

# Analysis of Oil Palm Farmer Households Food Security and Nutrition Based on the Share of Food Expenditures and Energy Consumption

<sup>1</sup> Siti Widiati, <sup>2</sup> Tatang Sutisna, <sup>3</sup> Aulia Ikhsan, <sup>4</sup> Suherman

<sup>1</sup> Universitas Sultan Ageng Tirtayasa, Indonesia, [sitiwidiati@untirta.ac.id](mailto:sitiwidiati@untirta.ac.id)

<sup>2</sup> Universitas Sultan Ageng Tirtayasa, Indonesia, [tatangsutisna@untirta.ac.id](mailto:tatangsutisna@untirta.ac.id)

<sup>3</sup> Universitas Sultan Ageng Tirtayasa, Indonesia, [aulia.ikhsan@untirta.ac.id](mailto:aulia.ikhsan@untirta.ac.id)

<sup>4</sup> Universitas Sultan Ageng Tirtayasa, Indonesia, [herman@untirta.ac.id](mailto:herman@untirta.ac.id)

**Corresponding author** : Siti Widiati, [sitiwidiati@untirta.ac.id](mailto:sitiwidiati@untirta.ac.id)

## ABSTRACT

Compared to farmers who cultivate food and horticultural commodities, oil palm farmers have different business characteristics and incomes. The income of the oil palm farming farmer will affect the food security of the farmer's household family. This study aims to determine the level of food security in the households of smallholder oil palm plantation farmers through a review of the share of food expenditure as well as energy adequacy and minimum energy consumption per capita. The research uses a quantitative descriptive method using structured interview data collection techniques and survey techniques. The respondents were oil palm farmer households who joined oil palm farmer groups in Cipeundeuy Village, Malingping District, Lebak Regency, Banten Province. Quantitative data analysis uses analysis of the Adequacy of Energy Rate (AKE) and Adequacy of Protein (AKP), to analyze the level of household food security. Analysis of the share of food expenditure showed the largest food expenditure of households of oil palm farmers was allocated for grains as much as 31.3%, while the smallest food expenditure was tubers at 1.59%. Based on the share of food expenditure, households of oil palm farmers are in a food secure condition, with 75% of households with a share of food expenditure <60%. The average household energy consumption of oil palm farmers is 1,707.39 kcal per capita/day with a household energy adequacy level of 83.79%. The average protein consumption per capita/day is 80.79 grams with a protein adequacy level of 80.63%. Analysis of the level of food security shows that 41.66% of households are at the level of food secure, 33% are at the level of food insecure, 8.33 are at the level of food vulnerability and 16.66% of households are food insecure.

## ARTICLE INFORMATION

**Submitted:** 27/05/2023

**Revised:** 29/05/2023

**Accepted:** 31/05/2023

**Published Online:** 31/05/2023

### Keywords:

Energy Consumption  
Farmer Households  
Food Expenditures  
Food Security  
Oil Pam

**How to cite this article** : Widiati, S., Sutisna, T., Ikhsan, A., & Suherman. (2023). Analysis of Oil Palm Farmer Households Food Security and Nutrition Based on the Share of Food Expenditures and Energy Consumption. *Journal of Nutrition Science*, 4(1), 46-51. doi:10.35308/jns.v4v1.7647

## Introduction

Agriculture is one of the sectors with a high level of employment in Indonesia (Syuaib, 2016). Based on Indonesian Statistics, in 2022 around 38.7 million people in Indonesia work in the agricultural sector. This amount is equal to 28.61% of the total working population in that year. This shows that agriculture is still the mainstay sector for households as their livelihood. Viewed based on the household scale, the 2013 Agricultural Census showed that there were 26,135,469 households working in the agricultural sector. Of this figure, 55.3 percent or around 14,452,914 farming households live below the poverty threshold because they are smallholder farmers with land ownership of less than 0.50 ha (Rachmah et al., 2017). This condition of land tenure has an effect on inefficient farming, as well as low production and income of farmers so that the economic level of these farmers is also at the pre-prosperous level.

On the other hand, agriculture is still the mainstay sector depended on its contribution to the national

economy. This is evident from the plantation sub-sector, which is a significant contributor to foreign exchange along with the oil and gas sector (Aprina, 2014). One of the leading plantation commodities as a national export product is palm oil. The significantly rapid increase in demand for palm oil, both nationally and globally, has encouraged a rise in production and area of cultivated land for this commodity, not only by private plantation companies and State-Owned Enterprises but also by smallholder smallholders (Saragih et al., 2013). Smallholder oil palm plantations are developing in various regions in Indonesia, including in the area of Lebak Regency, Banten. One of the locations for an oil palm plantation grown by the community is in Cipeundeuy Village, Malingping District, Lebak Regency. Compared to farmers who cultivate food and horticultural commodities, oil palm farmers have different business characteristics and incomes (Aisy, Haryono & Ismono, 2022). The income of the oil palm farming farmer will affect the food security of the farmer's household family.

Based on The Law Number 18 of 2012 on Food, food security is a condition of fulfilling food for households which is reflected in the availability of food that is sufficient in quantity and quality, safe, equitable and affordable. In addition, the availability of food also does not conflict with the religion, beliefs and culture of the community, so that they can live healthy, active and productive lives sustainably (BKP, 2019). One indicator of household food security is shown by the share of food expenditure. The share of food expenditure is the ratio between food expenditure and total monthly household expenditure. Another indicator that reflects the food security of farming households is energy adequacy and minimum energy consumption per capita of the farmer family. This study aims to determine the level of food security in the households of smallholder oil palm plantation farmers through a review of the share of food expenditure as well as energy adequacy and minimum energy consumption per capita. The results of this study are expected to further encourage farmer awareness and become material for consideration for relevant stakeholders in formulating policies related to food for smallholder plantation business actors, especially oil palm farmers.

## Method

The research was conducted in Cipuendey Village, Malingping District, Lebak Regency, Banten Province. This location was chosen deliberately with the consideration that there are many oil palm farmers as the main source of household income in that location. The sample in this study were 12 oil palm farmer households who joined oil palm farmer groups which were considered to be able to provide data and information in the research.

The data used throughout this research are primary data and secondary data. Primary data was obtained through direct interviews using a list of questions (questionnaire). While secondary data was obtained from related agencies and literature related to the research.

The research uses a quantitative descriptive method utilizing structured interview data collection techniques and survey techniques. Quantitative data analysis uses the analysis of Energy Adequacy Rate (EAR) and Protein Adequacy Rate (PAR), to analyze the level of household food security (Riptanti et al., 2019). Calculation of the actual energy and protein content of each food group is as follows.

$$E_i = [W_i * EC_i / 100 * (EPF_i / 100)] / HM$$

$$P_i = [W_i * PC_i / 100 * (EPF_i / 100)] / HM$$

with:

- $E_i$  : Actual energy consumed from food  $i$  (kcal/capita/day)  
 $P_i$  : Actual protein consumed from food  $i$  (gram/capita/day)  
 $W_i$  : Weight of food  $i$  (gram)  
 $EC_i$  : Energy content of food  $i$   
 $PC_i$  : Protein content of food  $i$

EPFi : Percentage of edible portion of food  $i$  (%EPF)

HM : Number of household members (people)

Calculation of actual EAR and PAR is as follows (Jonsson & Toole, 1991):

$$\%EAR = \frac{\Sigma \text{Energy consumption}}{\text{EAR recommended}} \times 100\%$$

$$\%PAR = \frac{\Sigma \text{Protein consumption}}{\text{PAR recommended}} \times 100\%$$

with:

%EAR : percentage of actual energy of each food group against EAR

%PAR : percentage of actual protein for each food group against PAR

EAR : 2000 kcal/capita/day

PAR : 52 grams/capita/day

Jonsson and Toole (1991) which was adopted by Maxwell et al (2000), uses a cross-classification between two indicators of food security, namely the share of food expenditure and household energy consumption and energy adequacy (kcal) as stated in Table 1. The table shows that the limit of 80 percent of energy consumption (per adult equivalent unit) will be combined with a share of food expenditure of > 60 percent of total household expenditure.

**Table 1.** Degree of Household Food Security

Energy Consumption per Adult Equivalent Unit	Percentage of Food Expenditure	
	Low (<60% Total Spend)	High (>60% Total Spend)
Enough Energy (>80% Sufficient Energy)	Food Resistant	Food Vulnerable
Lack of Energy (<80% Sufficient Energy)	Lack of Food	Food Insecurity

Jonsson dan Toole (1991)

## Results

### Food security

Food security is a condition of fulfilling food needs as a basic need of the community both in quantity and quality, food must be easily accessible, stable, available and utilization of food ingredients, as stated in Law Number 18 of 2012 on Food. Food security could be analyzed using the energy and protein adequacy ratio approach, besides that food security can also be viewed from the share of food expenditure.

### Food Security Based on Food Expenditures Share

The share of food expenditure is the ratio of expenditure for food expenditure and expenditure of the total population for a month.

**Table 2.** Average Food Expenditure of Palm Oil Farmer Household

No	Food Type	Amount (Rp/Month)	Percentage (%)
1	Grains	1.390.333	31,3
2	tubers	70.500	1,59
3	Fish/Meat	312.000	7,02
4	Meat	280.000	7,00
5	Eggs and Milk	176.700	3,68
6	Vegetables and Nuts	175.300	4,67
7	Fruits	95.500	2,15
8	Oil	196.378	4,42
9	Beverages	252.000	5,67
10	spices	96.300	1,75
11	Other Consumption	182.000	6,07
12	Prepared food and drink	142.000	3,19
13	Cigarette	1.078.000	24,2
<b>Total</b>		<b>4.447.011</b>	<b>100</b>

Source: Primary Data, 2023

Table 2 shows that the largest food expenditure for oil palm smallholder households is grain expenditure of 1,390,333 or 31.3%. Meanwhile, the second largest food expenditure is the purchase of cigarettes, which is IDR 1078,000. or by 24.2%. While the smallest share of food expenditure is tubers, which is Rp. 70,500 or 1.59%, this is because tuber food is self-produced for its fulfilment, which is cultivated in home gardens and the fields.

**Table 3.** Average Non-Food Expenditure of Palm Farmer Households

No	Expenditure Type	Amount (Rp/Month)	Percentage (%)
1	Rent/contract	150.000	5,1
2	Electricity and Fuel	350.700	12
3	Home Phone/Toll	230.000	7,8
4	Education	400.000	13,6
5	Transportation	514.000	17,5
6	Credit	700.300	23,8
7	Health	240.000	8,1
8	Durable Goods	110.000	3,7
9	Bathing and Washing Equipment	250.000	8,5
<b>Total</b>		<b>120,027</b>	<b>100</b>

Source: Primary Data, 2023

Based on Table 3, the largest non-food expenditure for oil palm farmer households is credit spending with an average of 700,300 or 23.8%. While the share of non-food expenditure for the smallest is non-food expenditure for durable goods of Rp.110,000 or 3.7%.

**Table 4.** Percentage of Palm Oil Household Expenditures

Percentage of Food Expenditure	Amount (Rp/Month)	Percentage (%)
< 60% (Food Security)	9	75
>60% (Less Food Insecure)	3	25
<b>Total</b>	<b>12</b>	<b>100</b>

Source: Primary Data, 2023

Based on the percentage of oil palm farmer household expenditure that is food secure, it is shown that the number of oil palm farmer households with a share of food expenditure >60% is only 3 households or 25%, while 9 or 75% of oil palm farmer households have a share expenditure < 60%.

Household income is related to the quality of food and the nutritional status of a household, this is because food fulfilment is complex and is influenced by many factors, such as income redistribution, access to savings, availability of health, education and other social services (Widiati, et al., 2020).

### Household Food Security Based on Energy Consumption

Food consumption could be assessed from the consumption of nutrients, namely protein and calories. The consumption that is calculated is not only staple foods, but also other foodstuffs such as fruits and so on.

**Table 5.** Total Consumption, Per Capita Consumption, and Energy Adequacy Level

	Average
Total Consumption	
Energy (kcal)	13.272,58
Protein (gram)	319,39
Per Capita Consumption	
Energy (%)	1607,39
Protein (gram)	80,79
Adequacy Level	
Energy (%)	83,79
Protein (%)	80,63

Source: Primary Data, 2023

Based on the table of nutritional adequacy figures in the Regulation of the Minister of Health of the Republic of Indonesia Number 28 OF 2019 concerning Recommended Nutrition Adequacy Rates for Indonesian People, the energy adequacy rate is 2,550 kcal with 65 protein grams. The results of the analysis are in Table 5. The average household energy consumption of oil palm farmers is 13,272.58 kcal, with an average energy per capita/day of 1,707.39 and an average protein consumption per capita per day of 83.79 kcal/capita/day. The figure meets the energy adequacy standard, which is 2,550 kcal/cap/day. Therefore the energy needs of oil palm farmers have met the standard. The average size of this energy has an impact on the average household energy adequacy. The level of energy adequacy of

oil palm farmer households is 83.79%. The protein adequacy level is 80.63%, this shows that the

energy and protein adequacy rates for oil palm farmer households are above the standard.

**Table 6.** Distribution of Household TKE and TKP Categories

No	TKG	Category	Energy		Protein	
			House-hold	%	House-hold	%
1	>100 %	Good	1	8,33	0	0
2	80-99 %	Moderate	5	41,67	6	50
3	70%-80 %	Lack	3	25,00	6	50
4	<70 %	Deficit	3	25,00	0	0
Total			12	100.00	12	100

Source: Primary Data, 2023

Table 6 demonstrates that the level of protein consumption of oil palm farmer households is better than the level of energy consumption. This is due to a lack of food diversification, especially energy intake from foodstuffs other than rice, which has resulted in many families being said to be far from good. Oil palm farmer households with a good level of energy consumption are 8.33%, then in the moderate category is 41.67%. Palm oil households in the category of less energy consumption and a deficit are both 25%. The level of protein consumption in oil palm farmer households shows that 50% are in the moderate category and 50% are in the less category, but none are in the deficit category. Protein can be met with protein derived from vegetable protein which can be obtained from several food ingredients such as legumes (tofu, tempeh and other processed nuts), tubers and vegetables, vegetable plants and tubers are one of the easiest food ingredients obtained because several oil palm farming families cultivate vegetables and tubers both in the garden and by utilizing the yard of the house. Meanwhile, animal protein can be obtained from foodstuffs such as eggs, meat, fish, milk and other processed foods produced from animal products.

#### Food Security Level of Palm Oil Farmer Households

Food security is a condition in which the share of food expenditure and household nutrition consumption has the following criteria: food security households (proportion of food expenditure <60% of household expenditure and energy >80% of sufficient energy requirements), households lacking food (proportion  $\leq$  80% of the energy adequacy requirements), and food insecure households, that is, if the proportion of  $\geq$ 60% of energy household expenditure is >80% of the energy adequacy requirements), while food insecure households, that is if the proportion of food expenditure is  $\geq$ 60%.

#### Analysis of Food Security Levels of Palm Oil Farmers' Households

The results show that there are 5 households or 41.66% which are at the food secure level. There are 4 households or 33.33% at the level of food insecurity, 8.33% or 1 household is food vulnerable and 2 households or 16.66% are food insecure. This indicates that oil palm farmers are already food secure based on the share of food expenditure and energy and protein adequacy rates at the household level.

**Table 7.** Analysis of Food Security Levels of Oil Palm Farmer Households

Energy Consumption per Adult Equivalent Unit	Percentage of Food Expenditure	
	Low (<60% Total Spend)	High (>60% Total Spend)
Enough Energy (>80% Sufficient Energy)	Food Resistant 5	Food Vulnerable 1
Lack of energy (< 80% Sufficient Energy)	Lack of Food 4	Food Insecurity 2

Source: Primary Data, 2023

#### Discussion

Household income is tied to the ability of households to access food both by quantity as well as quality to meet household food needs. As stated by Saliem & Ariani (2016), household food security is related to households that capable to access food in a manner to satisfy the food needs of all family members. Household food security is reflected by several indicators, including (1) the level of damage to crops, livestock and fisheries, (2) a decrease in food production, (3) the level of food availability in households, (4) the proportion of food expenditure to total expenditure, (5) price fluctuations of the main foods consumed by households, (6) changes in social life, such as migration, selling/mortgaging assets, (7) food consumption conditions in the form of eating habits, food quantity and quality, and (8) nutritional status.

A household is food secure if the share of food expenditure is <60%, but if the share of food expenditure is > 60% or = 60% then the household is food insecure (Maxwell et al., 2000). Palm Oil Farming Households are already food secure based on the results of the Food Expenditure Share analysis. Analysis of the share of food expenditure can be measured by dividing food expenditure by total household expenditure.

The results of the analysis demonstrate that the largest household food expenditure for oil palm farmers is grain expenditure, which is 1,390,333 or 31.3%. Meanwhile, the second largest food expenditure was the purchase of cigarettes, amounting to IDR 1,078,000 or 24.2% of total household food expenditure. Expenditure for buying food, the smallest is utilized to buy tubers, namely Rp. 70,500 or 1.59%. Cigarettes are the second

largest food expenditure after cereals because all research respondents consume cigarettes every day while purchasing tubers is the smallest food expenditure because for fulfillment tubers can be fulfilled from self-produced consequences, namely cultivated in the yard or the fields. The biggest non-food expenditure for oil palm farmer households is credit spending with an average of Rp.700,300 or 23.8%. The smallest share of expenditure for non-food items is spending on durable goods purchases of IDR 110,000 or 3.7%. The results of the analysis show that the average percentage of household expenditure for oil palm farmers who have expenditures > 60% is 9 households or 75%, and those who have a share of food expenditures > 60% are only 3 farmers or 25% of the total respondents. This shows that oil palm farmers are already food secure taken into account their share of food expenditure.

Food security could be analyzed apart from household income and the Share of Food Expenditure, it could also be reviewed on several indicators such as per capita energy availability, food affordability, and food consumption adequacy (Malik 2019)

The results showed five households or 41.66% at the food security level. There are four households or 33.33% that are at the food insecure level, 8.33% or one food insecure household and two households or 16.66% are food insecure. This suggests that oil palm farmers already have food security based on the portion of food expenditure and the level of energy and protein adequacy at the household level. The results showed five households or 41.66% which were at the food security level. There are four households or 33.33% at the level of food shortage, then as many as 8.33% or one household food vulnerable and two households or 16.66% are at the level of food insecurity. This indicates that oil palm farmers already have food security based on the portion of food expenditure and the level of energy and protein adequacy at the household level.

## Conclusion

Based on the share of food expenditure, households of oil palm farmers are in a food secure condition, with 75% of households with a share of food expenditure <60%. The average household energy consumption of oil palm farmers is 13,272.58 kcal, with an average energy per capita/day of 1,707.39 kcal. The energy adequacy level of a household of oil palm farmers is 83.79%. For protein consumption, the total consumption was 319.39 grams with an average protein consumption per capita/day of 80.79 grams with a protein adequacy level of 80.63%. These two things show that the energy and protein adequacy rates of farmer households are above the recommended standard of nutritional adequacy rates. The level of protein consumption in oil palm farmer households is better than the level of energy consumption. This is due to a lack of food diversification, especially energy intake from food ingredients other than rice. Meanwhile, the fulfillment of protein is more diverse, both from vegetable and animal protein. Overall, the analysis of the level of

food security illustrates that 41.66% of households are at the level of food security, 33% are at the level of food insecurity, 8.33 are at the level of food vulnerability and 16.66% of households are food insecure.

## References

- Aisy, A. M., Haryono, D., & Ismono, R. H. (2022). Ketahanan Pangan Rumah Tangga Petani Kelapa Sawit Swadaya Di Kabupaten Tulang Bawang. *JIIA (Jurnal Ilmu-Ilmu Agribisnis)*, 10(2), 237-244.
- Ariani, M., Suryana, A., Suhartini, S. H., & Saliem, H. P. (2018). Keragaan konsumsi pangan hewani berdasarkan wilayah dan pendapatan di tingkat rumah tangga.
- Arida, A., Sofyan, S., & Fadhiela, K. (2015). Analisis ketahanan pangan rumah tangga berdasarkan proporsi pengeluaran pangan dan konsumsi energi (studi kasus pada rumah tangga petani peserta program desa mandiri pangan di Kecamatan Indrapuri Kabupaten Aceh Besar). *Jurnal Agrisepe*, 16(1), 20-34.
- BKP. (2019). Panduan Analisis Sistem Kewaspadaan Pangan dan Gizi (SKPG). Badan Ketahanan Pangan Kementerian Pertanian, Jakarta.
- Erlyna Wida Riptanti, Masyhuri Masyhuri, Irham Irham and Any Suryantini. (2019). The ability of dryland farmer households in achieving food security in food-insecure area of East Nusa Tenggara, Indonesia. *AIMS Agriculture and Food*, 5 (1). DOI: 10.3934/agrfood.2020.1.30.
- Faoeza Hafiz Saragih, Dwidjono Hadi Darwanto, Masyhuri. (2013). *Analisis Daya Saing Ekspor Minyak Kelapa Sawit (CPO) Sumatera Utara di Indonesia*. *Jurnal Agro Ekonomi*, 24 (1).
- Hilda Aprina. (2014). Analisis Pengaruh Harga Crude Palm Oil (CPO) Dunia Terhadap Nilai Tukar Riil Rupiah. *Buletin Ekonomi Moneter dan Perbankan*, 16 (4).
- Jonsson, U., & Toole, D. (1991). Household food security and nutrition: A conceptual analysis. New York: United Nations Children's Fund.
- Jonsson, U., & Toole, D. (1991). Conceptual analysis of resources and resource control in relation to malnutrition, disease and mortality. New York: UNICEF.
- The Law Number 18 of 2012 concerning Food.
- M. A. Rachmah, Mukson, S. Marzuki. (2017). Analysis of Factors Affecting The Share of Food Expenditure Household of Farmers in Subdistrict Suruh Semarang Region. *Jurnal Pangan dan Gizi*, 7 (1).
- M. Faiz Syaib. (2016). Sustainable agriculture in Indonesia: Facts and challenges to keep growing in harmony with environment. *Agricultural Engineering International: CIGR Journal*, 18 (2).
- Malik, A., Wibisono, Y., & Iskandar, R. (2019). Analisis Ketahanan Pangan Kabupaten Jember. In *Seminar Nasional Multi Disiplin Ilmu Universitas Asahan*.

- Maxwell, D. (Ed.). (2000). Urban livelihoods and food and nutrition security in Greater Accra, Ghana (Vol. 112). Intl Food Policy Res Inst.
- Maxwell, D., & Caldwell, R. (2008). The Coping Strategies Index: A tool for rapid measurement of household food security and the impact of food aid programs in humanitarian emergencies. *Field methods manual, 2*.
- Maxwell, D., Watkins, B., Wheeler, R., & Collins, G. (2003). The coping strategies index: A tool for rapidly measuring food security and the impact of food aid programs in emergencies. Nairobi: CARE Eastern and Central Africa Regional Management Unit and the World Food Programme Vulnerability Assessment and Mapping Unit.
- Mulyo J.H., Sugiyarto, dan Widada, A. W. (2015). Ketahanan Pangan Rumah Tangga Tani Daerah Marginal di Kabupaten Bojonegoro. *Jurnal Agro Ekonomi* Vol. 26/ No. 2 : 121-123. Yogyakarta : UGM.
- Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun (2019). Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia.
- Widiati, S., & Rusmana, M. (2020). Peran Sistem Pertanian Lokal Dalam Mekanisme Pemenuhan Kebutuhan Pangan (Food Coping Strategy) Masyarakat Adat Kasepuhan Cicarucub Berbasis Kearifan Lokal. *Jurnal Agribisnis Terpadu, 13*(1), 134-153.

\*\*\*\*\*