



Household Food Security: Evidence From South Sumatera

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Permalink/DOI: <https://doi.org/10.15294/jejak.v12i2.20264>

Received: May 2019; Accepted: July 2019; Published: September 2019

Abstract

This study aims to determine the phenomenon of food security in South Sumatra Province. Food security is calculated using Shortfall/Surplus Index and Head Count Ratio. Binary Logistic Regression method is used to determine factors affecting food security. This study obtains data from National Socio-Economic Survey on March 2017 regarding average number of calories consumed by household per day, socio-economic characteristics of household, and household heads in South Sumatra. The Survey used total sample of 9,752 households consisting of 3,099 urban households and 6,653 rural households. The results of the study shows that using 2,100 kcal standard limit, most of districts in South Sumatra have entered safe food security limit. However, they have not entered safe food security limit using 2,500 kcal standard limit. Factors that affect household food insecurity in South Sumatra Province are caused by the number of household members and the education of household heads.

Key words : food security, poverty line, socio-economic, rural urban

How to Cite: Azwardi, A., Widyasthika, H., Saleh, R., & Adnan, N. (2019). Household Food Security: Evidence From South Sumatera. JEJAK: Jurnal Ekonomi dan Kebijakan, 12(2). doi:<https://doi.org/10.15294/jejak.v12i2.20264>

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INTRODUCTION

The development process in countries around the world continues to experience improvements based on the results of the MDGs in 1995 and 2015. Unfortunately, 800 million people in the world are still sleeping in a state of hunger (World Bank, 2015). ADB revealed that the economy continues to grow and there is a reduction in the level of poverty, but food insecurity still affected the population in Asia (ADB, 2013).

The fulfillment of food and nutrition has become the priority of development in Indonesia (Purwantini, 2012). This is as the result of many of Indonesian faces the problem of malnutrition in Indonesia, with calorie intake below the minimum nutritional level is still far from the target (Purwantini, 2015). Reported in 2011, the number of people who consumed energy less than 1,400 kcal (considered as a very food insecure condition) reached 14.65 percent, higher than the target by government which is 6.15 percent. The continuing condition of malnutrition will harm the future of the nation. Especially, if the malnutrition experienced by the children, this will harm the growth of the children. It can be harmful for the children's growth and brain that can danger the future of the children and their nation. (Ministry of National Development Planning Agency, 2011).

The Food Security Agency and the Ministry of Agriculture have mapped out food security by district in Indonesia. Districts are rated 1 to 6, where the most vulnerable conditions are in priority 1 and the secure conditions are in priority 6. Districts in South Sumatera are generally in priorities 5 and 6. This is not surprising because South Sumatera is one of the national rice barns.

But, unfortunately based on table 1.1 there are still several districts which are categorized as food deficits such as OKU, Pali and Muratara. This condition is shown from the NCPR score which has a value of more than 1, indicating that food vulnerability still looms over the South Sumatera Province.

Table 1. Food Insecurity Priority and NCPR in South Sumatera in 2018

Area	Food Insecurity Priority	NCPR
(1)	(2)	(3)
OKU	5	1,09
OKI	5	0,29
Muara Enim	5	0,97
Lahat	5	0,60
Musi Rawas	6	0,29
Musi Banyuasin	5	0,60
Banyuasin	6	0,16
East OKU	6	0,17
South OKU	5	0,38
Ogan Ilir	5	0,52
Empat Lawang	5	0,47
PALI	5	1,59
Muratara	5	1,57
Palembang	*	*
Pagar alam	*	*
Lubuk Linggau	*	*
Prabumulih	*	*

* Cities are not considered as experiencing Food Insecurity

Source: Food Security Council & Misnistry of Agriculture, 2018

The NCPR (Normative Consumption per capita ratio) value is the ratio of normative consumption per capita to the net availability of rice cereals, maize, and tubers. The normative value of cereals consumption per day / per capita is 300 gr and the calculation of the net availability of cereals per capita per day is calculated by dividing the total availability of cereals against the total population. If the normative consumption ratio of an area is greater than 1 then it is considered a food deficit, and a ratio value of less than 1 is considered a surplus area for cereal production.

The government has implemented a National Food Security program as a solution to overcome food insecurity in Indonesia. The food insecurity can be reduced only if the food security condition achieved in household level. Thus, the fulfillment of food needs in household level is an important issue for the government. The government need an information such as the number of population and the characteristics of households experiencing food insecurity, as well as the causes to reduce the food insecurity.

Food insecurity also the main issue of the dynamics of human life as it is noted as one of the the main goals in Sustainable Development Goals is the completion of poverty and food insecurity (Dalglish et al., 2007). Unlike its title as the Food and Energy barn, South Sumatra faces the inability to provide an adequate food supplies to achieve the food security of households and individuals in South Sumatra. Therefore, the analysis of the number of people who experience food insecurity as well as the causes especially in the province of South Sumatra is needed to decrease the food insecurity, proving the title to be rightful for this province.

In addition, several food security studies have been carried out in Indonesia, but they generally used macro data and indicators. While studies using micro data are still few, even though food security is very dependent on individual conditions in a household. Therefore this study aims to show the relationship between individual characteristics and household food security using micro data (individuals) in South Sumatera.

Food security simply described as the adequate food availability. Initially the definition of food security was only at the national level to measure food self-sufficiency, then this concept is expanding to the household level. Households are considered to have food security if they have the ability to obtain food needed by all of the members (Pinstrup-Andersen, 2009). Decree of the Rome Declaration described the food security in wider scope that it occurs when everyone at all times has physical and economic access to food that is sufficient, safe and nutritious to fulfill food and food preferences for an active and healthy life (FAO, 1996).

On the contrary, food insecurity is the inability of both individuals and households to access decent food in terms of quantity and quality (FAO IFAD UNICEF, 2017). Food insecurity can also be interpreted as insecurity experienced by households and individuals when there is no certainty in the future regarding food availability and access, insufficient number, type of food (quality) needed for healthy living or the need to use unacceptable methods socially to get food (Barrett, 2010).

Food insecurity also described as the condition of food insufficiency experienced by regions, communities or households, at certain times to meet the standards of physiological needs for plants and public health. Sufficient food consumption is an absolute requirement for the realization of household food security.

Food insecurity can be illustrated by changes in food consumption which lead to a decrease in quantity and quality including changes in the frequency of consumption of staple foods.

Food insecurity in Indonesia itself is not a problem in low food production but rather a problem of food distribution patterns. Food insecurity is a reflection of the situation of the adequacy of food and individual nutrition in communities or community groups in an area as a result of the inaccessibility of food, both physically, socially and economically (Purwantini, 2015).

FAO describes four main dimensions of food security, namely physical food availability, economic, and physical access to food, food utilization, and other three-dimensional stability. Availability of food—food supply is the physical existence of the choice and quantity of nutritious food that is sufficient to meet consumer needs at competitive prices. Adequacy of food supply is determined by factors such as location and accessibility of retailers and outlets, availability of food in outlets, as well as price, quality, variety, and promotion of food (FAO, 1996).

Food Access—food demand is the ability of consumers to obtain food that is safe, affordable, competitively priced, culturally acceptable and nutritious by using physical or financial resources. Access depends on individual financial resources and total household expenditure, physical mobility, distance and availability of transportation to food stores, and food preferences (FAO, 1996).

Utilization includes food preparation, cooking and storage facilities, and incorporates food safety issues. It depends on food preferences, which are influenced by eating habits and socio-cultural factors, as well as nutritional knowledge and the impact of time availability on the individual's ability

to prepare healthy food. Food security can be experienced at the national, community, household or individual level. The focus of food security and vulnerability in this study is on individuals and households access to food compared to other dimensions of food security.

Results of research conducted by Saliem et al. (2002) show the characteristics of food insecure households characterized by: a) the age of the head of the family and the wife of a productive age, low education, and the number of children who have dropped out of school, b) limited control of agricultural land and livestock, c) not all households store food the principal and even if kept in small amounts, d) the average income is below the poverty line and most of the income comes from the agricultural sector, and e) the share of food expenditure is very dominant and the largest proportion is for the grains group.

Research on food insecurity is not only carried out in Indonesia, but also in many other developing countries. Study on food insecurity and malnutrition for children in Nigeria shows that rural people have a higher level of food insecurity. Furthermore, environmental factors affecting food insecurity are access to water for safe cooking and drinking, cooking fuel, toilet facilities, the presence of electricity, the location of the kitchen and arrangements. Arrangements are defined as whether the community is in an urban, suburban or rural area (Atoloye et al., 2015).

Other socio-economic factors that positively affected food security are gender, age, education level, cooperative membership, and extension agent contact, farming experience, access to credit, income, and agricultural size. The findings that household size and child dependency ratio negatively affect food security (Funmilola, M. & P.O., 2015; Oyekale, Ayegbokiki & Adebayo, 2017). The larger the size of the family, the greater negative impact on household food security (Olayemi, 2012).

Household food security is positively affected by variables: male households' heads, household members with agricultural and allied jobs, age of household head, percentage of irrigation area, number of livestock owned by households, and operator owners. Female-headed households are more vulnerable to food insecurity compared to male households heads (Ibok et al., 2014; Zakari, Ying & Song, 2014; Joshi & Joshi, 2017).

Many literatures find that individuals who are at food insecurity risk are also living in poverty. Food insecurity usually occurs in groups of job seekers, long term sickness, disabled people, households with children, single parents, homeless people, members of the community traveler, retirees, single people and households with heads of families with low education (King et al., 2015).

Besides, the economic status—economic opportunity, access to land and economic power—unsurprisingly affected the high risk of food insecurity for women (Ivers and Cullen, 2011). The female-head household likely to suffer the food insecurity. The female-head household push the woman to take responsibility to earn money but still need to provide the domestic chores—this could give more burden to provide the adequate food (Mallick & Rafi, 2010).

Food poverty refers to the inability to obtain food or consume sufficient quality or adequate quality of food in a socially acceptable manner, or uncertainty that a person obtains in food (Riches, 1997). Poverty is seen as the inability of individuals to fulfill basic food and non-food consumption for food, clothing, housing, education, health and other basic needs. The limit of food consumption used by poor people is less than 2100 per capita calories per day which is equivalent to 320 kg / capita / year in rural areas and 480 kg / capita / year

in urban areas. Minimum basic needs are translated as financial measures in the form of money. The value of the minimum basic needs is known as the poverty line. Residents whose income is below the poverty line are classified as poor (BPS, 2015).

The food poverty rate in two family heads, namely male and female family heads in the Lagos, State of Nigeria based on the food poverty line N 39,759.49 shows that 36 percent of the sample of male households' heads live below 3,000 calories every day. Whereas, the female households heads are 80 percent live below 3,000 calories a day. This shows that food insecurity is higher in female than in male households heads (Lawson, 2014).

Many studies have combined socio-economic factors in determining the determinants of poverty. Research on the relationship of independent variables to poverty in Kenya using two analytical methods, namely augmented regression and logistic regression shows that land, education, household size, gender of households head, household characteristics, access to facilities and the number of assets influence the poverty status of individuals in Kenya (Ngunyi et al., 2015). Other studies show that the important variables of poverty in Nigeria are gender, employment, length of school, household size, per capita expenditure on health, education and food and the number of people working (Edoumiekumo, Karimo & Stephen, 2013).

METHOD

This study aims to determine the phenomenon of food security in South Sumatera. The measurement will be carried out using two standard calorie intake as comparison. The first standard reference according to Indonesian Central Bureau of Statistics is the minimum calorie intake of 2100

kcal and the second reference is using 2500 kcal limit.

This study using the average number of calories intake by household members per day, the socio-economic characteristics of the heads of households and the number of households in South Sumatera. Data is obtained from The National Socio-Economic Survey in March 2017 with total sample of 9,752 households consisting of 3,099 urban households and 6,653 rural households.

The variables used are dependent and independent variables. The dependent variable used is the food insecurity status obtained from the calculation of calories intake per capita. Then the independent variables are divided into individual and household characteristics. Individual characteristics used include age, gender, marital status, education, and work. Whereas household characteristics include number of household members, lighting and electricity, drinking water, government subsidized rice, and regional areas.

This study used descriptive analysis. There is a simple analysis of a distribution of data by presenting in the form of tabulations and drawings to provide a description of the dynamics of food security according to regional status during the study period. The statistical measure used in this descriptive analysis is the average value of household food expenditure in South Sumatera.

The method used in calculating Food Security is Shortfall / Surplus Index and Head Count Ratio. The Food Security Index can be mathematically written as:

$$FSI = Fi = \frac{Y_i}{C} \dots\dots\dots(1)$$

Where:

Y_i : Average number of calories consumed by households i

C : Limit Number of calories recommended

The Shortfall / Surplus Index is calculated as follows:

$$S = \frac{1}{n} \sum_{j=1}^n G_j \dots\dots\dots(2)$$

$$G_j = \frac{x_j - c}{c} \dots\dots\dots(3)$$

Where:

X_j : Calories consumed by households i

C : Limit Number of calories recommended

n : the number of households with secure food status or household with food insecure status

Binary Logistic Regression is being chosen to determine the factors that influence household food security. Assuming probability of occurrence of Y (coded 1) with a set of explanatory variables X_j, the linear relationship between variables X and Y is:

$$P (Y=1) = p = a_0 + \sum_{j=1}^m a_j \cdot x_j \dots\dots\dots(4)$$

$$P (Y=1) = p = a_0 + a_1 \cdot x_1 + a_2 \cdot x_2 + \dots + a_m \cdot x_m \dots\dots\dots(5)$$

The parameters a₀, a₁, a₂..... a_m can be formed using the Least Squares Method (LS). However, for some X_j probability values may be outside the 0-1 interval which is certainly contrary to the basic rule. To avoid this contradiction, the most commonly used probability values are transformed and forming the Logit Function:

$$\text{Logit} (p) = \ln \left(\frac{p}{1-p} \right) \dots\dots\dots(6)$$

As $\left(\frac{p}{1-p} \right)$, shows opportunity value where Y=1

Hence, the Logit transformation model becomes:

$$\text{Logit} (p) = a_0 + \sum_{j=1}^m a_j \cdot x_j = XT \cdot A \dots\dots(7)$$

Where:

A : vector parameter

$$[a_0, a_1, \dots \dots \dots a_m]$$

XT : vector independent variable/explanatory

The vector value of parameter A can be estimated by using the Likelihood Maximum method, then the probability value p is calculated by the formula:

$$P(Y = 1) = p = \frac{e^{X^T A}}{1 + e^{X^T A}} \dots\dots\dots(8)$$

The interpretation for the value of a_j is, if the value of x_j increases by 1 unit then the chance of the value of Y = 1 will increase e^{a_j} times. When X = [x₁, x₂] and Y = [0,1] hence the odds ratio θ can be formulated as:

$$\theta = (P_1 / P_2) \dots\dots\dots(9)$$

$$P_1 = \frac{P(Y=1 / X=x_1)}{P(Y=0 / X=x_1)} = \frac{P_{1/1}}{P_{0/1}} \text{ and } P_2 = \frac{P(Y=1 / X=x_2)}{P(Y=0 / X=x_2)} = \frac{P_{1/2}}{P_{0/2}} \dots\dots\dots(10)$$

When the odds are 1 < θ < ∞, the probability of Y = 1 is greater for X = x₁ compared to X = x₂

Based on the binary logistic regression formula, the food insecurity determinant model used is:

$$\text{Logit}(p) = \ln\left(\frac{p}{1-p}\right) \dots\dots\dots(11)$$

Logit (security status) = b₀ + b₁ gender of household head + b₂ residential location + b₃₁ education₁ + b₃₂ education₂ + b₃₃ education₃ + b₄₁ Number of household members₁ + b₄₂ Number of household members₂ + b₅ working + b₆ subsidized rice recipient + b₇ drinking water + b₈ lighting + b₉ Age Group(12)

To ensure the significance of logit model, it is necessary to test the significance of the model. Likelihood Ratio Test is used to measure the simultaneous effect of all independent variables to dependent variable. Whereas, Walt Test is used to measure the individual effect of each independent variable. Likelihood Ratio Test is performed using G² Test. Hypothesis in this test are:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \dots = \beta_k = 0$$

(There is no relation between independent variables and dependent variable)

$$H_1 : \text{at least one } \beta_j \neq 0$$

(At least one independent variables has relationship with dependent variable).

$$G_2 = -2 \ln \left[\frac{L_0}{L_k} \right] \dots\dots\dots(13)$$

Where:

L₀ = likelihood without independent variables

L_k = likelihood with all independent variables

H₀ is rejected if the significance level is less than α = 0.05, which means it can be concluded that the x independent variables simultaneously affect the dependent variable y. H₀ is rejected, meaning that there is at least one β_j ≠ 0. To know whether β_j is zero (not significant), it uses to test the parameter coefficient β partially.

Hypothesis test for Walt Test are:

$$H_0 : \beta_j = 0 \text{ for one particular } j ; j = 0, 1, \dots, p$$

$$H_1 : \beta_j \neq 0$$

Calculated as:

$$W_j = \left[\frac{\beta_j}{SE(\beta_j)} \right] \dots\dots\dots(14)$$

This statistic has a Chi-square distribution with degree of freedom = 1 or by symbolically written W_j ~ X². H₀ is rejected if W_j > X²_{α,1} with α is the degree of significance.. H₀ is rejected, means that independent variables are individually significant at the degree of significance α.

Table 2- Number of Samples According to Regional Status

District	Area		Total
	Rural	Urban	
OKU	240	360	600
OKI	76	633	709
Muara Enim	160	560	720
Lahat	157	479	636
Musi Rawas	50	470	520
Musi	80	557	637
Banyuasin			
Banyuasin	158	558	716
East OKU	40	479	519
South OKU	79	559	638
Ogan Ilir	120	479	599
Empat Lawang	40	440	480
PALI	40	280	320
Muratara	40	320	360
Palembang	744	39	783
Pagar alam	396	20	516
Lubuk Linggau	279	200	479
Prabumulih	400	120	520
South Sumatera	3099	6653	9752

Source: National Socio-Economic Survey, 2017 (processed)

The unit of analysis in this research is households. Based on the area of residence, the largest sample comes from Palembang, Muara Enim and Banyuasin. The fewest samples came from the Penukul Abab Lematang Ilir (PALI) district, which amounted to only 320 households.

According to marital status, samples are categorized as 8621 people are married, 1053 people are divorced, and 243 people are death divorced, while 195 people are single. According to gender, households are dominated by men with total number of 8,632 people and 1,120 households are female workers. Whereas according to age, sample households are dominated by the age range of 31-60 years. Sample households are only

809 households with age below 30 and 1,590 households with age above 60.

RESULTS AND DISCUSSION

When talking about food security, we have to look at the existing food stocks / production, especially in South Sumatra Province. South Sumatra Province has food potential that should be enjoyed by the entire population. This can be seen from the available main food production data including rice, meat, milk, and fish production as food intake that is generally consumed by the population.

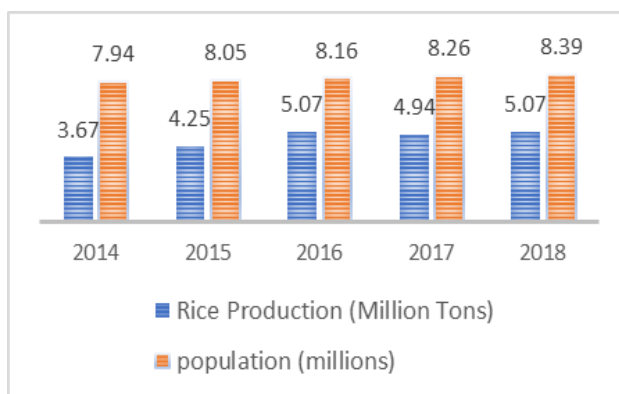


Figure 1. Rice Production and Population of South Sumatera, 2014-2018

Source: Ministry of Agriculture, 2019 (processed)

Rice is the staple food for the people of South Sumatra. Based on figure 1, the increase in the population of South Sumatra is accompanied by an increase in rice production every year. Rice production increased by 15 to 18 percent per year, while population growth of 1 to 1.5 per year. It turned out that the growth of rice production still exceeded population growth. If rice production is divided by population, each population can receive about five quintals each year, where per capita rice consumption per year is only around 70-90 kg. Seeing the adequacy of rice stocks every year, it should be able to meet the entire carbohydrate intake of the population.

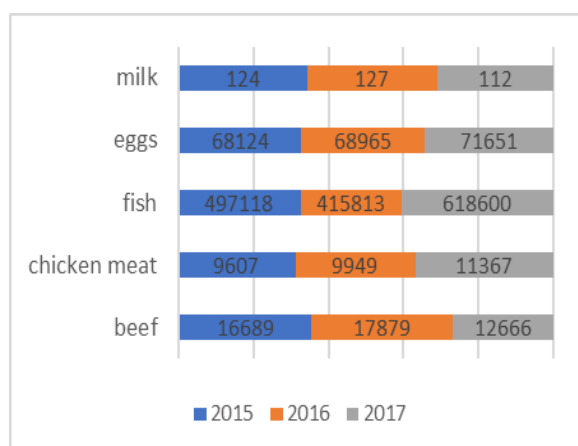


Figure 2. South Sumatera's Meat, Egg and Milk production (tons), 2015-2017

Source : Ministry of Agriculture, 2019 & BPS, 2019 (processed)

Foods other than staple foods are complementary foods such as meat, eggs, fish, and milk. South Sumatra's meat production continues to increase every year except in 2017, while there was a significant decrease in beef and fish production in 2016. The biggest potential for complementary food intake is fish whose production reaches millions of tons per year. This is supported by South Sumatra's geographical conditions which is bordered by sea and has many rivers.

If the production of complementary foods is compared with the population, a smaller result is obtained compared to rice which is the staple food. One resident will receive around 60 to 80 kg per year with this existing production. Existing complementary stock is enough to meet individual calories intake.

The adequacy of the staple food supply and complementary food that is available should be ensured that the entire population of South Sumatra has met its food needs. However, besides stocks, there are other factors that affect individual food security. The distribution chain and the level of

consumption that is affected by economic capacity also influences food security.

Access to food is related to the ability of individuals to get enough good food from their own production, buying, or giving. Food stock may be available in sufficient areas but cannot be accessed by individuals because of limited physical, economic, and social aspects (Food Security Council & Ministry of Agriculture, 2018). Therefore, to see the condition of food access to individuals, further analysis of the food security index is needed.

The FSI boundary line used in this research is the 2100 kcal limit and 2500 kcal limit. The FSI value above 1 indicates the secure condition and vice versa, the value below 1 indicates insecure food security index. When FSI reviewed by district city, the average FSI value seems homogeneous. By using the 2100 kcal limit, all regencies show secure food security status. Whereas with a limit of 2500 kcal, the majority of districts are in insecure status and only 3 districts show secure status, namely PALI, Lubuk Linggau and Banyuasin, while the lowest average FSI values happened in Musi Rawas, North Musi Rawas and Ogan Komering Ilir Timur districts with an average FSI value of only 1.06 (minimum limit of 2100 kcal).

The FSI value of South Sumatra is 1.12 based on calculation using 2100 kcal limit and 0.96 using 2500 kcal limit. This result indicated that households in South Sumatra on average is still lack calories intake because the FSI value is 0.96 which is below 1. Considered still lack in calories intake, the condition mostly not severe, because the FSI value averaged higher than 0.9. Banyuasin, PALI and Lubuk Linggau district show the FSI higher than 1 in 2500 kcal limit.

Table 3- The FSI Value using 2100 Kcal Limit and 2500 Kcal Limit in South Sumatera

District	FSI ₂ (2500 kcal)	FSI ₁ (2100 kcal)
(1)	(2)	(3)
OKU	0,97	1,14
OKI	0,98	1,14
Muara Enim	0,97	1,13
Lahat	0,96	1,13
Musi Rawas	0,91	1,06
Musi Banyuasin	0,95	1,11
Banyuasin	1,03	1,20
East OKU	0,91	1,06
South OKU	0,95	1,10
Ogan Ilir	0,95	1,11
Empat Lawang	0,93	1,08
PALI	1,04	1,22
Muratarra	0,91	1,06
Palembang	0,97	1,13
Pagar alam	0,93	1,08
Lubuk Linggau	1,03	1,21
Prabumulih	0,96	1,12
South Sumatera	0,96	1,12

Source: National Socio-Economic Survey, 2017 (edited)

The pattern of food distribution gives informations for the distribution and availability of food in vulnerable areas. The population dependency on rice in South Sumatra makes it important to maintain rice's availability and quality. In addition, the diversity of food consumption such as protein, fat, vitamins, and minerals should be encouraged. Increasing the diversity of food consumption will increase calories intake and hence increase nutritional intake and reduce stunting rates in infants and toddlers.

Table 4 and 5 presented the food security status both in 2100 kcal and 2500 kcal. Percentage of the number of households according to Food Security Status is calculated using the Headcount Ratio value. Based on the calories intake limit of 2100 kcal, there is

no significant difference between the population that is prone to food insecurity in rural (44.27) and urban area (44.88). Based on the 2500 kcal calories intake limit, the percentage of households that are prone to food insecurity becomes higher such as 72.10 percent in urban areas while 71.57 percent in rural areas.

Table 4. Food Security Status (2100 kcal) in South Sumatera Based on Headcount Ratio (HCR)

Characteristics	Security status 1 (2100 kcal)	
	Insecure	Secure
(1)	(2)	(3)
Areas		
Urban	44,88	55,12
Rural	44,27	55,73
Gender		
Male	44,83	55,17
Female	40,58	59,42
Education		
No Education	46,94	53,06
Primary	46,57	53,43
High School	46,55	53,45
Senior High School	41,00	59,00
Vocational High School	43,15	56,85
Diploma I-Diploma IV	34,67	65,33
Bachelor Degree and above	29,46	70,54
Activity		
Unemployed	59,72	40,28
Employed	44,00	56,00
Schooling	10,39	89,61
House working	45,24	54,76
Others	47,05	52,95

Source: National Socio-Economic Survey, 2017 (processed)

Table 5- Food Security Status (2500 kcal) in South Sumatera Based on Headcount Ratio (HCR)

Characteristics	Security status 2 (2500 kcal)	
	Insecur	
	e	Secure
(1)	(2)	(3)
Areas		
Urban	72,10	27,90
Rural	71,57	28,43
Gender		
Male	72,05	27,95
Female	68,38	31,62
Education		
No Education	77,63	22,37
Primary	73,91	26,09
High School	73,01	26,99
Senior High School	68,61	31,39
Vocational High School	69,25	30,75
Diploma I-Diploma IV	66,77	33,23
Bachelor Degree and above	57,52	42,48
Activity		
Unemployed	81,06	18,94
Employed	71,68	28,32
Schooling	32,52	67,48
House working	71,78	28,22
Others	68,97	31,03

Source: National Socio-Economic Survey, 2017 (processed)

This percentage presents that people in urban areas face the food insecurity slightly higher than people living in rural areas. In 2500 kcal limit, more than half of the population both in urban and rural areas living in food insecurity, although around 30 percent of population already consumed higher than 2100 kcal limit. People living in urban area mostly face the food insecurity affected by some factors, such as the difficulty living condition, local environmental risks, and limited access to markets (Craverio,

2016). The higher standard of living in Urban areas might affected the household financial ability to have adequate amount and variety of food.

The trend of urbanization also lead the people in urban area living below the standard. As the result of the competition difficulty in labor market, most of migrant become unemployment. Urbanization positively correlated to urban poverty (Zhang, 2016). The result show that 59,72 percent unemployment have food insecurity in 2100 standard. Not only that, in 2500 kcal standard, 81 percent unemployment still struggling to consume adequate amount of food and variety of food. Other factors such as urbanization, poverty, and income needed further research.

The result in 2100 kcal standard and the 2500 kcal standard show the same result based on gender of household-head. The male-head household are more likely to experience food insecurity than women. The result contrary to the previous study (Lawson, 2014; Ibok *et. al*, 2014) that found the female-head household likely face the food insecurity. The contrary result from the previous study could be as the result of the social condition in the household. Previous study explained that developing countries still depend on the agricultural sector, as the main source of food for direct and raw consumption (Dunga & Dunga, 2017). The male-head household might preferred to consume cheaper food, and less nutritional food that leads to food insecurity. Lack of education could lead to the food insecure condition where the result show that the higher level of family-head education, the less the number of households experiencing food insecurity.

Dunga and Dunga (2017) also present that education plays important role in vulnerability of food insecure in Melawi. The result supported by the findings where the higher education in urban and rural area of South Sumatera, the less food insecurity. Non-

education face the food insecurity more than 70 percent in 2500 kcal standard. Education levels may determine the ability to absorb information, and the income earned (Kumba, 2015), the higher education background of individu would likely to lower the food insecurity. Bachelor degree and above (70,54%) food secure while no-education background (53%) food secure. The result show higher percentage gap where bachelor degree and above (42,48%) more food secure than the no-education background (22,37%). The lower education level also present the lower food secure percentage, this result supported King *et al.*, 2015, that the low education leads to food insecurity.

This showed an indication that education has an important role in fulfilling the food intake of the population. Beside being able to increase knowledge and access to information on the importance of adequate food needs, education is also generally positively correlated with the welfare status of households, where the more prosperous a household, the greater the resources they have for their intake of food needs.

The educational background also plays an important role to income earned. Unemployment likely to face the food insecurity, in 2500 kcal standard. The percentage of unemployment that face food insecurity 81,06 percent. Unemployment of household—head or the member—significantly affected the food insecurity in household (Huang et al. 2014). Not only the inability to seek job, the unemployement houseld member could be the household leaders with no activities. Household leaders with no activities actually have a greater number of food insecurity than household leaders with daily routine activities. The head of the household with no activities is dominated by the elderly who have been unable to carry out any activities. This indirectly shows elderly households have a

greater tendency to experience food insecurity. This become an issue because the elderly are no longer able to work well to make a living and make them a vulnerable group.

The determinants of the food insecurity in urban and rural areas in South Sumatra will be explained based on data processing result, the binary logistic regression model is obtained as follows:

$$\ln \left(\frac{p}{1-p} \right) = -1,103 - 0.31 \text{ Gender} - 0.73 \text{ Age}_1 - 0.376 \text{ Age}_2 - 0.476 \text{ Age}_3 - 0.315 \text{ Age}_4 + 0.300 \text{ Marrital Status}_1 + 0.322 \text{ Marrital Status}_2 + 0.344 \text{ Marrital Status}_3 + 0.33 \text{ Number Of Household Members} - 0.269 \text{ Education}_1 - 0.329 \text{ Education}_2 - 0.388 \text{ Education}_3 - 0.550 \text{ Education}_4 - 0.620 \text{ Education}_5 - 0.129 \text{ Work} + 0.317 \text{ Lighting}_1 + 0.161 \text{ Lighting}_2 + 0.620 \text{ Lighting}_3 + 0.177 \text{ Drinking Water}_1 + 0.221 \text{ Drinkinh Water}_2 + 0.248 \text{ Drinking Water}_3 + 0.254 \text{ Drinking Water}_4 + 0.354 \text{ Drinking Water}_5 - 0.0095 \text{ Subsidized Rice} - 0.268 \text{ Area} \dots\dots\dots (15)$$

The result shows that all social, economic, and demographic variables have significantly affected the household food security status in South Sumatra. For model testing in the Model Summary table using the statistic value of -2 Log likelihood which is greater than chi-square and its significant value is less than 0.001, this means that the overall model results for each equation are significant at $\alpha = 0.001$. Hence, the model chosen is best describe the condition of data. The Nagelkerke R-Square value is 0.125, which means the model explains 12.5 percent status of household food security in South Sumatra while the rest is influenced by other variables not found in the model.

Based on the equation (15), the coefficient for gender is negative. This shows that households with female head households tend to be less likely to suffer food insecurity. The household opportunity value with female household head is 0.969 times compared to male household head. This findings supported the previous study by Lawson, 2014; Ibok *et. al*,

2014 where female-head household likely to suffer food insecurity.

There are 5 age groups in this analysis, namely age less than 30 years, age 31-40, age 41-50, age 51-60 and age above 60 years. From the equation (15), the coefficient value in all age groups is negative where the reference variable used is 30 years and under. This indicates that households with the age of household head over 30 have a tendency to have more food than households with the age of household head below 30. Age₁ coefficient is -0.073, this means that the opportunity of households having food security with the age of household head between 31 to 40 years is 0.930 times more compared to households with the age of household head 30 years and below.

Maturity of the household heads affects psychological and financial stability. The older the age of the household head, the more experienced they have in finding food sources and hence more established in managing family finances. Ibok et al., (2014) find that the food security positively affected by several factors, one of them is age household head.

The coefficients of marital status variables are positive. This shows that there is tendency of households with married, divorced, and death divorced status to be more vulnerable to food insecurity compared to those who are single. The chance of household with married status to experience food insecure is 1.350 times more compared to households with single status in South Sumatra. Marital status is closely related to the number of household members. Heads of households who are bound to marriage or divorce need to fulfil their children's needs, in terms of food, as well as other material. The woman divorcee also face some problems financially and struggle to provide food and other chores. This is in line with

another study by Yusuf et al (2015) which states that married households have higher food security than others. The head of the married household shows the greater number of household members that can be used as labor supply to increase income. But, this is different from the study of Haliu and Regassa (2007) which stated that divorced, widowed, and single headed households have higher food security than married headed households, while research shows that single headed household is more food resistant because it is associated with small family size.

The number of Household Members variable has a positive sign with a coefficient of 0.333. The result supported Olayemi, 2012 that found the greater the number of household members, the greater chance to face the food insecurity. Each addition of 1 household member will increase the chance of occurrence by 0.333. The number of household members is certainly closely related to the amount of food that must be available in the household. The more member at home, the more food that must be provided.

According to Antwi et al (2018), there was a negative correlation between food security and member size in Ghana. The more the number of household members, the lower the household food security. The large number of household members that is not accompanied by an increase of available food resources, makes individuals food consumption is not enough. These results are in line with the research of Abele et al (2015) and Habyarimana (2015).

The level of education shows a negative coefficient value. The head of the household with any education level has a smaller tendency of 0.764 times to experience food insecure compared to household no education at all. The regression result shows that the higher the education level of the head of household, the lower the risk of the household experiencing food insecurity. Higher education will open up

opportunities for individuals to receive high income. In addition, information about good food intake for the body, as well as better food access is usually available to households with more educated household heads.

According to equation (15), the coefficient of the working status variable is -0.129. This shows that the chances of households with unemployed household head to experience food insecurity are smaller than those who are employed household heads by 0.879 times. There is a possibility when the unemployed household heads are supported by other household members who work and provide for the needs of household members.

Households who are using non-government provided electricity as lighting devices have a higher tendency to experience household food insecurity. Households who are using non-government provided electricity have a higher chance of 1.174 times to experience food insecurity compared to households using government provided electricity. Households who do not use any electricity have a higher chance of 1.860 times to experience food insecure compared to households with government provided electricity. The existence of electricity indicates the location of household. Households without access to electricity are usually households with isolated locations or poor households. This certainly will affect the distribution of food ingredients or lack of access to food due to economic factors.

All coefficient for drinking water variables are positive. Based on equation (14), the coefficient value of 0.177 in clean water, shows that households with refilled drinking water has a tendency of 1.194 times more in experiencing food insecurity compared to households that use bottled water as drinking water. Likewise, the coefficient value of 0.354 for drinking water₅, means that the chance for households using other

drinking water sources (such as rainwater, etc.) to experience food insecurity is 1.425 times more compared to households that use bottled water as drinking water. Generally the price of bottled water is more expensive than other sources of drinking water, so households that consumed bottled water indicated better welfare standards.

The subsidized rice variable refers to the government subsidized rice received by households. According to equation (15), coefficient for subsidized rice is -0.095. This means that the opportunity for households that did not receive subsidized rice to experience food insecurity is 0.909 times more compared to households that received the rice. This indirectly shows that recipients of subsidized rice have been right, namely households that are vulnerable to experience a lack of food calories intake. Therefore, the existence of subsidized rice helps food intake for these households who need it. The subsidy provided by the Government for those who living below the standard. This refers to the poverty in society that can not afford the good amount and quality of food.

The tendency of rural population to experience food insecurity is smaller than that of urban population which is 0.765 times. This is related to the availability of natural resources in rural areas whereas in urban area, natural resources are hardly to find. Besides, the economic factors—standard of living, income earning, and prices in rural area lower than in urban area. The most important variable to understand the food insecurity in South Sumatera district by analyzing the other factors is the poverty. The poverty led the household to cut the budget for amount and quality of food consumed. Hadley et. al (2011) summarized that the poverty plays important role to understand the food security risk both in rural and urban area.

CONCLUSION

Food security is not only a matter of enough food production for the entire population, but also the problem of individual access to food itself. The individual access to high quality and variety of food urgently needed. The condition of food security in South Sumatra has entered a safe limit under calories intake limit of 2100 kcal. However, under calories intake limit of 2500 kcal, food security in South Sumatra has not entered a safe stage. Judging from the household socio-economic factors, the number of household members and the education of household heads are dominant factors influencing household food security in South Sumatra. The number of household members is directly related to the amount of food that must available in the household. The more household members, the more food must be provided by the Household Leader. Meanwhile, education is related indirectly to the level of income earned. The higher the education level, the higher the income earns. Financial sufficiency has a positive influence on meeting the food needs of all household members.

The findings implicated that the main determinant of food insecurity in South Sumatra district was educational background that leads to the lower income earned—even worse—being unemployment. The study recommends that family planning and educational program policies are actually implemented in southern Sumatra and even Indonesia to improve household food security status. Besides that poverty alleviation programs can also be a solution to improve food security for example by providing rice for poor households (Raskin). The government could provide education in managing land and crops reminded South Sumatera district mainly still depend on

primary sectors like agricultural. The modern technology and more educated farmers would bring the food security for household in South Sumatera.

The urgency to maintain the food security in South Sumatera closely related to economic development. The severe food insecurity would lead to higher government investment in food and public health lead to risked the fall of gross domestic product. Because good food will provide good health that will affect efficiency, productivity, income which in turn has an impact on economic growth and serves as the basis for achieving sustainable economic growth. On the other hand, food insecurity reflects the economic conditions of households that do not have access or are limited to consume adequate food which indicates that food insecurity traces to poverty.

This study uses micro data while many other studies use macro data. However, data lag (1 year) and limited types of variables are the weaknesses of this study. Future studies can use more up to date and more diverse data.

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APPENDIX

Table A. Definition of Dependent and Independent Variabls

Description	Variables Definition	Scale Category
Dependent Variable		
Food Security Status	Households are considered to have food insecurity status if they have a calorie intake of less than 2100 kcal per capita	0 : Experience Food Security Status 1 : Experience Food Insecurity Status
Independent Variable		
Gender	Gender of household head	1 : Male 2 : Female
Age Group	Age of household head	1 : ≤ 30 year 2 ; 31-40 year 3 : 41-50 year 4 : 51-60 year 5 : 60 year and above
Number of Household members	Number of Household Members living in the house	Number
Marital Status	Marital Status of Household Head	1 : Single 2 : Married 3 : Divorced 4 : Death Divorced
Regional Area	Regional status of resident	1 : Urban 2 : Rural
Work	Working Status of Household Head	1 : Unemployed 2 : Employed
Education	The last education level obtained by the household head	1 : No Education 2 : Primary 3 : High School 4 : Senior High School 5 : Diploma I-Diploma IV 6 : Universities
Lighting and Electricity	Source of Lighting and Electricity in the house	1 : Government supplied electricity 2 : Government supplied electricity unmetered 3 : Non-government supplied electricity 4 : No Electricity
Drinking Water	Source of drinking water	1 : Packaging water 2 : Refilled 3 : Tap water 4 : Well 5 : Spring Water 6 : Others sourced of water
Government Subsidized Rice	Government Subsidized Rice received by household	1 : Receive 2 : Not Received

Table B. Estimation Result of Logistics Regression Analysis

Variables	Wald	Sig.	Exp(B)
Gender(1)	51744	0,0	,969
Age	4329566	0,0	
Age(1)	88192	0,0	,930
Age(2)	2104822	0,0	,687
Age(3)	2770753	0,0	,621
Age(4)	940789	0,0	,730
Marital Status	1817311	0,0	
Marital Status(1)	1777193	0,0	1350
Marital Status(2)	355956	0,0	1379
Marital Status(3)	767980	0,0	1411
Number of Household Members	66891416	0,0	1395
Education	4791847	0,0	
Education(1)	1811658	0,0	,764
Education(2)	1944857	0,0	,719
Education(3)	2998503	0,0	,678
Education(4)	1195844	0,0	,577
education(5)	3720040	0,0	,538
work(1)	616978	0,0	,879
Lighting and Electricity	4753391	0,0	
Lighting and Electricity(1)	1823190	0,0	1373
Lighting and Electricity(2)	269600	0,0	1174
Lighting and Electricity(3)	3336754	0,0	1860
Drinking Water	1035040	0,0	
Drinking Water(1)	365050	0,0	1194
Drinking Water(2)	468022	0,0	1247
Drinking Water(3)	714280	0,0	1282
Drinking Water(4)	574785	0,0	1289
Drinking Water(5)	881010	0,0	1425
Government Subsidized Rice(1)	481215	0,0	,909
Regional Area(1)	3379953	0,0	,765

Source: Data Processed (2017)