

## **Patterns of Food Consumption and Production of Mountainous Community in Sinjai District, South Sulawesi Province, Indonesia**

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**Abstract:** Food availability of one area affects its community food consumption patterns. The area will use its natural resources to satisfy all needs of its society. This study aimed to explain the patterns of consumption and production of food in a mountainous area. This research is a descriptive study using both qualitative and quantitative approaches. In qualitative approach, the data obtained by indepth-interview and Focus Group Discussion (FGD), whereas quantitative data obtained through household surveys of 40 households as samples. Field data collection is done systematically through questionnaires and interviews. There are two data sources namely primary data and secondary data. Primary data were obtained from people in the local area either as informants selected using snowball technique or respondents selected purposively. Furthermore, the secondary data were obtained from the literature that correlates with research areas. The result shows that the pattern of food production in the mountainous region is divided into two types based on the land used that is wetland and dry land. The wetland is used by mountainous community to produce food such as rice and corn with a frequency of twice a year. As for the dry land, it is cultivated to produce vegetables that are produced throughout the year as daily necessities. The pattern of consumption in the community correlates with the amount, type and consumptive frequency of the food. In general, people in mountainous areas still consume rice as a staple food by eating vegetables and fish as complementary with a frequency of 2-3 times a day. This is because the access is still relatively easy to obtain these foods.

**Keywords:** Mountainous Area; patterns of production, patterns of consumption

## 1. Introduction

Nowadays, the world faces a major challenge of food security (Reid and Mooney 2016). Food is still a serious problem in most of developing countries (Christine, 2016). Because of that, the economic policy in developing countries always put the problem of food and nutrition on the main priority (Gerbens-Leenes *et al.*, 2010). One of reasons is the good quality agricultural land became very scarce due to the ongoing development of industrialization, infrastructure development and land degradation caused by unsustainable agricultural practices (Fiedler 2013). Because the production and consumption patterns are unsustainable, human civilization comes to the edge of global catastrophe (Brizga *et al.*, 2014). Throughout history, the human population has experienced a shortage in food production. The growth of population in the past had carried excessive exploitation of the natural resources and resulted in the extinction and the collapse of civilization in the past (Diamond, 2005).

Availability of production becomes important in satisfying the food demand, especially the domestic production, because food security is one important component of the country national securities (Meskhia, 2016). It is doing so in order to avoid making exports a top priority as the way to fulfill the food needs. Because of the dependence of export food needs is considered very vulnerable both politically and economically (Boucekkine, *et al.*, 2016). This has pushed many people, including many academics to undertake efforts to develop production and consumption of sustainable food (Dubey,

*et al.*, 2016). Sustainable Consumption and Production (SCP) has become an important topic both in terms of policy and research agenda for academics (Geels *et al.*, 2015).

The use of natural resources for food consumption is the combined effect of specific patterns of consumption and production systems (Delis and Iosifidi, 2016). Some scientists describe the complex relationship between sustainability of consumption and the limited availability of natural resources (Delis and Iosifidi, 2016). Requirement for specific natural resources for each item of food is determined by the production system. In general, food production is largely determined by the requirements of land, energy and fresh water (Gerbens-Leenes *et al.*, 2010).

One factor in the sustainability of production is land requirement for the fulfillment of the food (Tseng *et al.*, 2013). Indonesia is one country that applies the concept of food through Food Safety Act No. 18 of 2012 concerning food. In the Act, it is specified that food is a basic human need that its fulfillment becomes the right of every citizen of Indonesia in achieving qualified human resources in order to implement the safe, highly qualified, nutritious, diverse, and available national development sufficiently. This policy is needed to increase food self-sufficiency. In addition to the production aspect, food security is widely intended to guarantee food access for individuals to meet their food needs (Noromiarilanto *et al.*, 2016). However, food availability nationally or regionally is not a guarantee for household food security. According to Christine A. (2016) the inability to access food is a threat

to community food security and categorized into two types, namely chronic and temporary conditions. Chronic food security threat is a condition of continuous food shortages and malnutrition due to lack of access to food, usually because of poverty, while the temporary food security threat is a condition of food intermittent shortages caused by conditionally disrupted access to food, for example, as a result of food price rises, food distribution disturbed or decreased income (Christine, 2016). The areas facing food insecurity are located more in rural areas than in urban areas, the main causes are (a) low purchasing power or under poverty condition, (b) the consumption behavior, (c) inadequacy and gaps of food availability and food stocks between regions and between seasons and (d) the macro policies in the field of non-agriculture (Jabbour, 2015).

The availability of food in one area affects the food consumption patterns of its local community (Jaeger-Erben *et al.*, 2015). People's food needs between one region and another has a wide range of differences, including the people in mountainous areas (Vergragt *et al.*, 2014). Consumption of food is said as eating habits that will form a consumption pattern (Nguyen and Winters, 2011). Consumption pattern of people including mountainous community is based on the type of food consumed (Purwartini and Ariani 2008). The food consumed as everyday society meals in general is divided into two kinds of food that is the main food and snack (Mun'im 2012). Between the two types of the food, the main food is the food that the society put as the main meal which is consumed daily (Margareta, 2014).

The population census in 2010 by CBS has shown that the population of South Sulawesi was 8,034,776 inhabitants with a population density of 180 inhabitants / km<sup>2</sup>, and the growth rate of 3.34% per year (CBS, 2014). The high population growth rate can lead to the conversion of agricultural land into other agricultural and non-agricultural land to meet the needs of the population, such as for housing and other economic purposes. Sinjai regency is one of regencies in South Sulawesi, which has a total area of rice fields based on BPS 2015 in 15 903 hectares with a total production of 127 891 tons, with a population of 238,000 inhabitants and a density of 290 km<sup>2</sup> (CBS, 2015). Based on the results of 2013 National Economic Survey (IDHS 2013) Percentage of population based on expenditure group per Capita per month that is dominated by expenditure group Rp.100,000 - Rp.499.000 by 65.56%. This indicates that the number of people whose limited fulfillment of food needs capability is very high. Because one of the factors that influence food consumption is the budget allocation (Osman Mokhtar & Setapa, 2014).

There are a bundle of articles that explaining about consumption patterns and food production in general, both in rural and in urban areas. For example, Ali *et al.* (2017) who studied food consumption and production in Tempe Lake of South Sulawesi who found that the consumption and production of the people who are dependent to the lake were influenced by season and the lake water level. CIHEAM/FAO (2015) who write white paper to highlight the role that the current food consumption patterns play in

food and nutrition security, public health, environment protection and socio-economic development in the Mediterranean region; Shah and Frohberg (1980) who studied the food consumption pattern in rural and urban Kenya; and many others. But no one or limited studies has specifically examined how patterns of consumption and production communities in the mountains. With these considerations, this study aims to specifically explain the patterns of consumption and production of food in mountainous areas.

## 2. Method

This research was conducted from September to October 2016 in the mountainous regions of Sinjai District. The field research focused on the sub-district which has a height of over 950 meters above sea level that is in the Sub-district of West Sinjai. This sub-district has an area of 135.53 km<sup>2</sup> with a distance of 55 kilometers from the capital city of Sinjai District.

This research is descriptive research with mixed qualitative and quantitative approaches (Tashakkori and Teddile 2003 and Creswell and Clark, 2007). Qualitative data were obtained through indepth-interviews and Focus Group Discussion (FGD); whereas quantitative data were obtained through household surveys with a sample size of 40 households. There are two data sources namely primary data and secondary data. Primary data were obtained from people in the local area either as informants selected snowball or respondents selected purposively. Primary data collected include type of cultivated commodities, the reasons for selecting the commodity, the types of food

that are consumed, the amount of food consumed, reasons for selecting food commodities, land tenure, the types of profession in the research area, the intensity of community consumption, While the secondary data obtained from the literature that correlates with research areas.

## 3. Research Site

Sinjai District is one of 24 districts/cities within the province of South Sulawesi which lays on the east coast of the southern part of South Sulawesi province which is about more than 233 km from Makassar (the capital city of South Sulawesi Province, Indonesia). Sinjai district is geographically located at between 5°2'56" to 5°21'16" south latitude and between 119°56'30" up to 120°25'33" east longitude. Sinjai which has an area of 819.96 km<sup>2</sup> consists of 9 definitive sub-districts, 67 villages and 13 developed villages. The size and altitude of Sinjai districts is displayed in Table 1.

West Sinjai Sub-District is located 48 km from the district capital with an area of 135.53 km<sup>2</sup>. This sub-district comprises of 7 definite villages and two villages. The sub-district is affected by alternating two seasons: the rainy season and dry season, but it is more influenced by the rainy season. Potential rainfall occurs between the months of January to April, May and June were dry mid, July recur high rainfall, and August to October were dry season. Total land area of paddy fields (sawah) in West Sinjai sub-district was 1.688 hectares (Figure 1.)

The use of dry land in the West Sinjai sub-district with an area of up to 11 865 hectare, mostly used paddy fields, plantation,

**Table 1.** Size and Altitude of Sub-District of Sinjai District, 2015.

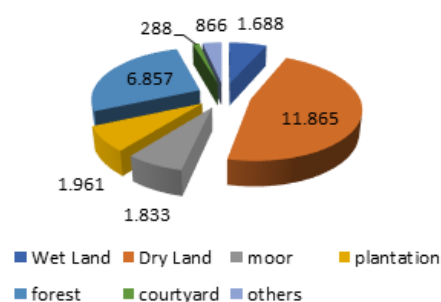
Sub-District	Region Extent (Ha)	Altitude From Sea Level									
		<25 Meter		25- 100 Meter		100-500 Meter		500-1000 Meter		> 1000 Meter	
		%	Ha	%	Ha	%	Ha	%	Ha	%	Ha
Sinjai Barat	13.553	-	-	-	-	12,67	1.717	46,02	6.261	41,13	5.575
Sinjai Borong	6.697	-	-	-	-	2,33	156	63,80	4.273	33,87	2.268
Sinjai Selatan	13.199	-	-	-	-	96,12	12.687	3,88	512		
Tellulimpoe	14.730	2,63	387	16,80	2.474	80,58	11.869	-	-		
Sinjai Timur	7.188	29,60	2.128	44,66	3.210	25,74	1.850	-	-		
Sinjai Tengah	12.970	-	-	4,75	616	72,62	9.419	22,63	2.935		
Sinjai Utara	2.957	51,17	1.513	48,83	1.444	-	-	-	-		
Bulupoddo	9.947	-	-	17,25	1.716	6,32	6.597	16,43	1.634		
Pulau Sembilan	755	82,25	621	17,75	134	-	-	-	-	-	-

Source: Regional Office of National Land Agency in Sinjai.

tegal/gardens, buildings and courtyard surroundings, pasture and protected forest. According to BPS data in 2015, the population of West Sinjai sub-district was 24.311 inhabitants, with population density of 179 people/km square. Majority of the population belong to Makassar ethnic and Buginese ethnic.

**Figure 1.** Area of wet land and dry land in the West Sinjai Sub-district in 2015.

### Hectares (Ha)



Source: BPS Sinjai, 2015

## 4. Results and Discussion

### 4.1. The pattern of food production

Pattern of food production is the way a person or group of people in producing food to meet their needs that is influenced by the natural resources, human resources, capital and management factors (Noromiarilanto

*et al.*, 2016). The success in agricultural production in the research site is also very dependent on climate change, because climate change will lead to changes in cropping patterns in the area. Utilization of natural resources efficiently and optimally in the area is the main advantage of local communities in their food production. By having an area of 1,688 ha of agricultural land with an average tenure of 0.68 ha/person and the availability of agricultural stalls in the area allows the public to easily access the necessary production facilities.

Agricultural lands in the West Sinjai are wetland and dryland. The wetland has irrigation both technical and non-technical or simple irrigation. Thus the wetland rice farming does not depend on the rainy season. Food crops cultivated by people in West Sinjai sub-district are planted in two cropping seasons. In the first growing season (the rainy season), farmers (100%) grow rice. Whereas in the dry season, farmers still grow rice (93.25%) while the rest of them (6.75%) plant corn. The average yield of rice is 5,100 kg/ha/household, while the average

corn production is 4,200 kg / household. On dry land, food crops are cultivated only once that is from December to June, the farmers (7.27%) plant corn, the others cultivating cassava (3.53%) with an average production of 2,145 kg / ha / household, while the rest of them (89.22%) grow vegetables. In dry land in July to October, the farmers in the research area (100%) cultivate vegetables such as carrots, tomatoes, lettuce, cabbage, leeks, peppers and potatoes.

Beside planting rice, corn or cassava as source main food, the farmers in this area were also grow vegetable such as carrots, tomatoes, lettuce, cabbage, leeks, peppers and potatoes. Supported by a suitable climate condition, the production of such vegetables were good. For exmpale, production of tomato was 37.57 tons/ha, chili and pepper was 36.13 tons / ha, potato was 20.71 tons / ha carrot was 12.13 ton / ha, cauliflower was 11.54 tons/ha. The household in the research site averagely own 0.63 ha of land which is used to grow rice, maize, cassava and vegetables.

Although the food production in the area was good and enough to support the community consumption, but for the long run such ability will decrease due to the decrease of available land for agriculture as impact of population growth which make much land converted into housing. The other factor contribute to this situation is water and climate change dynamics. These factors will cause failure in an effort to increase food production. The demand for increased production is also higher due to population growth of 0.47% per year.

#### 4.2. Food consumption pattern

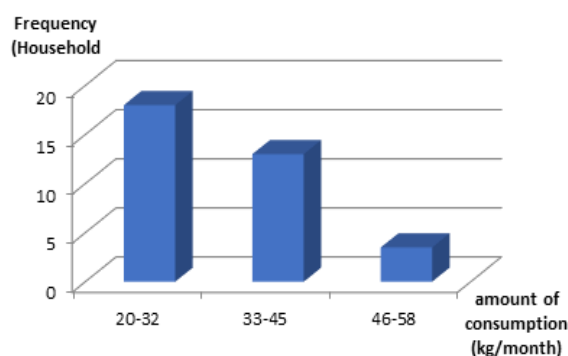
Pattern of consumption has a correlation with the food source, the type of food, the frequency of the food consumed and no less important household expenditure for food consumption (Baliwati&Roosita, 2004). In the area of research, carbohydrate sources are generally derived from rice and only a small portion of the tuber. The vegetables are foods that are available each day, which is understandable due to the fact that this region produces vegetables such as carrots, tomatoes, lettuce, cabbage, leeks, and potatoes. A group of proteins such as meat and eggs which are not produced in the local area, the people obtained it in village markets.

##### 4.2.1 Rice consumption

Rice is the staple food of people who are in mountainous areas that are consumed to meet the need for carbohydrates. Because it has a relatively high carbohydrate content and become the community energy sources in addition to another food source. In the research area, foods derived from rice is eaten daily that must be consumed by the community as many as three times a day. Given the role and function as a source of energy, the rice should always be available in the community home. Entire communities in mountainous area consume the rice / rice as a staple source of carbohydrates throughout the year. All the farming communities of the research area get rice as a staple food from their own production. Data analysis shows that households that consume rice is of 20-32 kg/month/household is 18 households

(45%), rice consumption of 33-45 kg/month/household as much as 13 households (32.5%) and households that consume rice of 46-58 kg/month/household is about 9 households (22.5%) (Figure 2).

**Figure 2.** Total Household Rice Consumption Per Month (kg)



Source: Primary data after being processed, 2016.

The average consumption of rice farmer in the study area was 275 grams/person/day or 8.25 kg/person/month. The data are classified as relatively low compared with the data of Dietary Expectation Pattern in 2015 that was 375 grams/person/day (Food Security Agency, 2015).

#### 4.2.2 Fish consumption

As a source of protein, fish is a commodity that is the most often in private consumption as a companion to the mountains of rice every day with the frequency of consumption of 2-3 times a day. This is because of the availability and accessibility in getting the fish is much larger than the other sources of animal protein. During the rainy season, the people in the study site cultivating freshwater fish such as carp (*Cyprinus carpio*) in their backyard pool and in the field by applying a system of rice mina (87.63%) households. While another household (12.37%)

get fish by buying it in the markets nearby. But in the dry season, as many as 98.74% of people in the location of research get fish from the market and as much as 1.26% community get their fish from farmed fish. For other animal protein sources like chicken and meat, are only consumed in the particular event and days.

#### 4.2.3 Vegetable consumption

The vegetables as source vitamin and mineral consumed by people in the mountainous areas were mostly from their agricultural products such as spinach leaves, moringa leaves, cassava leaves, cabbage, leeks, beans and other vegetable commodities. This food source is not consumed in large quantities and only as a complementary food along with rice and fish. In general, respondents categorized often consume vegetables when eating vegetables as much as 5-6 times a week and less frequent category when consume vegetables 3-4 times a week.

The percentage of vegetable consumption of people in the area is relatively high, especially the people who live near the village market. The percentage of respondents who consumed vegetables in the category often is 98.23% while respondents categorized as less frequent is 1.77%. The number of respondents who frequently consume vegetables is caused by easier access to get vegetables, supported by the availability of vegetables at the market and in the surrounding neighborhood. Whereas, the factors that lead to less frequent respondents consumed vegetables for taste reasons. In the processing of vegetables, usually they are boiled like spinach, tamarind, jackfruit and as fresh

vegetables. Vegetables always served in each dish of food in mountainous area.

Based on empirical description above, it is shown that consumption patterns in the mountainous area of West Sinjai sub-district can be divided into three categories: the type, amount and frequency. Based on the type, people consume rice as a staple food daily and, in addition, cassava becomes alternative. Both types of food are selected due to nutritional factors, the price factor, the time factor (Osman et al., 2014). The eating frequency or intensity of communities in mountainous areas averagely three times a day that is in the morning (breakfast) ranged from 07.00 to 09.00 am, lunch ranged from 11:30 to 12:30 o'clock and the evening meal (dinner) ranged from 19:00 to 20:00.

For nutritional factors, rice is the food containing a high carbohydrate (Ackerman, Craft, & Townsend, 2016; Rodriguez-Illera, Nikiforidis, van der Goot, & Boom, 2016). Nutrient content in 100 grams of rice are 27.9 grams of carbohydrates, 2.66 grams of protein and 0.28 grams of fat (MOH, 2015). Furthermore, the accessibility of food in mountain areas were strongly influenced by income levels. Due to budget allocations are determined by the income earned by the people, this is due to the high proportion of the budget allocated to the food than for other needs. Thus the increase in income will determine the quantity and quality of food consumed (Barigozzi, et al., 2012; Mao and Xu, 2014).

#### 4.3. Expenditure on food consumption

Expenditures for food consumption in the research area are influenced by the level

of income and number of dependents in a household. Most of the member of the community has only one source of income that is from agriculture. As a farmer, in general, 55% of respondents have an income from IDR. 2,500,000 to IDR. 5,200,000 per season, there are 27.5% of respondents who have an income from IDR.5,300,000 up to IDR. 7,000,000 per season and the remaining 17.5% of farmer respondents have an income from IDR.7,100,000 up to IDR. 8.8 million per season. The revenue is likely to be influenced by the acreage of rice fields planted with rice as well as planted corns and vegetables in dry season.

Food consumption expenditure in the mountainous areas in general ranges from 52.00% ranging from IDR. 400, 000, - to IDR. 750,000, - per month, while 42.00% of respondents spend consumption cost from IDR.760,000, - to IDR. 1.11 million, - per month and the remaining 5.00% cost their consumption from IDR.1,120,000 - to IDR.1.47 million, - per month (Table 2)

**Table 2.** Number of Monthly Household Consumption Expenditure

Total Spending per Month (IDR)	Frequency	Percent (%)
400000-750000	21	52.5
760000-1110000	17	42.5
1120000-1470000	2	5, 0
Total	40	100

*Source: Primary data after being processed, 2016*

The income level of people in mountainous areas did not affect their food consumption expenditures but the number of dependents which has dominant influence on food consumption expenditure in every family. According Chrestine, (2016) an increase



in the number of dependents leading to high spending for consumption.

## 5. Conclusion

The pattern of food production in West Sinjai sub district is determined by season. During rainy season all the farmers planted rice, while in the dry season most of the farmers beside growing rice, they also growing vegetables. Main food of the community such as rice, corn and cassava were produced in the community. The food that are not produced by the community are usually purchased in local market. The pattern of consumption in the community correlates with the amount, type and frequency of the food consumed. In general, people in mountainous areas still consume rice as a staple food by consuming vegetables and fish as complementary with a frequency of 2-3 times a day. The income level of people in mountainous areas did not affect their food consumption expenditures but the number of dependents which has dominant influence on food consumption expenditure in every family

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