

## Household Food Access to Rice in Riau Province, Indonesia

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### ABSTRACT

This study aims to assess the level of household food access to rice and the factors influencing it. The area was selected purposively based on certain considerations: the Siak District had the highest average per capita income; the Kuantan Singingi District was a food production center; while the Meranti Island District had a low average per capita income. This study uses primary and secondary data. Primary data were obtained from a survey conducted on 220 randomly selected households. Household food access was assessed using the Household Food Insecurity Access Scale (HFIAS), while the data analysis performed were Chi Square ( $\chi^2$ ) and path analysis. Research results showed that most of the households experienced food insecurity with regard to access to rice (severe 20.45%, moderate 29.09%, and mild 26.36%) with significant differences among the three districts. The income and education of mothers had a positive effect on the household access to rice, while food pattern had a negative effect.

**Keywords:** accessibility, household food insecurity access scale, Riau, staple food

### INTRODUCTION

Food security is a system which consists of three main sub-systems (components), namely food availability, food accessibility and food utilization. The realization of food security is a synergy and interaction of these three sub-systems (Chung *et al.* 1997), and contains at least two main elements, namely the availability of sufficient food and the people's accessibility to adequate food. Both elements have to be absolutely fulfilled in order to achieve the degree of health and well-being of the people (Firdaus *et al.* 2008).

Consumption fulfillment in areas with a high level of food availability tends to indicate a better picture of a good food consumption status (Suhardjo *et al.* 2006). The average food availability for consumption in Riau Province in 2012–2017 was 2,982 kcal/capita/day. However, high food availability did not necessarily mean better food consumption. The average food consumption of the population during that period was 1,888 calories/capita/day, lower than the RDA of 2,150 kcal/capita/day (Gevisioner *et al.* 2015).

Household food access in Riau can also be viewed from the high percentage of

the population experiencing food insecurity. In 2017, the percentage of the population experiencing mild and severe food insecurity reached 49.96% (BKP 2018). The results of nutritional status monitoring in 2017 showed that in Riau there were 4.2% of children under five who were categorized as wasted, 14.0% were underweight and 29.7% were stunted (Balitbangkes 2018). This is due to limited access to food. Adequate food availability is not accompanied by adequate food access, resulting in suboptimal food absorption. Consequently, many districts in Indonesia have been unable to achieve food security despite of achieving food surplus (Akhmad 2012). Food access is not only determined by economic access, but is also influenced by physical access/regional isolation, social access (Webb & Beatrice 2003) and culture (Wahyono 2011).

Efforts to increase accessibility have received less attention in the world of planning and development (Hubbard & Onumah 2011). Access to food guarantees that every household and individual has sufficient resources to meet food needs in accordance to nutritional norms. Unsecured access to food is an indirect factor causing the emergence of malnutrition (FAO

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2013). Food access is a condition of the mastery of resources (social, technological, financial, natural, human) that is sufficient to obtain and/or be exchanged to fulfill food sufficiency (Bappenas 2010).

Recently, there have been many methods to determine the status of household food security, both quantitative and qualitative, such as calorie intake and the food security index. The National Food Security Agency, in preparing the Food Security and Vulnerability Atlas (FSVA) of Indonesia in 2005 to 2009, described food access through the following indicators: 1) Percentage of people below poverty line; 2) Percentage of villages with inadequate connectivity; 3) Percentage of households without access to electricity; and 4) Improved road access for four-wheeled vehicles (Dewan Ketahanan Pangan, Departemen Pertanian, World Food Programme 2009). These indicators measure food adequacy in terms of quantity but did not provide information on food quality or issues regarding the sustainability of household food access (Ariani *et al.* 2008), thus these program interventions were deemed less than optimal. Therefore, this study uses the Household Food Insecurity Access Scale (HFIAS) (Coates *et al.* 2007), a method that has been applied in several countries and has shown that it is an appropriate and informative method to describe the ability of households to access food (Becquey *et al.* 2010), as well as it being easier and more practical for measuring food security (Ashari *et al.* 2019).

The objective of this study is to analyze household access to food, especially rice as a staple food that has an important role in fulfilling about 45% of the total food intake or around 80% of the main carbohydrate source of the Indonesian people. This condition was found in almost all parts of Indonesia (Suryana *et al.* 2014). Rice still remains the most important food for the people of Indonesia, be it economically, socially or culturally (Hikam 2014). This is also the case in Riau Province, where rice remains to be the staple food of the population to date. However, 70% of the rice supply in Riau is still imported from outside the region since the rice production to rice demand ratio has only reached 0.30 (Bappeda Provinsi Riau 2019). Based on these considerations, increasing the accessibility of rice is an important issue.

## METHODS

### Design, location, and time

The design of this study is cross-sectional. Research was conducted in three districts of Riau: the Siak District, Kuantan Singingi District and Meranti Island District. These areas were determined purposively based on certain considerations. The Siak District had the highest average per capita income; the Kuantan Singingi District was a food production center; while the Meranti Island District had a low average per capita income with a high percentage of the population experiencing severe food insecurity since it was not a food production center (BPS Riau 2017). Field data collection was conducted in approximately six months, from November 2017 to May 2018.

### Sampling

Two sub-districts were selected in each district based on their distance to the district capitals (the furthest and the nearest). A similar method was used for village selection, resulting in a total of 6 sub-districts and 12 villages. In each selected village, a number of households were determined as the sample. The sampling technique was the simple random sampling method using a random number table (Sugiyono 2011). Samples in each district were determined proportionally based on the number of households. In total, data was obtained from 220 households consisting of 104 households in Siak, 76 households in Kuantan Singingi and 40 households in Meranti Islands.

### Data collection

The type of data collected were primary and secondary data. Quantitative primary data were collected from respondents (mothers and/or heads of household) through a survey using structured questionnaires. Primary data comprised of socio-economic characteristics (age, household size, occupation, last education, per capita income, employment opportunities, food expenditure, distance to market), food pattern and food access. Household food patterns were measured by the contribution of rice to total household calorie consumption (%) obtained through 2x24 hr recall of household food consumption. We used the Household Food Insecurity Access Scale (HFIAS) to assess the household's food access to

rice (Coates *et al* 2007). The HFIAS scale has the ability to assess the availability, access, use and stability of food in the community (Pandey 2016). The HFIAS measurement instrument shows good validity and reliability for measuring household food insecurity (Kneuppel *et al* 2009). Household access to rice is the ability level of households to fulfill their need for rice in the last 30 days. In HFIAS, respondents were given nine questions related to food insecurity with response of “Yes” or “No”. Households with “Yes” responses further answered the frequency of occurrence (rarely, sometimes and often, with a score of 1, 2 and 3, respectively). “No” responses were scored as 0. The HFIAS score was obtained by adding up the frequency responses from the nine questions set. The value for each respondent would be in the range of 0 (lowest) to 27 (highest). The higher the score, the higher the level of household access to rice.

Secondary data were obtained from documents issued by related institutions. These data were related to demographics, food production, food price, food availability, economic facilities and infrastructure, and nutritional status.

#### Data analysis

The data was analyzed using Microsoft Excel 2010 and SPSS Version 21.0. The chi-square ( $\chi^2$ ) sample analysis was used to analyze differences in household access to rice among the three districts. Path analysis was used to analyze: a) the correlation between income, price of rice, distance to the market/stall, mother’s education, food patterns; b) the effect of income, price of rice, the distance to the market/stall, mother’s education, and food patterns on household access to rice, either separately or in combination. These analyses were the development of multiple regression analyses with arrows showing correlation between variables (Suyana 2012).

## RESULTS AND DISCUSSION

#### Household characteristics

The mean age of the heads of household in Riau Province was 44.27 years and 38.98 years (Table 1) for the mothers, or in other words, the heads of the household and mothers were in the productive age group. This productive age indicated the potential for households to

be employed in both the agriculture and non-agricultural sector to increase income to fulfill their food needs. The mean number of household members was 4.14 persons. The number of family members in a household could influence the ability of a household to fulfill household food consumption needs, especially in poor households (Suhardjo *et al.* 2006) where there is an extra burden on food consumption and are more likely to experience food insecurity (Drammeh *et al.* 2019).

The mean household income reached the amount of IDR 902,776 (Table 1). The mean household income was highest in the Siak districts compared to those in Kuantan Singingi and Meranti Islands. The mean price of rice in Riau province was IDR 12,442/kg. The price of rice in the Kuantan Singingi district was higher than in the Siak and Meranti Island districts. The difference in food prices was due to transportation facilities and infrastructure (roads) that were still limited in several villages; while the distance to the source of food (markets/stalls) in Kuantan Singingi district was further than those in the other districts.

The mothers’ education level was still considered low. On the average, mothers experienced 8.35 years of formal education. The percentage of mothers with elementary school education was still high, reaching 49.55%. The low level of education of the heads of household and housewives was an indicator of the low quality of human resources.

Household food culture was measured by food patterns. Household food patterns were measured by the contribution of rice to total household calorie consumption. The mean contribution of rice to total household energy consumption reached 48.08%. The highest contribution of rice to total household calorie consumption (50.62%) was found among households in the Kuantan Singingi district, while the lowest was in the Meranti Islands district.

#### Household access to rice

Responses from 220 households to a nine-item food security scale (HFIAS) indicated that the proportion of households with a “yes” response (i.e rarely, sometimes, often) ranged from 2.27% to 50.45%. The question with the most “yes” response was Question 2 "Unable to eat the kinds of rice you preferred" at 50.45%,

Table 1. Household characteristics (n=220)

Household characteristics	District			
	Meranti island (n=40)	Kuantan singingi (n=76)	Siak (n=104)	Riau province
Age of the head of household (years)	44.18	42.17	45.13	44.27
Mother's age (years)	39.20	37.56	39.95	38.98
Family size (n)	4.50	4.18	3.97	4.18
Income per capita/month (IDR)	555,483	941,648	1,008,587	902,776
Rice prices (IDR/kg)	11,737.5	13,241.56	12,076.21	12,442.50
Distance to market (km)	1.7	2.46	1.25	2.2
Mother's education (years)	7.48	8.42	8.64	8.35
Mother's education level (n (%))				
No education	3 (7.50)	1 (1.32)	5 (4.81)	9 (4.09)
Elementary school	22 (55.0)	40 (52.63)	47 (45.19)	109 (49.55)
Junior high school	7 (17.5)	18 (23.68)	28 (26.92)	53 (24.09)
Senior high school	7 (17.5)	9 (11.84)	20 (19.23)	36 (16.36)
Vocational/University	1 (2.5)	8 (10.53)	4 (3.85)	13 (5.91)
Food pattern (%)	39.95	50.62	49.34	48.08

while the question that received the least "yes" response was Question 9 "Never eat for a whole day and night because there isn't enough rice". (Table 2).

From the data it was found that 20.45% and 29.09% of households were faced with severe and moderate food insecurity, respectively. Households with good access or food security only accounted for 24.09% (Table 3). This was generally consistent with the results of another study (Knueppel *et al.* 2009) using HFIAS in rural Tanzania with a result of 20.7% of households categorized as food secure and 48.1% as severely food insecure.

The highest number of households that fell in the category of severe food insecurity was found in the Kuantan Singingi district (23.68%); while moderate food insecurity was found in Siak district (34.62%); and mild food insecurity (37.50%) and food-secure households (32.33%) were found in the Meranti Island district. The

results of the chi-square analysis showed that there was a significant difference in household access to rice among the three districts ( $p < 0.05$ ).

#### Factors affecting household access to rice

Path analysis can be described as a linear regression analysis with standardized variables. Therefore, the path coefficient is basically a beta coefficient or standard regression coefficient (Suyana 2012). The result of the path analysis on factors affecting household food access to rice is presented in Table 4.

The direct correlation between variables can be seen based on structural equations formed by the influence or effect that each exogenous variable had endogenous variables. Based on Table 4, there were effects of household income, mother's education, and food pattern on food access to rice ( $p < 0.05$ ). The effects of those factors on household food access was illustrated by the equation  $Y = 0.238X_1 + 0.366X_4 - 0.359X_5$ .

Table 2. Household responses to 9 questions in the HFIAS (n=220)

HFIAS Questions	Responses (%)			
	Yes	Rarely	Sometimes	Often
Worried that household would not have enough rice	49.51	37.73	11.36	0.45
Unable to eat the kinds of rice you preferred	50.45	33.18	15.91	1.36
Eat just a small amount of rice with a limited variety	50.00	31.82	16.82	1.36
Eat unwanted rice (foods they really do not want eat)	42.73	27.73	13.18	1.82
Eat unwanted rice (foods they really do not want eat)	42.73	27.73	13.18	1.82
Fewer meals in a day because there is not enough rice	29.09	17.73	11.36	0.00
No rice of any kind in the household	6.37	2.73	3.64	0.00
Having to sleep hungry at night because of not eating enough rice	4.09	1.82	2.27	0.00
Never eat a whole day and night because there isn't enough rice	2.27	1.82	0.00	0.45

HFIAS: Household Food Insecurity Access Scale

These factors contributed as much as 38.2% to household access to rice, while the rest was influenced by other variables.

Based on Table 4 and the equation of the path above, it can be seen that an increase in income of IDR 1000 will improve the household access to rice score by 0.238. This is in line with FAO (2010) which mentions that households with high income support households to access food. However, if the household's income remains the same while food prices rise, the household's purchasing power decreases and their access to food will also decrease.

An increase in mother's education of one year will improve the access to rice score by 0.366. This research is in line with Asghar and Muhammad (2013), who concluded that a low level of education had an impact on all aspects of life, such as access to receive information on health, food and nutrition. Female education is important because food preparation and serving is carried out by women. A mother's nutritional knowledge as indicated by the level of education also affected family food consumption. A mother acts as the decision maker in determining the family food menu, having her own preference

Table 3. Household food access to rice in Riau province

Household food access	District							
	Meranti Island		Kuantan Singingi		Siak		Riau Province	
	n	%	n	%	n	%	n	%
Severely food insecure	5	12.50	18	23.68	22	21.15	45	20.45
Moderately food insecure	7	17.50	21	27.63	36	34.62	64	29.09
Mildly food insecure	15	37.50	25	32.89	18	17.31	58	26.36
Food secure	13	32.50	12	15.79	28	26.92	53	24.09
Total	40	100	76	100	104	100	220	100



Table 4. Factors affecting household access to rice (y)

Factors	$\beta$	SE	p
Income ( $X_1$ )	0.238	0.000	<0.001*
Rice price ( $X_2$ )	0.034	0.000	0.532
Distance to market ( $X_3$ )	-0.050	0.052	0.359
Mother's education ( $X_4$ )	0.366	0.068	<0.001*
Food pattern ( $X_5$ )	-0.359	0.021	<0.001*

\*Path analysis  $p < 0.05$

and way of choosing it. Moreover, Abdullah *et al* (2019) showed that education played a key role in household food security because people with higher education were more likely to receive a higher salary.

An increase in the contribution of rice energy by 1 percent to the total household energy (food pattern) will reduce access to rice by 0.359. The significant relationship between food pattern and food access obtained in this study is supported by research conducted by Mapandin (2005), which states that cultural factors play a role in the consumption of various household staple foods. The stronger the cultural factors adopted, the less types of staple foods were consumed.

### CONCLUSION

The level of household food access to rice in Riau Province was categorized as severe (20.45%), moderate (29.09%), mild (26.36%) and secure (24.09%). There was a significant difference in the level of household accessibility to rice in the districts of Meranti Island, Kuantan Singingi and Siak. The factors of household income and mother's education had positive and significant effects on the level of accessibility, while the factor of food patterns had a negative effect on the level of household accessibility to rice. The factor of the mother's education had the highest effect (36.6%) and was followed by food patterns (35.9%) for the level of household accessibility to rice. This condition illustrates that areas with better food production and higher incomes did not guarantee that households would have higher access. Economic, physical, social and cultural factors might influence the household accessibility to rice in Riau province; therefore

issues related to food accessibility need to be thoroughly addressed in an integrated food policy.

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### AUTHOR DISCLOSURES

The authors have no conflict of interest.

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