

# The Analysis of Food Security and Vulnerability in South Sumatra, Indonesia

1<sup>st</sup> Abdul Bashir

Department of Development  
 Economics, Faculty of Economics,  
 Universitas Sriwijaya  
 South Sumatra, Indonesia  
 abd.bashir@unsri.ac.id

2<sup>nd</sup> Taufiq Marwa

Department of Development  
 Economics, Faculty of Economics,  
 Universitas Sriwijaya  
 South Sumatra, Indonesia  
 taufiqmarwa@unsri.ac.id

3<sup>rd</sup> K. M. Husni Thamrin

Department of Management,  
 Faculty of Economics,  
 Universitas Sriwijaya  
 South Sumatra, Indonesia  
 kemasmthamrin@gmail.com

**Abstract**—This study to investigate food security and vulnerability through ten indicators which are grouped into three dimensions of food security, namely (1) food availability; (2) food access; and (3) utilization (food consumption, health, and nutrition) in South Sumatra. The study sites were performed in three regions namely Ogan Komering Ilir (OKI), Banyuasin and East OKU Regencies. The analytical methods used in this study are (1) qualitative descriptive analysis; (2) determining the scoring of each indicator, and (3) grouping according to the quintile with a composite index. The findings in this study generally indicate that most of the Sub-districts in the OKI and Banyuasin Regencies classified as quite food resistant, obstacles faced by this area due to the low productivity of farmers especially food crop production, the distance to trade centers relatively far, the population poor high, access to clean water and health is still limited. While East OKU regency generally classified as extremely food security. Food availability in this area is nice relatively, the only indicator is still not ideal is the ratio of health facilities to the total population.

**Keywords:** *food security, vulnerability, agriculture policy*

## I. INTRODUCTION

Indonesia has sufficient resources to ensure food security for its population. Food availability in Indonesia also illustrates the conditions that are nice relatively. Even though there are still many Indonesian people who have not received sufficient food needs. Around 19.4 million people in Indonesia are still below their proper consumption needs [1]. This situation link to an increase in malnutrition in Indonesia if the situation has been widely felt it can inhibit the normal growth of children, endanger the health of mothers and reduce labour force productivity. It can also reduce the body's resistance to disease in populations that are in poor health and in poverty [2].

The role of government through agricultural policy is needed to break the cycle of poverty, which is a picture of the interrelationships of some characteristics of developing countries in the form of existing resources that have not been managed properly [3]–[5]. The livelihoods of the majority of which are farmers can take place under conditions that less productive, the existence of economic dualism between the modern sector which follows the market economy and the traditional sector which follows the subsistence economy, as well as high population growth rates with relatively low-quality human resources [6], [7].

The availability of staple food including rice is related to many factors such as production, distribution, and consumption aspects. Although the aspect of the production of rice food commodities can be produced in the production centre, it becomes less useful if the distribution aspect is hampered. In regions where rice production is available and prices are low, in other places rice supply is inadequate and prices are high [8], [9]. The distribution aspect is closely related to the availability of adequate transportation infrastructure to ensure the mobilization of goods and people absolutely must get the attention of all parties, especially the government [10], [11].

Meanwhile, food vulnerability occurs when certain households or regions experience insufficient food to meet the physiological needs and health of individual members [12]. There are three important things that affect the level of food vulnerability, namely: (a) the ability to provide food to households, (b) the ability of households to obtain food, and (c) the process of distribution and exchange of food available with resources owned by households. In conditions of chronic food vulnerability, these three things can emerge simultaneously and relatively permanent. Whereas in the case of seasonal and temporary food insecurity, factors that influence are likely to be only one or two factors and are not permanent. Whereas in the case of seasonal and temporary food vulnerability, factors that influence are likely to be only one or two factors and not-permanent [13].

In addition, the financial inability of the population to obtain food is closely related to poverty levels. The cause of poverty, according to Nurkse [14] in the vicious circle of poverty theory is the endless end. The solution must be through indicators and comprehensive. The government and society have the same and equal role. This means that the responsibility does not only depend on the government or the community but both.

The unavailability of food is more the responsibility of the government, this is related to the production process and distribution process. The production process is closely related to government policies in the agricultural sector including land extensification policies, the provision of superior seeds, fertilizers, and pesticides. While the distribution process is more related to the feasibility of economic infrastructure such as roads and bridges where the government's role is more dominant [4].

The development of food security is based on three main components namely the availability, distribution, and price of food as well as consumption and food security [5], [15]. The indicator of rice production in South Sumatra Province in 2015-2018 tended to increase, with a growth of 4.56 percent. In general, South Sumatra has been able to meet its own food needs. The development of paddy production (GKP) in South Sumatra during 2015-2018 showed a positive trend. In 2018 South Sumatra rice production reached 5.08 million tons, the figure increased from the previous year which reached 4.94 million tons. The average paddy production in South Sumatra Province was 4.84 million tons. The slowing growth of rice production in South Sumatra is due to the low intensity of cropping and the reduced availability of land as a result of increased land-use change, resulting in reduced land area for food crops [4].

The government should be able to realize food security to increase national security. Such conditions can benefit and create food security, the national economy, and even national stability [5]. Therefore, this study to investigate food security and vulnerability in the region of food-producing through ten indicators which are grouped into 3 dimensions of food security, namely (1) food availability; (2) food access; and (3) utilization (food consumption, health, and nutrition). The three dimensions have a very big influence on the occurrence of chronic food insecurity requires long-term handling. By knowing information about the conditions of food security and vulnerability an ingredient in making food security policies in South Sumatera.

## II. METHODS

The location of this research was conducted in South Sumatra, with sample locations being Ogan Komering Ilir (OKI), Banyuasin and Ogan Komering Ulu Selatan (East OKU) Regencies. The selection of these three regions has potential in the agriculture, forestry and fisheries sectors. The types of data that support this literature study are secondary data obtained from the Central Statistics Agency (BPS). Food security can be done with literature studies and is equipped with interview and observation methods. This study is conducted by adopting agreed food vulnerability indicators and become a national reference. The analysis used in this study is (1) qualitative descriptive analysis; (2) determining the scoring of each indicator; and (3) grouping according to the quintile with a composite index. The ten indicators are covered in 3 dimensions as Table below:

TABLE I. INDICATOR OF FOOD SECURITY

No	Dimensions (NBD)	Indicator of food security (NSI)	Weights (VPW)
1	Food Availability	1. Rice consumption to production ratio 2. Contribution of food commodity production	45%
2	Food Access	3. Population below the poverty line 4. Infrastructure availability	35%
3	Utilization	5. Infant mortality rate 6. life expectancy 7. Malnourished children 8. Access to safe drinking water 9. Access to health services 10. Illiterate population	20%

<sup>a</sup> Source: Modification from FAO (2015)

The determination and identification of food-insecure areas is carried out using various indicators including agriculture, health, social and infrastructure indicators. The Food Security Council (DKP) and the World Food Program (WFP) 2005, mapping the areas of chronic food vulnerability and nutrition in Indonesia to the district level using 10 indicators. These ten indicators were adopted and used as a basis for determining food vulnerability areas in this study.

TABLE II. INDICATORS SCORING OF FOOD SECURITY

Indicators	Scoring value			
	1	2	3	4
Rice consumption to production ratio (%)	>8.54	5.37 - 8.54	2.20 - 5.37	<2.20
Contribution of food commodity production (%)	>15.31	10.36 - 15.31	5.41 - 10.36	<5.41
Population below poverty line (%)	<10.32	10.32 - 12.45	12.45 - 14.58	>14.58
Infrastructure availability (km)	<48.5	48.5 - 79.0	79.0 - 109.5	>109.5
Infant mortality rate (person)	<129,5	129.5 - 199	199 - 268.5	>268.5
life expectancy (year)	>65.83	65.51 - 65.83	65.39 - 65.51	<65.51
Malnourished children (%)	<2.51	2.51 - 4.66	4.66 - 6.81	>6.81
Access to safe drinking water (person)	>24,960	19,880 - 24,960	14,880 - 19,880	<14,880
Access to health services (person)	<2,126	2,126 - 2,856	2,856 - 3,586	>3,586
Illiterate population (%)	<3.30	3.30 - 6.26	6.26 - 9.22	>9.22

<sup>a</sup> Source: Modification from FAO (2015)

The role of each indicator above can be known by using scoring. In general, the scores are in the range 1-4, number 1 indicates better conditions (extremely food security) while value 4 indicates conditions that are not good (extremely food vulnerability). The equation in determining the category of food security presented as follows:

$$IFS = (NSI_{1-2} \times VPW_A) + (NSI_{3-4} \times VPW_B) + (NSI_{5-10} \times VPW_C)$$

Where, IFS is the index of food security; NSI is an indicator of food security; VPW is proportion weights; and 1, 2, 3, 10 is ten indicators of security

In the combined Index, the determination of the overall score is determined again through the level of urgency. We consider that the three aspects or dimensions of the indicators mentioned above have different levels of urgency. The dimension of food availability is the most urgent dimension given a weighting score at 45 percent, then the dimension of access to food ranks second with a weight of 35 percent, and finally, the dimension of utilization has the smallest urgency and is given a weighting score of 20 percent. After the composite index figures obtained from the range of determining the level of food security is determined as follows:

TABLE III. THE INDEX OF FOOD SECURITY

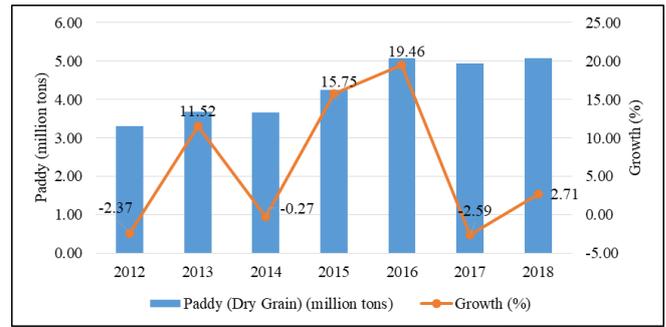
Index of food security (IFS)	Scoring	Level of food security
< 5.43	1	Extremely food security
5.43 – 6.11	2	Food security
6.12 – 7.79	3	Quite food resistant
7.80 – 8.47	4	Vulnerable to food insecurity
8.48 – 9.15	5	Food vulnerability
> 9.15	6	Extremely food vulnerability

<sup>a</sup> Source: Modification from FAO (2015)

The composite index score range (1-6) above shows the category of food security level by sub-district.

### III. RESULTS AND DISCUSSION

The realization of food sovereignty is a reflection of national economic independence. Agriculture has become a strategic development sector in South Sumatra due to the potential of abundant agricultural resources in the region. This potential needs to be utilized and developed for the food security of the people of South Sumatra. Local food sources in South Sumatra Province include food crops and horticulture, livestock, plantations, and fisheries. The development of food security is based on three main components namely the availability, distribution, and price of food as well as consumption and food security. The indicator of rice production in South Sumatra Province in 2012-2018 tended to increase, with a growth of 6.31 percent. In general, South Sumatra has been able to meet its own food needs.



<sup>a</sup> Source: BPS (Authors processed)

Fig. 1. The trend of Paddy production in South Sumatra

The development of rice production (GKP in South Sumatra during 2015-2018 showed a positive trend. In 2018 South Sumatra rice production reached 5.08 million tons, the figure increased from the previous year which reached 4.94 million tons. The average rice production in South Sumatra Province was 4.28 tons per hectare, the achievement of food security and independence in the Province of South Sumatra is also affected by the innovation and adoption of technology in the development of food crops, horticultural farming, animal husbandry, and plantation businesses that are able to have an impact on increasing production and productivity of farmers and ranchers. The local government is encouraging an increase in the number of agricultural lands by re-functioning paddy fields to be planted with rice, corn, and soybeans in accordance with the season. The availability of land in South Sumatra is wide enough to be utilized in increasing the production of agricultural crops and other food needs Banyuasin Regency, Ogan Komering Ilir, and East Ogan Komering Ulu are potential areas for expansion of food crop areas. Efforts to expand paddy fields are very important to support food security because the need for food crop production, especially rice, continues to increase, while the conversion of land is quite extensive every year.

Utilization and processing of paddy fields farmers need to get guidance and be accompanied intensively both in land management, planting, maintenance, harvesting, and post-harvest by agricultural extension workers by applying location-specific technological innovations. The government needs to supervise the distribution of seeds and fertilizers so that paddy fields can be cultivated in a sustainable manner so as to increase production and productivity of food crops. Farmers also need to get facilities in the form of easy access to production facilities, sources of capital, processing of products and marketing to increase income and prosperity. One effort to encourage food production and productivity is the availability of adequate agricultural infrastructure. Infrastructure development that is currently needed, among others, is in the form of repair and construction of irrigation infrastructure, such as reservoirs and irrigation channels, as well as the construction of roads that connect production centre to end consumers. To realize the availability of this infrastructure, support, and coordination between agencies in charge of physical development and local government through policy support that facilitates the implementation of such development is absolutely necessary. In addition to infrastructure development, increasing agricultural production and productivity also requires the support of the provision of technology and production facilities, as well as good human resources.

**A. Food security conditions of OKI Regency**

OKI Regency is a tropical area, this region is divided into 18 districts and each sub-district is divided into villages and sub-districts. The population of OKI Regency is based on a 2018 population projection of 819,570 people, an increase from the previous year of 1.28 percent, consisting of 418,785 male residents and 400,785 female residents. Meanwhile, the livelihoods of the population in OKI Regency are mostly farmers or work in the agriculture, forestry, hunting, and fisheries sectors with a total of 233,729 workers in 2018. The contribution of the agricultural sector to the formation of Gross Regional Domestic Product (GRDP) and labor recruitment is still relatively dominant. The proportion of the population working in the primary sector amounted to 58.95 percent in 2018.

The agricultural sector is the leading sector in OKI Regency, this sector provides a very large contribution to Regional Revenues and also GRDP. Agriculture is the livelihood of most of the people of OKI, this is supported by the condition of the region which is very suitable for the development of this sector. Food agriculture centers, especially rice, are found in several sub-districts, such as Lempuing, Lempuing Jaya, Air Sugihan, Tanjung Lubuk, and Sirah Pulau Padang. Lempuing Jaya sub-district is the largest rice producer in OKI Regency (21.09 percent of the total rice production in OKI Regency).

Identifying food vulnerability in this study is identical to poverty due to the region characteristics classified as poor consists i.e. *First*, poor agricultural land conditions, sub-optimal land use, and land degradation. *Second*, the use of low-tech agriculture, the availability of limited production facilities, and the presence of pests or diseases. *Third*, low quality human resources caused by low level of education, low labor productivity, the existence of a tradition that inhibits; and (4) long distances from the center of capital city, isolated, limited capital, narrow land ownership and low wage rates.

Study results in OKI Regency show that food-insecure areas are generally almost the same as the characteristics of poor areas. Sub-districts that are food vulnerability have the following characteristics: *first*, the number of food production is smaller than their needs: this means that the area has a low level of soil fertility and labor productivity is not optimal. *Second*, the distance between the area and the trade center and government center is relatively far, on average it is above 150 km: with such a long distance, it means that the area is relatively isolated. *Third*, relatively large number of poor population, a large number of poor people has an impact on high infant mortality, low of life expectancy, limitation accessibility of clean water and health facilities, and high number of illiterate population.

TABLE IV. THE INDEX OF FOOD SECURITY IN OKI REGENCY

Sub-districts	IFS	Scoring	Level of food security
Kayu Agung	4,60	1	Extremely food security
Tanjung Lubuk	5,42	1	Extremely food security
Teluk Gelam	5,55	2	Food security
Mesuji	5,61	2	Food security
Mesuji Raya	6,40	3	Quite food resistant
Lempuing	6,60	3	Quite food resistant
Lempuing Jaya	6,60	3	Quite food resistant

Sub-districts	IFS	Scoring	Level of food security
Pampangan	6,65	3	Quite food resistant
Pedamaran	6,75	3	Quite food resistant
Sirah Pulau Padang	6,90	3	Quite food resistant
Pedamaran Timur	7,05	3	Quite food resistant
Jejawi	7,05	3	Quite food resistant
Air Sugihan	7,20	3	Quite food resistant
Pangkalan Lampam	7,45	3	Quite food resistant
Sungai Menang	8,10	4	Vulnerable of food insecurity
Mesuji Makmur	8,10	4	Vulnerable of food insecurity
Tulung Selapan	8,25	4	Vulnerable of food insecurity
Cengal	9,15	4	Vulnerable of food insecurity

\* Source: Authors calculation

Table 4 shows the results of the calculation of the food insecurity index in 18 sub-districts in OKI Regency, showing that the regions with the extremely food security status are Kayu Agung and Tanjung Lubuk sub-districts. This region is relatively unproblematic in terms of food security. If observed in more detail, these two regions have near distance. Both of these regions have good scores for the indicator of the poor household ratio, the distance to the capital city and the trade center a relatively near, the number of low infant deaths, the number of poor malnutrition, access to clean water, health facilities access, and the low population illiteracy.

Regions that have food security status are Teluk Gelam and Mesuji sub-districts, these two regions have no problems with food. If observed in more detail, Teluk Gelam and Mesuji sub-districts have good indicators such as the indicator of the ratio of poor households, the number of infant mortality, life expectancy, the number of malnourished children, and the ratio of health facilities to the total population. On the other hand, this area still has low indicators such as indicators of the level of commodity crops still low and the distance between the capital of the sub-district with the trade center and the government center relatively far.

Other findings show that there are ten sub-districts have sufficient status of quite food security namely Mesuji Raya, Lempuing, Lempuing Jaya, Pampangan, Pedamaran, Sirah Pulau Padang, Pedamaran Timur, Jejawi, Air Sugihan, and Pangkalan Lampam. When observed in more detail, most sub-districts still have poor indicators such as low farmer productivity, distance to the capital and trade centers that are quite far away, high numbers of poor population, access to clean water and health are still limited. These ten sub-districts are still able to survive due to food availability can be fulfilled.

Although OKI Regency has high potential in the agriculture, forestry and fisheries sectors, this area still has districts that are vulnerable to food insecurity such as Sungai Menang, Mesuji Makmur, Tulung Selapan, and Cengal sub-districts. This situation triggered by poor indicators such as the number of food production ratios, high malnutrition, the limited availability of clean water facilities and the ratio of health facilities to the population shows is not ideal.

**B. Food security conditions of Banyuasin Regency**

Banyuasin Regency has the potential of abundant natural resource wealth. In addition, this region has a strategic geographical location in the provincial traffic lane. This region has an area by 11,832.99 km<sup>2</sup>, which divided into 19 districts. Banyuasin Regency has a topography of 80% of

the flat area in the form of tidal swamps and Lebak swamps, while the remaining 20 percent is choppy to undulating in the form of dry land. Tidal swamps are located along the East Coast to inland covering the areas of Muara Padang sub-district, Makarti Jaya, Muara Telang, Banyuasin II, Rimau Island, Air Saleh, Muara Sugihan, parts of Talang Kelapa, Betung and Tungkal Ilir sub-districts. Whereas the Lebak swamp is located in Rantau Bayur sub-district, a part of Rambutan sub-district, a small part is Banyuasin I Subdistrict. Whereas dry land with a rather bumpy topography found in most of Betung sub-district, Banyuasin III, Talang Kelapa and a small part of Rambutan sub-district.

The population of the Banyuasin Regency in 2018 totaled 844,175 people, increasing from the population in 2017 of 833,625 people. The largest population is in Talang Kelapa sub-district with 138,643 inhabitants, while Suak Tapeh sub-district has the smallest population of 18,508 inhabitants. The total workforce in Banyuasin Regency in 2017 was 391,525 people. From the workforce, the number of people employed was 377,252 and 14,273 people were unemployed. The labor force participation rate (TPAK) in 2017 in Banyuasin Regency was 66.25 percent. The development of an area certainly has an impact on the social conditions of its population. Most of the residents' livelihoods in the Banyuasin Regency are farmers. The agricultural sector is the leading sector in Banyuasin Regency this visible from the contribution to the Banyuasin economy reaching 33.31 percent in 2018. The agricultural sector divided into nine sub-sectors, including the food crops sector, annual horticultural crops, annual plantations, annual horticultural crops, and others, estate crops annual, animal husbandry, agricultural and hunting services, forestry and logging, and fisheries.

In 2018, the real economic growth in the Banyuasin Regency at 5.14 percent with oil and gas, while without oil and gas at 5.77 percent. Economic growth in 2018 has accelerated compared to 2017 by 5.04 percent, whereas if compared to without oil and gas there was also a slowdown of 5.70 percent. This is in line with the reduction in the poverty rate by 11.32 percent in 2018, a decrease compared to 2017 which was 11.47 percent

TABLE V. THE INDEX FOOD SECURITY IN BANYUASIN REGENCY

Sub-districts	IFS	Scoring	Level of food security
Tanjung Lago	5.25	1	Extremely food security
Pulau Rimau	5.80	2	Food security
Air Saleh	5.83	2	Food security
Makarti Jaya	5.95	2	Food security
Muara Telang	6.11	2	Food security
Sembawa	6.45	3	Quite food resistant
Sumber Marga Telang	6.70	3	Quite food resistant
Talang Kelapa	6.75	3	Quite food resistant
Tungkal Ilir	6.40	3	Quite food resistant
Banyuasin II	6.85	3	Quite food resistant
Banyuasin III	6.80	3	Quite food resistant
Betung	6.95	3	Quite food resistant
Muara Padang	6.85	3	Quite food resistant
Muara Sugihan	6.55	3	Quite food resistant
Rantau Bayur	7.15	3	Quite food resistant
Suak Tapeh	7.35	3	Quite food resistant
Air Kumbang	7.80	4	Vulnerable of food insecurity

Sub-districts	IFS	Scoring	Level of food security
Banyuasin I	7.85	4	Vulnerable of food insecurity
Rambutan	7.50	4	Vulnerable of food insecurity

\* Source: Authors calculation

The findings in this study indicate that Tanjung Lago sub-district is region with extremely food security category. This region has good food availability. In general, this region has good indicators in terms of food security. If observed in more detail, the Tanjung Lago sub-district has a good score such as distance to the capital city and the trade center has relative near, life expectancy, low infant mortality, low malnutrition, access to clean water, and lower illiterate population. Meanwhile, the indicators have poor such as the productivity of Palawija crops (maize, cassava, sweet potatoes), poor households are quite high, and health facilities have a relatively limited.

Pulau Rimau, Air Saleh, Makarti Jaya, and Muara Telang sub-districts have a food security category the four regions have the same characteristics as Tanjung Lago sub-district. The food security category indicated by better conditions for indicators of food insecurity such as the distance from the sub-district capital to the trade center, the life expectancy, low infant mortality, low malnutrition, clean water access, and illiterate population low. However, these regions have poor indicators like the productivity of food crops, poor households relatively high, and health facilities have a relatively limited.

The regions that have quite food resistant categories contained in eleven districts namely Sembawa, Sumber Marga Telang, Talang Kelapa, Tungkal Ilir, Banyuasin II, Banyuasin III, Betung, Muara Padang, Muara Sugihan, Rantau Bayur, and Suak Tapeh. This indicates that aspects of food absorption and food access show better conditions, but aspects of food availability are relatively low. The low aspect of food availability due to this region not-producer of food crops of paddy, but as a producer of other materials such as coconut, palm, and rubber. Addressing the potential for food insecurity in this area is enough just to maintain the availability of food supplies and minimize distribution barriers. The relative condition of the community has sufficient ability to buy food. Eleven of these regions are familiar as centers for producing coconut, palm, and rubber, but they are minimal in the production of food crops such as rice and secondary crops. Meanwhile, other indicators have a relatively good.

Meanwhile, the three regions that are vulnerable to food insecurity are Air Kumbang, Banyuasin I, and Rambutan. These regions are vulnerable to food insecurity this is due to paddy production and Palawija crops the relatively low due to these regions in general has located alongside rivers, high poor households also quite influential, clean water acces and health facilities has relatively limited. However, in general, food access is quite good, transportation is smooth and the percentage of the illiterate population has relatively low.

### C. Food security conditions of East OKU Regency

Generally, topographic conditions in East OKU Regency are lowlands. This area has a tropical climate and tends to be wet because it is affected by the rainy season and the dry season. In addition, this area consists of 20 sub-districts with a percentage of the agricultural land area of 59.38 percent of the total area of East OKU Regency. The area of agricultural

land covers 35.89 percent of plantation land, 17.16 percent of paddy fields, and 6.33 percent for another agricultural land. In 2018 employment in East OKU Regency was still dominated by the agricultural sector by 62.05 percent, although the percentage decreased compared to 2015. Conversely, employment in the industrial and service sectors increased to reach 27.27 percent

TABLE VI. THE INDEX OF FOOD SECURITY IN EAST OKU REGENCY

Sub-districts	IFS	Scoring	Level of food security
Madang Suku II	4.00	1	Extremely food security
Buay Madang	4.20	1	Extremely food security
Belitang III	4.25	1	Extremely food security
Belitang Jaya	4.30	1	Extremely food security
Madang Suku III	4.40	1	Extremely food security
Buay Pemuka Peliung	4.45	1	Extremely food security
BP Bangsa Raja	4.55	1	Extremely food security
Belitang II	4.65	1	Extremely food security
Buay Madang Timur	4.60	1	Extremely food security
Jayapura	4.70	1	Extremely food security
Martapura	4.75	1	Extremely food security
Semendawai Timur	4.75	1	Extremely food security
Semendawai Suku III	4.80	1	Extremely food security
Semendawai Barat	4.90	1	Extremely food security
Cempaka	5.40	2	Food security
Belitang Madang Raya	5.45	2	Food security
Bunga Mayang	5.60	2	Food security
Belitang Mulya	5.65	2	Food security
Belitang	5.85	2	Food security
Madang Suku I	5.90	2	Food security

<sup>a</sup> Source: Authors calculation

East OKU Regency as one of the biggest food-producing regions in South Sumatra Province, which has paddy and not paddy agricultural land. For paddy fields, there are two types of irrigation and non-irrigation systems. From 78,585 Ha, the total area of agriculture in East OKU Regency is around 53.82 percent which is irrigated paddy fields (42,297 hectares) and the remaining 46.18 percent is rain-fed paddy fields (36,288 Ha). The availability of technical irrigation networks in East OKU Regency can minimize the impact of the dry season so that it does not interfere with food security stability in this area. This can be seen from the increasing amount of food crop production especially corn and peanuts in East OKU Regency. Corn production in East OKU Regency increased by 170.66 thousand tons in 2018, while peanut production increased by 1.67 thousand tons in 2018.

Accordingly, the findings of this study indicate that there are 14 sub-districts in the category of extremely food security (Table 6). Conditions can be seen from most of the indicators of food insecurity, which shows relatively good condition access to food. Only the indicator of the ratio of health facilities to the total population is still not ideal. While there are six other sub-district areas that get the category of food security. These six regions have agricultural land which is generally used for lowland rice and freshwater fisheries, it is natural that the total production of Palawija crops becomes very minimal. This region is relatively food resistant, while other indicators have relatively good. The potential for food insecurity although relatively small but can still occur. This is possible if a flood or a rice pest disaster caused crop failure, so the population have relatively difficult to get food because alternative food ingredients are difficult to obtain. It's just that because the distance from the trade center that is

relatively nearby caused the distribution of food is relatively no obstacle. However, if harvest failure is followed by a decline in people's purchasing power, it can cause transient food insecurity. In general, problems encountered of this regions are limited health facilities.

#### IV. CONCLUSIONS

Generally, the conclusions in this study indicate that most of the sub-districts in the OKI Regency are classified as quite food resistant, obstacles faced by this region due to the low productivity of farmers, especially Palawija production, the distance to the capital and trade centre far enough, the number of poor people who high, access to clean water and health is still limited. Likewise, in Banyuasin Regencies most of the sub-districts are still classified as quite food resistant, this is related to the relatively low food availability aspect. The low aspect of food availability is mainly due to the fact that this region is not a producer of food such as rice, but as a producer of other materials such as coconut, palm, and rubber. Addressing the potential for food insecurity in this area is enough just to maintain the availability of food supplies and minimize distribution barriers. The relative condition of the community has sufficient ability to buy food. Eleven of these areas are known as the centre for producing coconut, palm, and rubber, but they are minimal in the production of food crops such as rice and secondary crops. While East OKU Regencies are mostly classified as food security. Food availability in this area is relatively good, only an indicator of health facilities have a relatively limited.

The results of this study recommend policies in the agricultural sector through first, increasing the availability of agricultural land for food crops. Second, optimizing the application of post-harvest technology and tools. Third, increasing access to fertilizer and irrigation. Fourth, developing quality and safety standards for local food products. Fifth, developing a regional food stock system. Sixth, develop awareness of the use of local products.

Policies support of food security from another field through first, improvement of infrastructure such as roads and bridges as a link between villages. Second, improve and equate the availability and quality of educational facilities and infrastructure in accordance with minimum service standards. Third, improving access and quality of health services. Fifth, increasing access to clean water and proper drinking water, and ensuring the availability of raw water for domestic needs.

#### ACKNOWLEDGMENT

We would like to thank Universitas Sriwijaya has provided financial support for this research.

#### REFERENCES

- [1] J. Neilson, M. Morrison, A. Dwiartama, R. Utami, A. Patunru, and B. Protchard, "Food Processing and Value Chain Development in Indonesia," Victoria, Australia, 2018.
- [2] T. Marwa, E. Rostartina, and A. Abukosim, "Faktor-faktor yang Mempengaruhi Stok Beras di Sumatera Selatan," *J. Ekon. Pembang.*, vol. 7, no. 1, pp. 14–24, 2009.
- [3] T. Marwa, A. Bashir, M. Adam, Azwardi, and K. M. . Thamrin, "Market Integration of Agricultural Products," *Int. J. Econ. Bus. Adm.*, vol. 5, no. 2, pp. 69–82, 2017.
- [4] M. Adam, T. Marwa, - Azwardi, K. M. H. Thamrin, and A. Bashir, "Analysis of Rice Distribution in South Sumatera, Indonesia," *Int. J.*

- Econ. Financ. Issues*, vol. 7, no. 3, pp. 166–171, Sep. 2017.
- [5] Azwardi, A. Bashir, M. Adam, and T. Marwa, “The effect of subsidy policy on food security of rice in Indonesia,” *Int. J. Appl. Bus. Econ. Res.*, vol. 14, no. 13, pp. 9009–9022, 2016.
- [6] A. Bashir and S. Yuliana, “Identifying Factors Influencing Rice Production and Consumption in Indonesia,” *J. Ekon. Pembang. Kaji. Masal. Ekon. dan Pembang.*, vol. 19, no. 2, pp. 172–185, 2018.
- [7] A. Bashir, D. Susetyo, A. Azwardi, and S. Suhel, “The Relationship between Economic Growth, Human Capital, and Agriculture Sector: Empirical Evidence from Indonesia,” *Int. J. Food Agric. Econ.*, vol. 6, no. 4, pp. 35–52, 2018.
- [8] C. P. Timmer, “Food Security in Asia and the Pacific: The Rapidly Changing Role of Rice,” *Asia Pacific Policy Stud.*, vol. 1, no. 1, pp. 73–90, 2013.
- [9] C. P. Timmer, “Reflections on food crises past,” *Food Policy*, vol. 35, no. 1, pp. 1–11, 2010.
- [10] C. R. Daniel, A. J. Cross, C. Koebnick, and R. Sinha, “Trends in meat consumption in the United States,” *Public Heal. Nutr.*, vol. 14, no. 4, pp. 575–583, 2011.
- [11] C. C. Okeke, “Determinants of Local Rice Consumption among Households in Makurdi Metropolis of Benue State, Nigeria,” *Int. J. Food Sci. Technol.*, vol. 5, no. 1, pp. 1–10, 2015.
- [12] P.- Andersen, “The State of Food Security in Pakistan: Future Challenges and Coping Strategies,” *Pak. Dev. Rev.*, vol. 49, no. Winter 2010, pp. 903–923, 2015.
- [13] V. P. Sati, “Issues and Options of Food Security and Poverty: An Empirical Study of Mizoram, the Eastern Extension of the Himalaya,” *J. Food Secur.*, vol. 3, no. 4, pp. 107–114, 2015.
- [14] R. Nurkse, *Problems of Capital Formation in Underdeveloped Countries*. Oxford, Britania Raya: Oxford University Press, 1953.
- [15] A. Bashir, Suhel, Azwardi, D. P. A. I. Hamidi, and N. Adnan, “The Causality Between Agriculture, Industry, and Economic Growth: Evidence from Indonesia,” *Etikonomi*, vol. 18, no. 2 (Forthcoming Issue), 2019.
- [16] FAO, *Mapping the vulnerability of mountain peoples to food insecurity*. Rome: Food and Agriculture Organization of the United Nations, 2015.