The farmer’s household food security at the village of Moncongloe Bulu Maros South Sulawesi

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Abstract. The research was conducted to measure the level of farmer’s household food security in Moncongloe Bulu village, Maros South Sulawesi. The research was mainly focused on the food supply, food accessibility, food utilization, and the food consumption in connection with the national standard of food consumption recommended by government of Indonesia. Survey method was used to collect primary data as well as secondary data based on questioner to interview 30 household in the village. Descriptively analysis was employed to obtain a scientific conclusion of the research. The result of this research suggested that the level of food security of household in the Moncongloe Bulu village was very high (32%). The average food consumption of energy (2.485 kcal/capita/d) and total protein (84.5 g/capita/d) of household in Moncongloe Bulu villages were higher than that of national standard recommended by government of Indonesia. It was also found that the food security was closely correlated with food consumption, purchasing ability which influenced by household income, job availability, level of education of father as well as mother in each of household. To get extra job available during their spare time was the way of the farmers to increase their income and to improve their accessibility to food and to finally improve their quality of life. In conclusion, the level of food security of household in Moncongloe Bulu village were very high. The level of food security determined the level of food consumption which is affected by household income, availability of job, and the level of education. It is suggested that the cause of food insecurity is not only determined by the degree of food supply itself, but it may also be caused by the lack of a good governance implementation, food distribution, and the effort in empowering the farmers.

1. Introduction
Desa Moncongloe Bulu is one village in the district of Moncongloe of Maros South Sulawesi. South Sulawesi is well known to be one of food production center in Indonesia. Economic growth of South Sulawesi is relatively high 6.34% (2007) and 7.23% (2017), similarly the average income per head incease from 8.9 million IDR (2007) 48 million IDR (2017) [1-2]. However, Maros with high growth rate of population, has been having problem in connection with food supply and fulfilment the nutrient need of their people [3]. Research showed that the food security in South Sulawesi was 14.67% (surplus), less secure 51.54%, more less secure 8.58%, and not secure 25.20% [4]. Futhermore he stated that food insecurity in the town areas was 25.59% and in the villages area was 25.64%. This indicated that the farmers household who produce food doesn’t have better acces to food availability. The food consumption in South Sulawesi based on the national socio economy survey (2002) was 2.012 kcal per capita per day (91.45% from the national nutrient standard of 2.200 kcal) with the
expected food consumption of 69.4 out of 100 [5]. The low food quality figure might caused by the food consumption which was dominated by carbohydrate source (60.41%) especially the grain which supose to be 50%. In contrast the consumption of animal protein source, vegetable and fruits sources was remain low [6–8].

It is clear that the root of food insecurity was not only caused by the availability of the food production, but can be also caused by the weakness implemention of good governance, the basic needs, and the unfairness of food distribution in the society. It is important that in the national development need to be note the equal food distribution and not the marginal inrease in the food production. Therefore the food security issues from the government and the public policy which pro-society and pro-poor have important role in developing household food security.

Based on the fact and the strategic issues above this research was conducted to investigate the relationship between the food supply and the food consumption of the farmers in the village of Moncongloe Bulu Maros.

The issue regarding the food security in South Sulawesi including at the village of Moncongloe Bulu Maros has been always interested to be investigated since South Sulawesi as one of nasional centre food production. How close the relationship between the food supply and the food consumption as well as how does the farmers effort to increase their family income and to improve their food consumption quality are still need to be investigated.

The objective of the research were 1) to measure the food security at the Moncongloe Bulu village including food supply, food assecibility, and food utility. 2) to examine the correlation between food supply, food consumption by farmers, and the consumption of animal protein per capita per day by farmers at the village of Moncongloe Bulu. 3) to investigate the strategy to improve their family income during their spare time.

2. Research method
This research was conducted in the village of Moncongloe Bulu Maros, on February 2018 to Nopember 2018. Sampling metode using simple random sampling by choosing 10 % (30 household) of the total population. The 30 household then quetioning using prepared quesioner, including names of head household, member of household, age of each member, income, food stock, food supply, and daily food consumption. All of this main data and supported data were analysed descriptively to achieve a scientific conclusion of this research.

The food security was measured by using 3 aspects of food security [9–11] including :

2.1. Indicator of food supply aspect (I_AV)

2.1.1. Net production of grain (P food).

\[ P_{food} = R_{net} + M_{net} + C_{net} \]

2.1.2. Food availability of grain per capita per day (F).

\[ F = \frac{P_{food}}{total\ sample} \]

2.1.3. Index of food availability of household (I_AV).

\[ I_{AV} = \frac{C_{Norm}}{F} \]

C Norm was a standard food consumption of household (275 gram).

2.2. Indicator of food accessability aspect (I_FL_A)
- The percentage of household which classified as poor household, with income per capita per head per day equals to Rp. 149.439 (I_BPL) [12]
- The percentage of head of household which working hours less than 35 hours per week (I_LAB).
- The percentage of head household who does not finish their primary school education (I_EDU).
- The percentage of household who does not have access to electricity facility (I_R).
Therefore the calculation of food accessibility was ($I_{FLA}$):

$$I_{FLA} = \frac{1}{4} (I_{BPL} + I_{LAB} + I_{EDU} + I_{RI})$$

2.3. Indicator of food utilization aspect ($I_{FU}$)

2.3.1. Index of health infrastructure ($I_{HI}$) including: percentages of household who does not have access to clean water ($I_{WAT}$), and percentage of household who live more than 5 km from puskesmas ($I_{PUS}$).

Calculation index of health infrastructure ($I_{HI}$):

$$I_{HI} = \frac{1}{2} (I_{WAT} + I_{PUS})$$

2.3.2. Percentage of Mother who illiteracy ($I_{FI}$).

Calculation index of food accessibility ($I_{FU}$):

$$I_{FU} = \frac{1}{2} (I_{HI} + I_{FI})$$

Therefore calculation index of food security ($I_{KP}$):

$$I_{KP} = \frac{1}{3} (I_{AV} + I_{FLA} + I_{FU})$$

In this research was also investigated the strategy of household to improve their family income by having extra job during their spare time.

3. Results and discussion

3.1. Profile of Moncongloe Bulu Village

The village of is one of 5 villages in the district of Moncongloe Kabupaten Maros. The areas of this village is 121.826 Ha, consists of, paddy land 150 Ha, resident and buildings 86 Ha, mix farming 10 Ha, horticulture 329 Ha, forestry 14 Ha, others areas 121.137 Ha. This villages gederaly has 2 climates which is 6 moths dry and 6 months wet seasons. The population of this village was 3.399 heads, consists of 844 household as shown in table 1.

| Village       | Male (head) | Female (head) | Total  |
|---------------|-------------|---------------|--------|
| Diccekang     | 438         | 493           | 931    |
| Tamalate      | 297         | 326           | 623    |
| Tammu-Tammu   | 288         | 278           | 566    |
| Tompo Balang  | 228         | 222           | 450    |
| Moncongloe Bulu | 462      | 367           | 829    |
| **Total**     | 1.713       | 1.686         | 3.399  |

Source: Data from the office of Moncongloe Bulu 2018

The education profile of people at Moncongloe Bulu was relatively moderate. This indicated by the fact that this village has 4 pre-primary school, 2 primary school, and 3 Secondary school. The figures of education of people at Moncongloe Bulu are as follows finish per-primary school was 365 heads, finish primary school was 702 heads, finish junior primary school was 411 heads, and finish senior secondary school was 380 heads, graduates from university was 50 heads.

Most of people at this village are working as farmers (475 heads), small business 49 heads, gornent officials was 345 heads, and mixed labor was 272 heads.
Table 2. Profile of landuse in the village of Moncongloe Bulu

| No | Landuse     | (Ha) |
|----|-------------|------|
| 1  | Paddy field | 150  |
| 2  | Resident    | 86   |
| 3  | Holtoculture| 329  |
| 4  | Fishery     | -    |
| 5  | Forest      | 14   |
| 6  | Education   | 8    |
| 7  | Offices     | 0.50 |
| 8  | Sports      | 1.5  |
| 9  | Others      | 12.1237 |
|    | Total       | 12.1826 |

Source: Data from the office of Moncongloe Bulu 2018

Apart from working as farmers in paddy areas most farmers also rearing variety of animals such as cattle, goats, chickens, ducks, horse, buffalo, and goose. This part time works are usually is one of strategy to improve their family income, this including planting variety of vegetable around their backyards. The numbers of farmers and their animals are shown in Table 3.

Table 3. Numbers of farmers and species of animals at Moncongloe Bulu

| No. | Species of animals | Numbers of farmers |
|-----|--------------------|--------------------|
| 1.  | Cattle             | 86                 |
| 2.  | Goats              | 17                 |
| 3.  | Bufallo            | 1                  |
| 4.  | Duck               | 235                |
| 5.  | Chicken            | 288                |
| 6.  | Horse              | 2                  |
| 7.  | Goose              | 3                  |
|     | Numbers of farmers | 632                |

Source: Data from the office of Moncongloe Bulu 2018

Most commodity planted by farmers were paddy, rice, cassava, and jati putih. Infra structure such as road, education building, Church, Mousque, Cemetary, and Market still needs to be improve both number and quality. This is important for improving the economic profile of the people at Moncongloe Bulu village.

3.2. Analysis of household food security in Moncongloe Bulu Village

Characteristics of household recorded in this research were name, age, education of all member of family, working hours, family income, and also their knowledge of the food and nutrient. The numbers of household samples were 30 household with 30 to 66 years of ages. The numbers of members of family were 3 to 7 people. More members of family will be more food needed to meet the national standard of food consumption. Their job were vary usually low paid labor such as labor of motor services, part time security guard, bakso salesman, and other small business. Most of household have access to electricity only 1 household was not have access to electricity. Their income were also vary from Rp. 500.000,- to Rp. 3.500.000,- . Most family have second job during their spare time such as rearing anomals, palnting vegetables, and helping their neighbour for extra money. All of those of factors will determine the food production, food accessibility, and food utility wich finally dtermine the levels of household food security.
3.2.1. Food Supply Aspect. For calculation of food production and food supply at Moncongloe Bulu, data of food availability and food supply in each household were recorded, and the results is shown in Tabel 4.

**Tabel 4.** The food availability and index of food supply of household at Moncongloe Bulu

| Site of research | Food production (gr) | Food availability/capita/day | Standard of food consumption (C Norm) | Index of food availability (Iav) | Category |
|------------------|----------------------|-----------------------------|--------------------------------------|---------------------------------|----------|
| Moncongloe Bulu  | 102.300,300          | 805.51                      | 275                                  | 0.34                            | Surplus  |

Source: Analysis of research data, 2018.

Food availability is figures of food production which depends on other factors such as weathers. Climate, rainfall levels, infrastructure of agriculture production, landuse and the average income of farmers. As shown in Tabel 1 indicate that total main food production (rice, corn, and cassava) for 30 household was 102.300 gr per day or 805.51 gr per capita per day. Since the standard of national food consumption was 275 gr, therefore the index of food availability can be calculated. Based on the figure above the index of food availability is 34 % which means that the food production at the village of Moncongloe Bulu is surplus.

3.2.2. Food accessibility aspect. Food accessibility is depended on family income and buying ability of the farmers. The more household which low their family income the low likely the food accessibility for them. To calculate the food accessibility will be using formula as follows ($I_{FLA}$):

$$I_{FLA} = \frac{1}{4} (I_{BPL} + I_{LAB} + I_{EDU} + I_{RI})$$

Where:

$I_{BPL} =$ percentage of household who have income less than Rp.149.439,- per capita per month.

$I_{LAB} =$ percentage of household who working less than 35 hour per week.

$I_{EDU} =$ percentage of head of household who are not finish their primary school education.

$I_{RI} =$ percentage of household who are not have access to electricity facility.

Result of this research indicated that the average of family income vary from Rp.500.000,- to Rp.3.500.000,- per month, or around Rp. 142.857,- to Rp. 875.000,-per capita per months (average Rp. 326.93,-). Therefore the average income of famers which less than Rp.149.439,- was 2 household or 30%. The results of this research also show that 6 % of household who are not able to access to food supply due to their low income.

Based the interview data shows that the lack of food acessibility of the household was due to their low income plus having small areas available to plant vegetable in their back yard to plant vegetable etc in order to increase their family income. The low education levels were also contribute to the skill in managing limiting food resource available and transforming them to useful consumed nutrient to their family. Their working hours vary from 8 hours to 25 hours per week (average 14.53 hours). Therefore the numbers of family who have working hours less than 30 hours per week was 30 household or 100%. The more household who works less than 30 hours the more household who have less income to their family. In contrast the household who have higher education level having higher payment and higher income to their family. The percentage of household who are not finish their primary education was 3 household or equals to 10%. Low level of education associated with low income, low skills, and poor family. Where as electricity support improving economic condition of the farmers family. The results of this research indicated that the numbers of household who are not have access to electricity was 1 household or 3.3 %. Therefore the index of food accessibility can be calculated based on the above figures, and the result is shown in Tabel 5.
Tabel 5. Index of food accessibility (I\textsubscript{FLA}) at Moncongloe Bulu

| Site of research     | I\textsubscript{BPL} (%) | I\textsubscript{LAB} (%) | I\textsubscript{EDU} (%) | I\textsubscript{RI} (%) | I\textsubscript{FLA} (%) |
|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Moncongloe Bulu      | 6                         | 100                       | 10                        | 3.3                       | 29.8                      |

Source: Analysis of research data, 2018.

Tabel 5 shows that the index of food accessibility was 29.8 \% which is classified as good figure of food accessibility. It is well known that this figure supported by a good income and the income was well managed and sustainable.

3.2.3. Food utilization aspect. The food utilization index at Moncongloe Bulu was measured using formula as follows:

\[ I_{FU} = \frac{1}{2} (I_{HI} + I_{FI}) \]

Where:

- \( I_{HI} \) is index of health infrastructure = \( \frac{1}{2} (I_{wat} + I_{pus}) \). \( I_{wat} \) is the percentage of household who does not have access to clean water. \( I_{pus} \) is the percentage of household who live more than 5 km from puskesmas. Where as \( I_{FI} \) is the percentage of house wife who illiterate and uneducated.

The results of this research indicated that there were 12 household who does not have access to clean water or equals to 40\%. Since all house hold lives less than 5 km from puskesmas, then the index of health infrastructure (\( I_{HI} \)) was 70\%. This figure was supported by a good road and a good transportation facilities arround village of Moncongloe Bulu.

A house wife have very important role in the food security. A house wife who has agood education background have better food management which determine the healthyness of all members of family. Though 15 of the house wife does not finish their primary school, but none of them are illiterate. Therefore the index of food utilities of household at Moncongloe Bulu was 35\% (Tabel 6).

Tabel 6. Index of food utilities (I\textsubscript{FU}) at Desa Moncongloe Bulu

| Site of research | Index \( I_{WAT} \) (%) | Index \( I_{PUS} \) (%) | Index \( I_{FI} \) (%) | Index \( I_{HI} \) (%) | Index \( I_{FU} \) (%) | Criteria   |
|------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------|
| Moncongloe Bulu  | 40%                     | 100%                    | 0                       | 70%                     | 35%                     | Good       |

Source: Analysis of research data, 2018.

Based on the result of the indexes food availability, food accessibility, and food utilities of the household at Moncongloe Bulu, the index of food security can be calculated using formula as follows:

\[ I_{FS} = \frac{1}{3} (I_{AV} + I_{FLA} + I_{FU}) \]

The result of calculated index of food security is shown in Tabel 7.

Tabel 7. Index of food security of household at Moncongloe Bulu

| Site of research | Index Food availability (I\textsubscript{AV}) (%) | Index Food accessibility (I\textsubscript{FLA}) (%) | Index Food utilities (I\textsubscript{FU}) (%) | Category   |
|------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|------------|
| Moncongloe Bulu  | 34%                                           | 29.8%                                         | 35%                                           | Good       |

Source: Analysis of research data, 2018.
Tabel 5 to Tabel 7 clearly indicated that the level of food security of household at Moncongloe Bulu was 32% which is classified as a good level of food security. However, some noted have to be pointed out that high percentage in the numbers of poor family, high numbers of house wife who are not finish their primary education, will definitely influence the quality of the figure of the household food security at Moncongloe Bulu village.

3.3. Analysis of household food consumption at Moncongloe Bulu

Food consumption might be affected by the availability of food in each household. Food availability can be provided from farmers production, and buying from the market. Generally farmers plant paddy, corn, cassava, vegetable as the main job as well as extra job during their spare time. The main food such as rice, corn, and cassava are usually came from their own agriculture areas. Whereas animal food such as meat, fish, chicken, and egg are usually came from buying from the nearby market.

Results of this research indicated that people at Moncongloe Bulu are usually eat 3 time a day, morning, afternoon, and night time. Cooking time of each household vary from 1 to 3 time a day. Generally most farmers at Moncongloe Bulu consume rice about 300g per day, corn vary from 75 sampai 250g per day and cassava vary from 100 sampai 200g per day. Whereas fish, chicken, and sometime meat, also fruits such as banana, mango, and orang were usually consume in the afternoon after lunch time. The figure of food security of household in Moncongloe Bulu can be calculated from the energy intake and protein intake. The result of the calculation is shown in Tabel 8 and Tabel 9.

### Tabel 8. Food consumption and Energy intake of household at Moncongloe Bulu

| Type of Food staffs consume | Food consumption (g/cap/day) | Energy intake (kcal/cap/day) | Total energy intake (kcal/cap/day)* | Standard of Energy intake (%AKE) |
|-----------------------------|-------------------------------|-----------------------------|------------------------------------|----------------------------------|
| Rice                        | 300.0                         | 1005.00                     |                                    |                                  |
| Corn                        | 156.6                         | 555.93                      |                                    |                                  |
| cassava                     | 158.3                         | 231.12                      |                                    |                                  |
| Spinach                     | 163.3                         | 40.82                       |                                    |                                  |
| Green bean                  | 115.3                         | 50.73                       |                                    |                                  |
| Cabbage                     | 83.3                          | 24.15                       |                                    |                                  |
| Chicken                     | 80.0                          | 241.60                      |                                    |                                  |
| Fish                        | 133.3                         | 150.62                      |                                    |                                  |
| Benana                      | 103.3                         | 102.26                      |                                    |                                  |
| Pepaya                      | 95.0                          | 43.70                       |                                    |                                  |
| Orange                      | 88.3                          | 38.85                       |                                    |                                  |
| Total                       |                               | 2.484.78                    | 2.200                              | 112.94                           |

Note : *= Standar energy intake, recommended by [5].

According to [5] and [8], standard of energy and protein intake for Indonesian were 2200 Kcal for energy and 52g per capita per day for food protein [13] (Hardinyah and Victor Tambunan, 2004). Chicken meat consumed vary from 50 to 150g per capita per day, fish vary from 50 to 150g per capita per day, whereas red meat consumed regularly by only 5 household and vary from 50 to 100g per capita per day. Generally most farmers at Moncongloe Bulu consume variety fruits such banana, papaya, orange, dan mango which vary from 50 to 200g per capita per day.

It is clear that the average consumption of food energy for household at Moncongloe Bulu was 2.484.78 kcal per capita per day, which is higher than that of national standard of energy intake 2.200 kcal per capita per day. Whereas the protein intake was 84.53 g per capita per day, higher than that of national standard of protein consumption 52 g per capita per day recommended by the government of Indonesia.
Tabel 9. Food consumption and protein intake of household at Moncongloe Bulu

| Type of Foodstuffs consumed | Food consumption (g/cap/day) | Protein intake (g/kap/hari) | Total protein intake (g/cap/day)* | Standa | rd protein intake (% AKP) |
|----------------------------|-------------------------------|-------------------------------|-----------------------------------|--------|--------------------------|
| Rice                       | 300.0                         | 20.40                         |                                   |        |                          |
| Corn                       | 156.6                         | 14.41                         |                                   |        |                          |
| cassava                    | 158.3                         | 1.89                          |                                   |        |                          |
| Spinach                    | 163.3                         | 2.61                          |                                   |        |                          |
| Green                      | 115.3                         | 3.11                          |                                   |        |                          |
| Cabbage                    | 83.3                          | 2.49                          |                                   |        |                          |
| Fish                       | 80.0                          | 14.56                         |                                   |        |                          |
| Benana                     | 133.3                         | 22.66                         |                                   |        |                          |
| Orange                     | 88.3                          | 0.70                          |                                   |        |                          |
| Jumlah                     | 84.53                         | 52                            | 169.06                            |        |                          |

Note: *= Standar energy intake, recommended by [5].

4. Conclusion
It was concluded that the level of household food security of farmers at Moncongloe Bulu was 32%. Food energy and food protein intake were 2.484 kcal per capita per day and 84.5 g per capita per day, respectively. This good level of food security was supported by a good index of food production, food accessibility, and food utility. Moreover, most of farmers household members at Moncongloe Bulu have extra job during their spare time in order to increase their family income.

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