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**Food Security Status of Households in a Cassava-Growing Village in Southeast Sulawesi, Indonesia**

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**Abstract**

*The study assessed the food security status of poor households and contribution of cassava in their diets. Sixty-four cassava growers were selected from a Southeast Sulawesi cassava growing village using simple random sampling method. The United States Adult Food Security Survey Module was adopted in assessing the food security status of selected households. Data were analyzed qualitatively and using descriptive statistics. Results showed that a great majority (81.3%) of households were food secure. Average consumption of cassava based foods of 4.1 days a week compared to only 2.9 days for rice clearly confirmed that cassava was a dominant source of food and thus had contributed positively to the high food security status of households in the area. In view of its suitability with the farming and local food system as well as its importance in strengthening food security, efforts should be exerted to promote production, processing, marketing and consumption of cassava as staple food.*

**Key words:** cassava, food security, households, Indonesia, Sulawesi

## **Introduction**

Food self-sufficiency has long been an important objective of agricultural and rural development in Indonesia. Under the food self-sufficiency policy, the government has mainly promoted rice production to attain food security. Food and Agriculture Organization (FAO) (2017) defines food security as “situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” The government has adopted various measures to support food security objectives including *raskin* (an abbreviation of *beras miskin*, subsidized rice for the poor) programme launched in 1999. As a result, food security has improved, and according to FAO (as cited in World Food Programme (WFP), 2018), the prevalence of undernourishment declined to 7.6 percent in 2014–2016, from 19.7 percent in 1990–1992. In 2015, however, 58 out of 398 rural districts were still found to be highly vulnerable to food insecurity (WFP, 2018).

Factors affecting household food security include household assets, household savings, education, access to credit, non-farm work, family size, soil fertility, irrigation access, electricity connection, cultivated land size, income, and gender of household head (Some and Jones, 2018). Food consumption usually constitutes more than two-third of overall expenditure of poor households, so owning a food crop farm will increase food security of poor households.

At the national level, in order to attain food security, the government has attempted to increase domestic rice production. Rice is consumed as staple food by 97.0% of households (Badan Pusat Statistik (BPS), 2018) with per capita rice consumption of 100.57 kg/year (Kementerian Pertanian, 2017). However, given the high population to feed and satisfy, domestic production is not sufficient to meet rice demand so the government has imported rice since 2009 (Widyanti, Sunaryo & Kumalasari, 2014). Productivity leveling off and uncontrollable speed of conversion of rice fields to other land use purposes will likely make rice supplies decreasing from time to time (Harini, Yunus, Kasto, & Hartono, 2012). For this reason, the government has tried to adopt food diversification programme to encourage consumption of other staple foods. This is emphasized in Food Law 2012 that the food security condition should be developed based on primarily domestic production and the ability to define own food preference based on local specific need and resources (Rachmat, 2015). Therefore, food security policy at local level needs also to be based on local, natural and cultural resource base. As such, traditional staple foods which once were consumed as the main source of carbohydrates such as sago, cassava, maize and taro need to be promoted. Maize and cassava are the two most important food crops in Southeast Sulawesi after rice (Saediman, 2015).

In Buton District in Southeast Sulawesi, cassava has been grown by small-scale farmers in impoverished soils using traditional methods. Cassava fits well with the farming system in the area and has several characteristics that can support household food security. It is able to grow under marginal condition, tolerant to drought, tolerant to a range of rain fall pattern, and has relatively easy production process. Its mature roots can be kept in soil for a long time without losing their nutritional value due to the fact that the time for harvesting is flexible according to needs. The cultivated cassava varieties are bitter varieties, which are

Many studies have shown that cassava can contribute to enhancement of food security status of farming households (Muhammad-Lawal, Omotesho, & Oyedemi, 2013; Widyanti *et al.*, 2014, Ibok, Idiong, Brown, Okon, & Okon, 2014; Saediman, Limi, Rosmawaty, Arimbawa, & Indarsyih, 2016; Reincke *et al.*, 2018). However, studies that particularly focus on food security of poor cassava-growing households are lacking. Finding out food insecurity status of poor households is especially important as there might always be vulnerable households regardless of food security status at national level. At the same time, food insecurity itself could be a predictor for poor health and nutritional status (Mohamadpour, Sharif, & Keysami, 2012). For this reason, it is necessary to ascertain the food security status of poor-households. The objectives of this study were to analyze the level of food security among poor cassava-growing households and to find out the contribution of cassava based foods in their diets.

## **Methodology**

The study was carried out in Pasarwajo subdistrict located between longitude 122° 32' and 122° 40' East and between latitude 5°14' and 5°30' South in the southern part of Buton Island. Takimpo village has a size of 3.6 km<sup>2</sup>. The village consists of 3 hamlets. It has 1,920 inhabitants, consisting of 423 households. The average temperature varies between 25 and 32°C. The major economic activities of the inhabitants are agriculture and fisheries. The village is not suitable for wetland rice farming and the main food crop grown is cassava. Like any other areas in Indonesia, the village has a tropical climate marked by dry and rainy seasons.

Respondents consisted of *raskin*-eligible low-income households that grew cassava and processed it for their own consumption. A total of 64 respondents were selected randomly from the population of 180 farmers who were beneficiaries of *raskin* programme. Data and information were collected using questionnaires and focus group discussions (FGD). Data collected through questionnaires were socio-economic characteristics of respondents, food security status, staple foods consumption, cassava based foods consumption, and food acquisition. The FGDs were held twice with two farmer groups; each group was represented by five persons, consisting of the head and secretary of the group as well as three group members. Direct observation at the farm and local market was also done to increase understanding of cassava production and consumption in the area. Data were analyzed qualitatively and using descriptive statistics. Results of the survey are summarized and presented in tables and figures.

To assess the food security status of respondents' households, this study adopted the U.S. Adult Food Security Survey Module. The Survey Module consists of ten questions which do not include questions about children's food security (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). The questions deal with conditions and behaviors that characterize households when they are having difficulty meeting basic food needs. The responses to each of the questions were coded as either affirmative or negative. Responses of "yes," "often," "sometimes," "almost every day," and "some days but not every day" are coded as

The food security status of the each household interviewed is based on the sum of affirmative responses (raw score) to the 10 questions. Food security is defined into four categories as follows (Coleman-Jensen *et al.*, 2018):

- Raw score zero—High food security among adults
- Raw score 1-2— Marginal food security among adults
- Raw score 3-5— Low food security among adults
- Raw score 6-10— Very low food security among adults

The food security status of the first two categories in combination is categorized as food secure and the latter two as food insecure.

To find out the contribution of cassava based foods in the diets of the selected households, respondents were asked about the frequency of consuming particular staple in a week. In this regard, a household was said to have eaten a particular staple food “one day” if the household had eaten that staple food twice or three times from the total three meals or three eating occasions (morning, midday, and evening) a day. If both cassava based foods and rice were served in one eating occasion, respondents would decide which one was the main staple on that menu. In case of the same number of serving in a day, the respondents would choose which staple was considered dominant on that day

## **Results and Discussion**

### **Socio-Economic Characteristics of Respondents**

All of the household heads interviewed were *raskin* beneficiaries who grew cassava and consumed it as staple. The average age of the farmers was 47 years. This finding agrees with that of cassava farmer-processors reported in Saediman *et al.* (2016), implying that most cassava farmers were in their productive age. Mean household size was 5 persons. This household size is higher than average household size for the province of Southeast Sulawesi (4 persons) (BPS, 2017). A larger family size means that more family labor could be available for cassava production and processing, and enable adoption of cassava agronomic practices (Nwaobiala, 2015). However, higher number of family members will also put pressure on the availability of food as more people would have to be fed. Majority of respondents (73.4%) had been involved in cassava growing for more than ten years. This result is in agreement with Sosiawati (2015) who reported that sufficient farming experience can increase technical efficiency in cassava production. Average size of cassava farming was 0.9 ha. The result implies that cassava farmers in the study area were small scale farmers that cultivate less than one hectare of land. Small land holdings could present major constraint to technology adoption (Agwu, Njom, & Umeh, 2017). With respect to the level of education, majority (64.1%) of respondents had only completed elementary school, with a mean of 7 years of schooling. This mean years of schooling is lower than that for Southeast Sulawesi Province of 8.9 years (BPS, 2017). Despite being literate, respondents had low level of education, which might become a constraint to adopt improved farming practices and technologies (Nwaobiala, 2018).

### Household Food Security Status

Table 1 shows the the majority (79.7%) of households reported 1-2 food insecure conditions, which is under the category of *marginal food security*. Households with *low food security* status accounted for 17.2% as they reported 3-5 food-insecure conditions. Households with high and very low food security status were only 1.6% each. Overall, these results showed that households having the status of “*Food Secure*” accounted for 81.2% and households having “*Food Insecure*” status accounted for 18.8%. These findings revealed that a great majority of households had access to enough food for their members. These were confirmed during FGD that a majority of households did not show anxiety for food availability and accessibility nor did they experience disruption of their eating pattern and reduction in their food intake.

**Table 1: Respondents food security status**

Number of affirmative responses	Food Security Status	Percentage (%)
0	High	1.6 (1)
1-2	Marginal	79.7 (51)
3-5	Low	17.2 (11)
6-10	Very low	1.6 (1)
Total		100 (64)

Prior to 2006, food security status was linked with hunger (Bickel *et al.* as cited in Sirotin, Hoover, Shi, Anastos, & Weiser, 2014). Households with low food security were previously categorized as “food insecure without hunger” and households with very low food security were categorized as “food insecure with hunger (moderate).” Using this previous categorization, as many as 17.2% of households had “food insecure without hunger” status, indicating that they might have experienced limited availability of adequate foods or limited ability to acquire foods, but those limitations had not gone to experiencing hunger. The results revealed that only one household had experienced moderate hunger.

The percentage of households with food secure status in the present study was lower compared to that in cassava growing villages in South Buton District, which accounted for 96.1% (Saediman *et al.*, 2016). This difference was understandable because the households in the present study were beneficiaries of *raskin* programme that targeted poor-households in the village. However, compared to findings reported in various studies, the number of households with food secure status in the present study was much higher. For example, the reported proportion of food-secure households in Nigeria varied from 12.44% (Ibok *et al.*, 2014) to 45.5% (Saleh and Mustafa, 2018), 52.8% in Malaysia (Alam, Siwar, Wahid, & Talib, 2016), and 44.5% in Brazil (Vianna, Hromi-Fiedler, Segall-Correa & Pérez-Escamilla, 2012). In Indonesia, the number of food secure households was 56.9% in Bandar Lampung (Yuliana, Zakaria & Adawiyah, 2013) and 49.07% in Bali (Suharyanto & R. Indrasti, 2017). The methodologies applied for measuring food security in some of those studies were different from that used in the present study, but still the percentage of food secure households in the study area was very high particularly in the context of poor cassava-growing households in rural areas.

Table 2 presents the number of affirmative responses to food security questions. The results reflect to a great extent the nature of USDA food security questions that acknowledge different experiential and behavioral stages of household food insecurity (Broussard & Sharad, 2016). As questions were arranged to reflect the gradual severity of food insecurity, it is expected that the number of positive responses will gradually be decreasing from Q1 to Q10 as can be seen in several studies (Alam *et al.*, 2016; Broussard & Sharad, 2016; Vianna *et al.*, 2012 ). In the present study, however, the number of affirmative response for Q3 (95.3%) that deals with the quality of the diets is strikingly high. This finding might indicate that respondents' households still focus on the quantitative adequacy of foods, and not yet on the nutritional content and quality. It was revealed from FGD that for their everyday meals, respondents' households usually consumed only one of the following combination: rice and fish, rice and vegetables, cassava and fish, cassava and vegetables, and rice and noodles. They only sometimes consumed complete menu consisting of cassava/rice, fish, vegetables, and fruit. This agrees to findings by Anwar and Hardinsyah (2014) that food consumption in Indonesia was characterized by (1) the lack of quality, low level of diversification, and being dominated by carbohydrate-source food, and (2) low level of consumption of vegetables, fruits, and beans, and (3) inadequate nutrient intake. Government and all stakeholders need to take into account this fact as diets with poor nutrition can impair health and well-being and, over time, can contribute to the emergence of some illnesses and various health problems.

**Table 2: Affirmative responses on food security scale**

Category	Questions	Affirmative Responses (%)
Perception that household food budget or food supply was inadequate	Worried food would run out (Q1)	59.4 (38)
	Food bought just didn't last (Q2)	7.8 (5)
Perceptions that the food eaten was inadequate in quality	Couldn't afford to eat balanced meals (Q3)	95.3 (61)
Reported instances of reduced food intake, or consequences of reduced intake	Adults cut or skip meals (Q4)	15.6 (10)
	Frequency of adults to cut or skip meals (Q5)	15.6 (10)
	You ate less than you felt you should (Q6)	1.6 (1)
	You were hungry but didn't eat (Q7)	0 (0)
	You lost weight because not enough money (Q8)	0 (0)
	Adults did not eat because there wasn't enough money for food (Q9)	0 (0)
	Frequency of not eating on Q9 (Q10)	0 (0)

The high percentage of food-secure households in the study area was closely related to the availability and accessibility of both cassava and rice. Cassava was available throughout the year as each household grew it in its own farm and processed it for own consumption. With respect to rice, households got monthly allotment of 15 kg per household per month of *raskin* programme to be purchased at much cheaper price, making it accessible to farmers. As food costs usually contributed to more than two-third of overall expenditure of poor

households, the presence of *raskin* rice directly improved food security status of respondents' households.

### **Cassava Consumption**

Table 3 depicts the number of respondents (%) according to the frequency of consuming staples in the last seven days. All respondents reported eating cassava, 96.9% had eaten rice, and none had consumed maize. On average, cassava was consumed for 4.1 days a week, which was the highest among all staple foods. Rice was eaten averagely for 2.9 days. This finding indicates that cassava was the most frequently consumed staple, followed by rice. With respect to maize, it was revealed from FGD that it was also a staple in the area, but its availability was seasonal. Maize was planted twice a year at the beginning of rainy season. During the survey it was not yet harvested so no selected households consumed it in the last seven days.

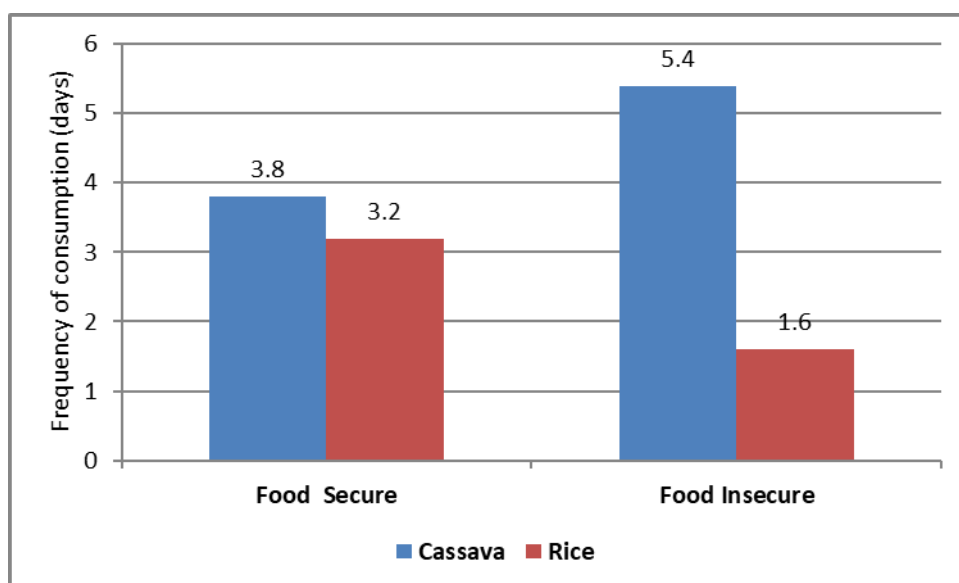
Findings of the study confirm the predominance of cassava as the main source of calorie intake in the respondents' households. It was revealed from FGD that respondents perceived cassava based food (*kasoami*) as their main staple, so they always tried to include it in their everyday meals, or at least once out of three meals a day. This is contrary to the situation at the national level where rice is the dominant staple. In 2016, the amount of rice consumption is 100.57 kg/capita/year compared to cassava consumption that only reaches 3.81 kg/capita/year (Kementerian Pertanian, 2017). Seen from per capita monthly average expenditure by food group, the share of prepared foods and cereals is 33.98% and 12.02%, respectively, whereas the share of tubers is only 1.01% (Badan Pusat Statistik, 2018). Similarly, Rae (as cited in Saediman *et al.*, 2016) found that as a proportion of the total household calorie intake, the mean share of rice reaches 65.04% compared to tubers that only accounts for 2.43%. Indeed, at the national level, staple food consumption pattern was leading toward single staple (namely rice), including in the provinces in Eastern Indonesia that previously highly consumed traditional staple foods. The predominance of cassava as staple in the study village and in other villages in Buton and South Buton Districts (Saediman *et al.*, 2016) is a special case that warrants attention by the government to pursue cassava development for enhancing food security in rural areas.

**Table 3: Consumption of staples in the last seven days**

Staple Food	Days of Consumption in the Last 7 Days				Total (%)	Average Days of Consumption
	Never	1-2 days	3-4 days	5-7 days		
Rice	3.1	40.6	46.9	9.4	100	2.9
Cassava	0.0	9.4	46.9	43.8	100	4.1
Maize	100.0	0.0	0.0	0.0	100	0.0

Figure 1 reports average number of days of consumption of staples in the last seven days according to food security status. In the group of food secure households, the number of days of cassava consumption was slightly higher than that of rice consumption. The marked difference in the number of consumption days between the two staples was found

in food-insecure group. One possible explanation for this phenomenon was the difference in the level of income. Food secure households might somehow have more financial resources than food-insecure households, so the former could afford to purchase rice in addition to *raskin* rice that they had bought. However, in line with the findings in South Buton (Saediman *et al.*, 2016), cassava consumption by food secure households was still higher than that of rice consumption. This finding implies that people in the study area might still choose cassava-based food as their dominant staple though they had financial capacity to purchase and consume rice. Similar to observation by Myers, Wiendiyati, Pickering and Tenrisanna (2014), since the introduction of *raskin* programme, rice has been added as a staple in the study village, but has not completely replaced cassava. This assertion is important, as strategies directed toward improving food security of households in areas where cassava has been the dominant staple for generations may be quite different from those aimed at areas where cassava is only co-staple or supplementary staple.



**Figure 1: Days of consumption of staples in the last seven days by food security status**

Cassava production, consumption pattern and food preference in the study area was very much similar with that in South Buton as reported by Saediman *et al.* (2016). Cassava was consumed in the form of *kasoami*, fresh boiled cassava, and *keo-keo* (steamed dried cassava). As Table 4 shows, households almost always consumed *kasoami* and very rarely consumed fresh boiled tuber and *keo-keo*. Fresh boiled tuber, which was made from sweet cassava variety, was rarely consumed because villagers preferred to grow bitter varieties whose *kasoami* tasted better.



**Table 4: Frequency of consumption of cassava-made staple foods**

Frequency	<i>Kasoami</i>	Boiled tuber	<i>Keo-keo</i>
Always	98.4	0.0	0.0
Often	1.6	0.0	4.7
Sometimes	0.0	0.0	3.1
Very seldom	0.0	100.0	92.2
Never	0.0	0.0	0.0
Average score	4.98	2.00	2.13

## Conclusion and Recommendations

Households in the study area had adequate foods for their members, and only a few showed anxiety about their food availability and accessibility but had not experienced hunger. In view of the low-income status of households, the percentage of food-secure households in the present study was surprisingly high. This high percentage of food security status was contributed mainly by the existence of own production of cassava which was then consumed as staple in addition to availability of rice under *raskin* programme. Cassava was the most consumed staple food followed by rice.

Cassava had proven suitable with the local food system and had served as key food security crop in the area. Therefore, specific interventions are needed to unlock the potential of cassava in enhancing food security covering aspects of availability, accessibility, and utilization of cassava. They may include strategies and programmes in cassava production, processing, marketing and consumption. Promotion of cassava consumption should include nutritional content and quality of the meals to support active and healthy life. For future researches, questions about coping strategies, quality of diets, and seasonality of food production should be included to complement standard questions in the food security module.

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