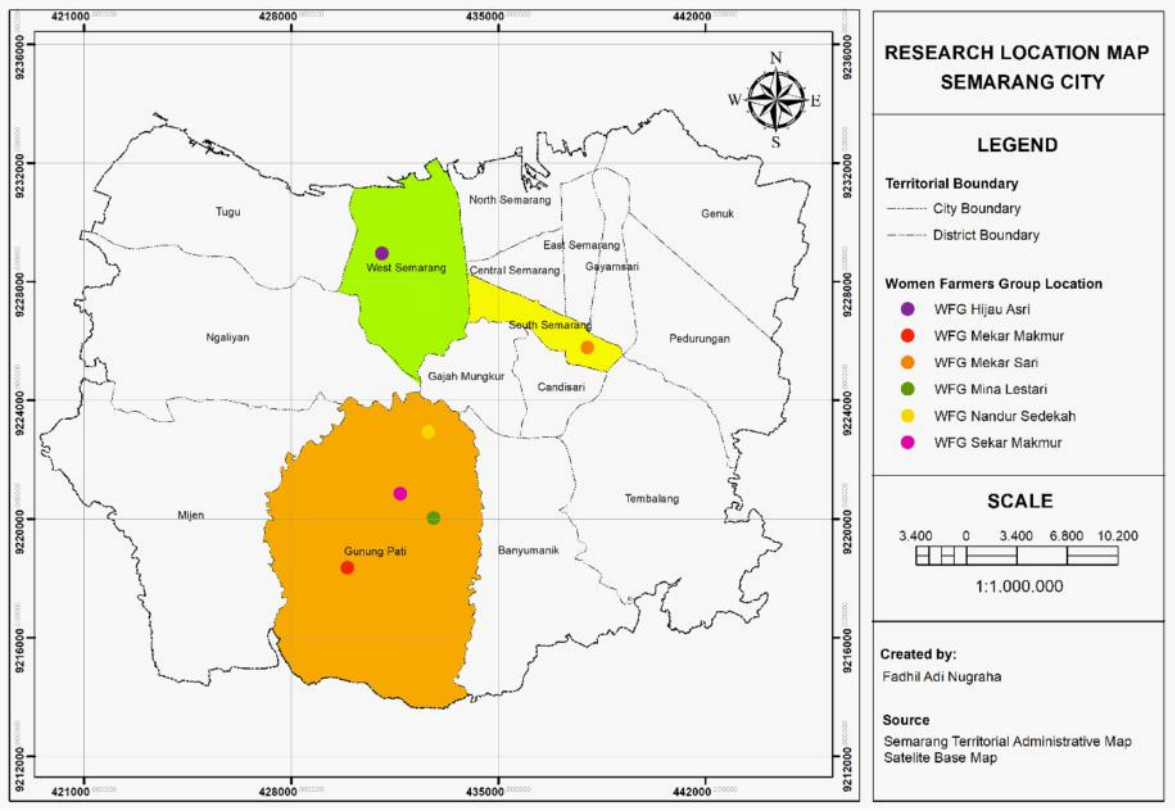



**Figure 1** Research Location Map

The number of samples (n) was calculated using the Slovin formula quoted from Lagebada et al. (2017).

$$n = \frac{N}{1 + Ne^2}$$

The population (N) in this study was 193 farm households. Meanwhile, the maximum error limit (e) was 5 percent, so the respondents were 130 farm households.

The representative sampling technique from each WFG uses the proportional random sampling method. Collecting data in the field using interview techniques with questionnaires and food recall measures the amount of food consumption, be it breakfast, lunch, dinner, snacks, drinks, etc., consumed inside or outside the house for 24 hours (Yu et al., 2020). The data taken is then processed using cross-tabulation analysis between the energy sufficiency percentage analysis and the food expenditure share of farm households.

**Analysis of Energy Sufficiency Percentage**

Farm household energy consumption is calculated using the energy sufficiency percentage approach obtained using the following formula (Purwantini et al., 2006):

$$E \quad = \frac{E}{A} \; x \; 100\%$$

Notes:

ESP: Energy sufficiency percentage (%)

ECAE: Energy consumption per adult equivalent (kcal)

ARES: Amount of recommended energy sufficiency (2,100 kcal)

### Analysis of Food Expenditure Share

The share value of farm household food expenditure is found using the formula quoted from Rahmansyah et al. (2020):

$$FES = \frac{FE}{TE} \ x100\%$$

Notes:

FES: Food expenditure share of farm household (%)

FE: Food expenditure of farm household (IDR/month)

TE: Total food and non-food expenditure of farm household (IDR/month)

### Analysis of Food Security Status

The tabulated results of the energy sufficiency percentage analysis and the food expenditure share of farm households were then cross-analyzed using the Microsoft Excel application to determine the food security status of farm households. There are four categories of food security status: food security, vulnerable, questionable, and food insecure. A more detailed cross-tabulation analysis is shown in Table 1.

### Analysis of the SFY Program's Role in Food Security

The household food security status obtained from the cross-analysis was then described more specifically to determine the role of the SFY program in Semarang City on the food security of participating farm households. The SFY program's role was analyzed descriptively using processed research data and a literature study. Data for the literature study is collected by reviewing journals, books, documents, and other relevant information sources (Supriyadi, 2016).

## RESULTS AND DISCUSSION

### Respondent Characteristics

All respondents are female and are members of the Women Farmers Groups (WFGs) participating in the SFY program in Semarang City. The WFGs are WFG Mekar Makmur, WFG Hijau Asri, WFG Nandur Sedekah, WFG Sekar Makmur, WFG Mina Lestari, and WFG Mekar Sari. Other respondent characteristics describe the respondent farm households in Table 2, which are grouped according to age, education, occupation, household income, and number of family members.

Table 2 shows that most respondents are between 44 and 59 years old. This age is included in the productive age because it is 15-64 years old and can carry out farming activities optimally to meet household needs (Utami et al., 2021). The majority of respondents have a background at the senior high school level. The respondent's education

**Table 1** Household status based on food security indicators

| Energy Sufficiency Percentage | Food Expenditure Share | |
|---|---|---|
| | **Low (< 60% total expenditure)** | **High (≥ 60% total expenditure)** |
| Sufficient (> 80% energy sufficiency) | I. Food secure | II. Vulnerable |
| Less Sufficient (≤ 80% energy sufficiency) | III. Questionable | IV. Food insecure |

Source: Jonsson and Toole (1991) in Maxwell et al. (2000)

**Table 2** Characteristics of farm household respondents participating in the SFY program in Semarang City

| Respondent Characteristic | Number | Percentage (%) |
|---|---|---|
| Age | | |
| - 28–43 years old | 57 | 43.85 |
| - 44–59 years old | 59 | 45.39 |
| - 60–76 years old | 14 | 10.77 |
| Education | | |
| - Elementary school | 15 | 11.54 |
| - Junior high school | 37 | 28.46 |
| - Senior high school | 55 | 42.31 |
| - Diploma/bachelor/master degree | 23 | 17.69 |
| Profession | | |
| - Labor | 7 | 5.38 |
| - Private employee | 8 | 6.15 |
| - Entrepreneur | 31 | 23.85 |
| - Housewife | 59 | 45.38 |
| - Others | 25 | 19.23 |
| Household's income | | |
| - < IDR 2,500,000 | 10 | 7.69 |
| - IDR 2,500,000–IDR 3,500,000 | 43 | 33.08 |
| - > IDR 3,500,000 | 77 | 59.23 |
| Number of family members | | |
| - 1–2 persons | 47 | 36.15 |
| - 3–4 persons | 68 | 52.31 |
| - > 4 persons | 15 | 11.54 |

Source: Primary data (processed, 2022)

level shapes their mindset before implementing the SFY program (Purwati et al., 2023). In addition, the better the respondent's education as a housewife, the more rational they are in making consumption pattern decisions to maintain their household's food security (Mulyani & Mandamdari, 2012).

Most respondents' occupations are homemakers, so they have more time to focus on participating in the SFY program, which is implemented in the area around the house. The profession of respondents in this study is in line with the results of SFY research conducted by Mandini et al. (2022). The highest overall household income is more than IDR 3,500,000/month. All income comes from outside the agricultural sector because the SFY program participants in Semarang City do not work as commercial farmers. Farming income from the SFY program is also not used by households because the money goes into the WFG treasury. The money is used again to pay operational costs for the SFY program on demonstration plots cultivated jointly by WFG member farmers.

The maximum number of family members is between 3 and 4, consisting of the husband (head of the family), wife, and children. Rasmiati et al. (2016) argue that the greater the number of family members, the greater the food needs and expenses. This means that the opportunity to increase household food security is getting smaller.

**Household Energy Sufficiency Percentage**

Food consumption refers to the amount of food and drink consumed by individuals to

meet their physical needs. The energy contained in food is measured in kcal/person/day (Aziz & Muharni, 2016). Fulfillment of sufficient energy is one indicator in determining food security status. Household energy consumption in this study is listed in Table 3.

The research results in Table 3 show that the majority of households, 40 percent, consume between 1,901 and 2,100 kcal/person/day of energy. The average energy consumption is 2,001.58 kcal/person/day. This value is quite good because it is close to the recommended energy consumption given by the National Widyakarya for Food and Nutrition of 2,100 kcal/person/day (Indonesian Institute of Sciences, 2012). Energy consumption is then used to calculate the household energy sufficiency (ESP) percentage presented in Table 4.

Table 4 shows that 91.54 percent of households are included in the sufficient category based on ESP ≥ 80 percent of the recommended energy sufficiency (2,100 kcal). The remaining 8.46 percent of households are in the less sufficient category. General conditions in the field indicate sufficient energy consumption due to the respondents' adequate education and understanding as housewives. Homemakers or wives mainly serve food for all household members (Agustina et al., 2015).

**Household Food Expenditure Share**

The proportion or share of food expenditure is the percentage of food expenditure compared to total household expenditure, which consists of monthly food and non-food expenditures. Household food and non-food expenditure in this study is presented in Table 5 and Table 6.

Grains are the food category with the most expenditure based on Table 5; the value is IDR 307,792. Grain expenditures are the highest because rice is the staple food for every farm household (Prasetyoningrum et al., 2016). Prepared food and drinks (cake, bread, soda, etc.) are in second place for food expenditure, amounting to IDR 187,546. Meanwhile, vegetables are in third place, with an average expenditure of IDR 152,865.

**Table 3** Energy consumption of farm households participating in the SFY program in Semarang City

| No. | Energy (kcal/person/day) | Number (unit) | Percentage (%) |
|---|---|---|---|
| 1. | ≤ 1,700 | 5 | 3.85 |
| 2. | 1,701–1,900 | 33 | 25.38 |
| 3. | 1,901–2,100 | 52 | 40.00 |
| 4. | > 2,100 | 40 | 30.77 |
| Total | | 130 | 100.00 |

Source: Primary data (processed, 2022)

**Table 4** Energy sufficiency percentage of farm households participating in the SFY program in Semarang City

| No. | Energy Sufficiency Percentage | Number | Percentage |
|---|---|---|---|
| 1. | Less sufficient (< 80%) | 11 | 8.46% |
| 2. | Sufficient (≥ 80%) | 119 | 91.54% |
| Total | | 130 | 100.00% |

Source: Primary data (processed, 2022)

**Table 5** Food expenditure of farm households participating in the SFY program in Semarang City

| No. | Foodstuffs | Amount (IDR) | Percentage (%) |
|---|---|---|---|
| 1. | Grains | 307,792 | 22.48 |
| 2. | Tubers | 36,442 | 2.66 |
| 3. | Fish | 70,235 | 5.13 |
| 4. | Meat | 75,962 | 5.55 |
| 5. | Eggs and milk | 138,565 | 10.12 |
| 6. | Vegetables | 152,865 | 11.16 |
| 7. | Nuts | 91,308 | 6.67 |
| 8. | Fruits | 36,365 | 2.66 |
| 9. | Oil and fat | 53,877 | 3.93 |
| 10. | Drink ingridients | 77,262 | 5.64 |
| 11. | Spices | 73,958 | 5.40 |
| 12. | Processed food and drinks | 187,546 | 13.70 |
| 13. | Others (instant noodles, crackers, sausages, nuggets, etc.) | 67,150 | 4.90 |
| Total | | 1,369,327 | 100.00 |

Source: Primary data (processed, 2022)

**Table 6** Non-food expenditure of farm households participating in the SFY program in Semarang City

| No. | Expenditure Type | Amount (IDR) | Percentage (%) |
|---|---|---|---|
| 1. | Electricity and water | 147,346 | 8.77 |
| 2. | Oil and gas fuel | 255,292 | 15.20 |
| 3. | Cigarette | 107,885 | 6.42 |
| 4. | Education | 352,215 | 20.97 |
| 5. | Social activites | 99,615 | 5.93 |
| 6. | Daily needs | 228,577 | 13.61 |
| 7. | Communication | 254,769 | 15.17 |
| 8. | Taxes | 56,887 | 3.39 |
| 9. | Clothes | 41,846 | 2.49 |
| 10. | Health service | 134,885 | 8.03 |
| Total | | 1,679,217 | 100.00 |

Source: Primary data (processed, 2022)

Farm households' most significant expenditure for non-food purposes is education (Table 6). The children of farmer respondents generally have junior and senior high school education. Education costs can be donations for educational development, pocket money, and books. Oil and gas fuel are the second largest non-food expenditures. Gasoline expenses are high because the distance from the house to school and/or office is quite far, so they need to drive a motorcycle/car. Meanwhile, respondents generally walk from their houses to the SFY demonstration plot area so they do not spend money on petrol. Accessibility or affordability from the house to the demonstration plot land is relatively easy because the distance is less than 1 km, and the road conditions are pretty good.

After analyzing food and non-food expenditure, the results can be used to find the share of food expenditure shown in Table 7. Non-food expenditure dominates at 55.08 percent of the total expenditure of farm households. The amount of food expenditure is 44.92 percent, which means that food availability for farm households is in good condition because the share of food expenditure is below 60 percent. This figure is close to the percentage of expenditure of the Semarang City residents in 2022 for food consumption of 40.43 percent and non-food consumption of 59.57 percent (Statistics of Indonesia for Semarang City, 2023).

Furthermore, the distribution of households with low and high food expenditure shares is presented in Table 8. The number of farm households included in the low food expenditure share category is 96.92 percent of the total households studied. Reducing the share of food expenditure will increase food security because households have more substantial purchasing power to increase food consumption (Ilham & Sinaga, 2007).

A total of 3.08 percent of households had a high food expenditure share. The existence of households with this condition is due to high expenditure on the consumption of rice, processed food, and vegetables. Limited income makes these households try to fulfill their food needs first as a basic need before meeting other needs. The higher the share of food expenditure, the lower the household's welfare or food security (Anzaini et al., 2022).

## Household Food Security Status

Measuring household food security status is carried out by first analyzing the energy sufficiency percentage as a proxy for nutritional variables and the food expenditure share as a proxy for economic variables (Syarief et al., 2014). Next, cross-tabulation analysis was applied to determine food security status, and the results can be seen in Table 9. Most households have achieved food security (88.46%) when the energy sufficiency percentage is > 80 percent and food expenditure is < 60 percent of total expenditure.

Households with questionable status are in second place at 8.46 percent of the total households studied. Questionable status occurs when the percentage of energy sufficiency is ≤ 80 percent and the share of food expenditure is < 60 percent. Even though household income is relatively good, respondents do not make maximum use of it for food consumption. The education level of homemakers is still low, so they lack an understanding of the nutritional content of food (Jayarni & Sumarmi, 2018). Besides that, some respondents were busy working

**Table 8** Food expenditure share of farm households participating in the SFY program in Semarang City

| No. | Food Expenditure Share Category | Number (unit) | Percentage (%) |
|---|---|---|---|
| 1. | Low (< 60%) | 126 | 96.92 |
| 2. | High (≥ 60%) | 4 | 3.08 |
| Total | | 130 | 100.00 |

Source: Primary data (processed, 2022)

**Table 9** Food security status of farm households participating in the SFY program in Semarang City

| No. | Food Security Status | Number (unit) | Percentage (%) |
|---|---|---|---|
| 1. | Food secure | 115 | 88.46 |
| 2. | Vulnerable | 4 | 3.08 |
| 3. | Questionable | 11 | 8.46 |
| 4. | Food insecure | 0 | 0.00 |
| Total | | 130 | 100.00 |

Source: Primary data (processed, 2022)

and did not have enough time to prepare nutritious meals for all family members.

In third place are households with vulnerable status, with a percentage of 3.08 percent. Vulnerability occurs when the percentage of energy sufficiency is > 80 percent, but the food expenditure share is > 60 percent. Meanwhile, no households experienced food insecurity with indicators of energy sufficiency percentage of < 80 percent and food expenditure share of > 60 percent. The overall research results show that the food security status of farm households participating in the SFY program in Semarang City is in excellent condition compared with the research results of Saputro et al. (2021) on household food security in Surakarta City.

**The SFY Program's Role on Household Food Security**

The energy sufficiency percentage is one aspect of food security in this research. Most households already consume enough energy, but the role of the SFY program in Semarang City needs to be more significant. This can be seen from the results of the SFY program farming, which has little impact on increasing the quantity of consumption by farm households. Only 27.70 percent or 36 household units from the total sample of households consumed SFY products. The most widely consumed vegetables from the SFY program are chilies and mustard greens.

Meanwhile, the average consumption of SFY products is 4.20 kcal or 3.25 percent of the average consumption of vegetables and fruit for households (106.26 kcal). The low consumption of SFY results from research when the SFY demonstration plot land had yet to enter the big harvest season. At the same time, the availability of commodities that farm households could utilize was minimal.

Farmer respondents only produce a few types of vegetables, such as chilies, eggplant, spinach, mustard greens, and kale, for household consumption. This type of vegetable has been chosen because it is relatively easy to cultivate in the lowlands compared to other types of vegetables, especially chilies, which can be harvested quickly and often used for cooking (Sari et al., 2022). Low commodity production on demonstration plots also occurs because farmers have yet to be able to consistently cultivate plants according to the schedule made and agreed upon by WFGs. Apart from that, farmers no longer cultivate plants in their private yards like when the SFY program started because they are busy and have low knowledge and skills (Nugraha et al., 2023). This challenge aligns with research by Waskitojati et al. (2019), who explained that efforts to change farmers' perspectives and maintain farmer consistency are the biggest challenges for developing horticultural agriculture. Respondents ultimately meet most household vegetable needs by buying from traveling sellers or markets near their houses.

The limited amount of vegetable production on demonstration plots for household use caused 45.38 percent of all respondents to assess that the SFY program in Semarang

City did not affect vegetable expenditure savings for households. Some respondents (12.31%) even stated that they sometimes spent their money to run the SFY program and needed proper feedback. Therefore, they feel they need more motivation to participate in this program. Meanwhile, some other respondents (39.23%) assessed that the SFY program could save less than IDR 50,000/ month, and only a few respondents (3.08%) argued that the program could save more than IDR 50,000/month. The SFY program's role in saving household expenses in Semarang City is lower than the results of studies from Kusumaningsih and Tyas (2019) and Saputri et al. (2021). However, monthly income from outside the agricultural sector can meet the household food needs of farmer respondents participating in the SFY program in Semarang City. The results of this SFY research indicate that the SFY program also does not significantly contribute to farm households' food security regarding the food expenditure share.

## CONCLUSION

This research concluded that 91.54 percent of farm households participating in the SFY program in Semarang City consumed enough energy based on the ESP value, while 8.46 percent did not meet the criteria. The percentage of households with a low food expenditure share was 96.92 percent, while 3.08 percent had a high food expenditure share. The results of cross-tabulation analysis to determine food security show that 88.46 percent of households are food secure, 3.08 percent are vulnerable, and 8.46 percent are questionable. The analysis results of the SFY program's role in household food security show that the vegetable harvest from the SFY program was not very significant in increasing household energy consumption and reducing household food expenditure due to the low quantity of harvest from the SFY demonstration plot land at the time the research carried out.

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