Asian Journal of Agriculture and Rural Development
Volume 15, Issue 1 (2025): 1-10.

http://www.aessweb.com/journals/5005

Analysis of the welfare gap among smallholder palm oil farmers in two scheme farming management: A case study in Lampung province, Indonesia

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Article History
Received: 9 August 2024
Revised: 16 December 2024
Accepted: 30 December 2024
Published: 20 January 2025

Keywords
Ordinal-logit
Palm-oil
Partnership
Prosperous
Smallholders farmer.

ABSTRACT
This paper aims to analyze the level of welfare of palm oil farmers and the factors that influence it. The research design employs a survey method. Indonesia smallholder palm oil farmers face complex welfare issues. The study employed a survey-based research design. Farmer's sampling involved 594 palm oil farmers. Quantitative methodology with an ordinal logit regression model is applied to determine the welfare factors. The welfare analysis is carried out by household expenditure approach. The findings reveal the fact that the majority of smallholder palm oil farmers, whether with independent or partnership patterns, are prosperous. The independent pattern has a higher chance of improving welfare. The household prosperity is determined by the variables age, education, number of family members, land cultivated, palm oil income, household income, and cultivation patterns. The direct connection between farmers and the palm oil industry supply chain in the form of cooperation patterns and factory supply guarantees is a basic prerequisite in ensuring improvements in the level of farmers' income. The practical implication recommends that strengthening farmers in the upstream production line is a precondition in developing the Indonesian sustainable palm oil industry. The synergy among stakeholders in the fair business value chain framework should start from strengthening farmers in the upstream production line.

Contribution/Originality: The main finding reveals an interesting fact that smallholder palm oil farmers in independent form have a higher chance of improving welfare. Independency pattern farming gives extended exploring opportunities in enhancing palm oil productivity and income sources. The pattern of farming was an important factor in the household's prosperity.

DOI: 10.55493/5005.v15i1.5275
ISSN(P): 2304-1455/ ISSN(E): 2224-4433
How to cite: Lestari, D. A. H., Fitriani, F., Prasmatiwi, F. E., Sayekti, W. D., & Lestari, F. Y. (2025). Analysis of the welfare gap among smallholder palm oil farmers in two scheme farming management: A case study in Lampung province, Indonesia. *Asian Journal of Agriculture and Rural Development, 15*(1), 1–10. 10.55493/5005.v15i1.5275

1. INTRODUCTION
Palm oil is the main raw material in the supply of crude palm oil (CPO) in the world. In the Indonesian economy, palm oil plays a strategic role because this commodity has bright prospects as a source of foreign exchange (Rosa & Zaman, 2017; Suroso, Tandra, & Wahyudi, 2021). Indonesia is a competitive country in the global oil market, representing major export and import countries (Ramadhani & Santoso, 2019; Rifin, 2010; Salleh et al., 2016).

The promising prospects for the palm oil industry are facing negative issues, especially for the environment. Issues related to the negative impacts of the palm oil industry have become a global concern, especially after the Sustainable

Development Goals (SDGs) Agenda (Erwiningsih, 2023). The European Union (EU) has officially implemented the Anti-Deforestation Law, which aims to ensure that products entering the European Union market come from legal sources and do not cause deforestation.

This rule aims to ensure consumption and trade do not contribute to world deforestation. Deforestation can result in ecosystem changes, including loss of biodiversity, increased greenhouse gas emissions, and overall environmental damage. There are at least seven commodities regulated in the European Union's Anti-Deforestation Law, namely palm oil, coffee, meat, wood, cocoa, soybeans, and rubber. The existence of the Anti-Deforestation Law certainly has implications for the European Union's trading partners, including Indonesia.

In the midst of the debate on the issue of deforestation, Indonesia is still exporting CPO to reach US$29.62 billion in 2022, an increase of 3.56 percent compared to the previous year (Badan Pusat Statistik, 2022a). This is in line with data from the Indonesian Palm Oil Entrepreneurs Association (Gabungan Pengusaha Sawit Indonesia, 2022), which notes that in August 2022 Indonesia exported 506,800 tons of CPO, up 51.7 percent from 334,000 tons in the previous month. Indonesia's palm oil production in 2022 will reach 45.58 million tons, an increase of 0.88 percent from the previous year (Badan Informasi Geospasial, 2022). This production is generated from Indonesia's palm oil plantation area, which has reached 14.9 million hectares, with the largest proportion being in Riau Province, which reaches 2.9 million hectares (Badan Pusat Statistik, 2022b).

The advancement of palm oil manors in world palm oil-producing nations can contribute altogether to diminishing destitution in those nations (Palm Oil Agribusiness Strategic Policy Institute, 2021; Syahza, Tampubolon, Irianti, Meiwanda, & Asmit, 2023). The foremost imperative thing approximately welfare is salary, since assembly needs are restricted by family wage (Purba, Rifai, & Kausar, 2015). A family's expenditure on food consumption decreases as their income increases. So, if there's an increment in pay and this increment does not alter utilization designs, at that point the family is affluent. On the other hand, in the event that an increment in family pay changes utilization designs, the family will not be as affluent.

The growing world market share related to CPO needs has meant that Lampung Province, one of the provinces on Sumatra Island, continues to strive to develop palm oil plantations as a driver of regional economic growth. By 2022, the area of palm oil plantations in Lampung Province will have reached 109,876 hectares. In accordance with the 2019-2024 Lampung Province Long Term Development Plan (LTDP), the plantation sub-sector is expected to make a significant contribution to the regional domestic product (RDP) of Lampung Province through increasing production of plantation commodities, especially smallholder plantations (SP), namely palm oil, coffee, pepper, cocoa, coconut, rubber, and sugarcane.

Nationally, Lampung Province only ranks 15th as a palm oil-producing province. The contribution of exports of animal/vegetable fats and oils (CPO and refined palm oil) in Lampung Province is 38.03 percent of the national level. The central districts for palm oil production are Mesuji Regency, Tulang Bawang Regency, Central Lampung Regency, and Way Kanan Regency (Badan Pusat Statistik Provinsi Lampung, 2022). Tulang Bawang Regency is the largest palm oil producer, with a contribution of 22.96 percent of the total palm oil production of Lampung Province.

The province of Lampung divides palm oil cultivation into two groups: independent palm oil farmers and plasma palm oil producers. Independent palm oil farmers are farmers who manage their palm oil farming business independently, both in meeting capital needs, managing the farming business, and selling their products. Plasma palm oil cultivation involves the management of palm oil farming as a core company partner. This relates to palm oil farming activities under a cooperation agreement with the core company regarding mutually agreed-upon rights and obligations.

Palm oil cultivation using an independent pattern and a partner pattern will influence the income obtained. Most of the palm oil in Lampung Province is old, so it is time for it to be rejuvenated. However, because palm oil farming is still a mainstay for earning income and achieving prosperity, despite the issue of limiting world palm oil exports, palm oil farming is still being carried out. Therefore, this research aims to analyze the level of welfare of farmers whose palm oil plants are old and the factors that influence this under the pattern of farming management issues.

2. MATERIAL AND METHODS

The research was carried out using survey methods. The location covers six districts in Lampung Province, Indonesia, as a palm oil production center of the smallholder palm oil plantation. It involved Tulang Bawang, Mesuji, Way Kanan, Central Lampung, South Lampung, and West Pesisir Barat districts. The study divided the sample frame of smallholder palm oil farmers into two categories; independent and partnership farmers. Palm oil farmers with partnership patterns are located in Tulang Bawang, Mesuji, and Way Kanan Regencies. Map of distribution of research areas in Lampung Province can be seen in Figure 1.

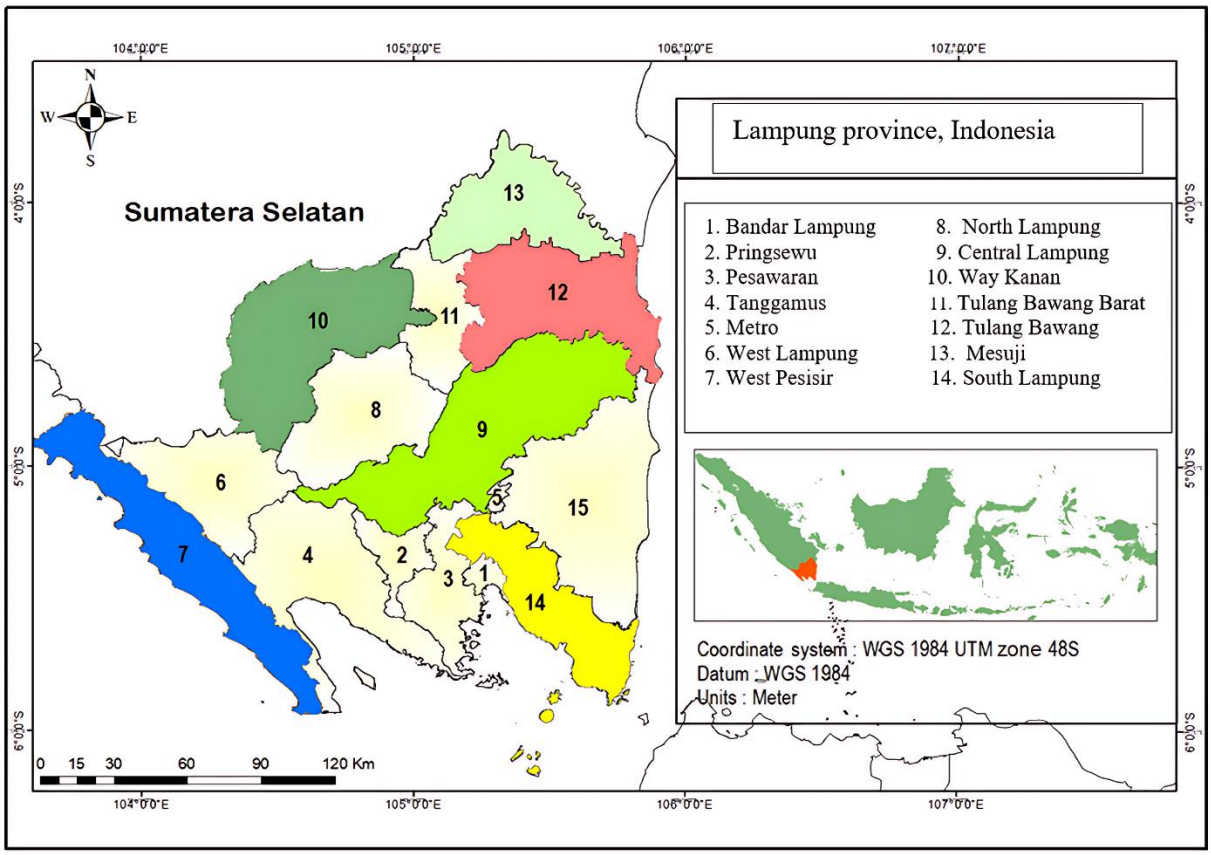

Figure 1. Research areas in Lampung Province, Indonesia.
Source: Badan Informasi Geospasial (2022).

The data consists of primary data and secondary data. Primary data was obtained from interviews with respondents using a questionnaire. Secondary data was obtained from related agencies. The number of farmers with palm oil plants old (>17 years) in Lampung Province is 1,008 households (Ismono, Prasmatiwi, & Lestari, 2019). From this population data, households were selected that owned one parcel of palm oil land with a maximum land area of 2 ha. Therefore, the farmers' sample was 594 households spread across six districts determined by simple randomness. Table 1 shows the distribution of samples of palm oil farmers in six districts of Lampung Province.

Table 1. Distribution of samples of palm oil farmers in six districts of Lampung province.

No.	District	Sample amount		Total
		Independent	Partnership	
1	South Lampung	64	0	64
2	Central Lampung	98	0	98
3	Pesisir Barat	36	0	36
4	Mesuji	21	108	129
5	Tulang Bawang	30	70	100
6	Way Kanan	46	121	167
	Total	295	299	594

The analytical method for measuring the level of welfare of palm oil farming households uses (Sajogyo, 1997) poverty criteria (Fitriani, 2022; Fitriani, Arifin, & Ismono, 2010). This method calculates household expenditures using the following formula:

$$Ct = Ca + Cb + Cn \quad (1)$$

Information:
Ct = Total household expenditure.
Ca = Expenditure on food.
Cb = Non-food expenditure.
Cn = Other expenditures.

$$\text{Expenses per capita/year (Rp)} = \frac{\text{Household expenditure/year}}{\text{Number of family dependents}} \quad (2)$$

$$\text{Expenses/capita/year equal to rice consumption (Kg)} = \frac{\text{Expenditure/capita/year (Rp)}}{\textit{Rice price (Rp/Kg)}} \quad (3)$$

From these calculations, the poverty level obtained according to Sajogyo (1997) is categorized as follows:
a. The poorest: Expenditure equivalent to ≤ 180 kg of rice/Capita/Year.
b. Very poor: Expenditure equivalent to 181-240 kg of rice/Capita/Year.
c. Poor: Expenditure equivalent to 241-320 kg of rice/Capita/Year.
d. Near poverty: Expenditure equivalent to 321-480 kg of rice/Capita/Year.

e. Enough: Expenditure equivalent to 481-960 kg of rice/Capita/Year.
f. Decent living: Expenditure equivalent to >960 kg of rice/Capita/Year.

The poorest, very poor, poor, and almost poor categories mean not well off, while the moderate and decent living categories mean well off. Factors that influence the welfare of palm oil farmer households in Lampung Province were analyzed using a logistic regression model (Rosadi, 2011). In ordinal logit regression, there were more than two categories. The following is an econometric approach to the logit model:

$$Pi = F(Zi) = F(\alpha + \beta Xi + \mu) \quad (4)$$

$$Pi = 1/(1 + e - Zi) \quad (5)$$

$$Pi = 1/(1 + e - (\alpha + \beta Xi + \mu)) \quad (6)$$

If both sides of the equation are multiplied $1+e^{-Zi}$ then obtained:

$$(1 + e^{-Zi})\, Pi = 1 \quad (7)$$

$$e^{-Zi} = \frac{1}{Pi} - 1 = \frac{Pi}{1-Pi} \quad (8)$$

While $e^{-Zi} = 1/$ e-Zi then:

$$e^{-Zi} = \frac{Pi}{1-Pi} \text{(Rasio Odds)} \quad (9)$$

Next, the ordinal logit regression equation is expressed as follows:

$$Pi = F(Zi) = F(\alpha + \beta_1 Xi + \mu) \quad (10)$$

Zi find with the formula:

$$Zi = Ln\left[\frac{Pi}{1-Pi}\right] = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8D1 + \mu \quad (11)$$

Information :
Zi: Probability Z1 = Z(Y=1) for the poorest category of households.
Opportunity Z2 = Z(Y=2) for households in the very poor category.
Opportunity Z3 = Z(Y=3) for poor category households.
Opportunity Z4 = Z(Y=4) for households in the near-poor category.
Opportunity Z5 = Z(Y=5) for sufficient category households.
Opportunity Z6 = Z(Y=6) for households in the decent living category.
Pi: The opportunity to determine the level of household welfare if Xi is known.
α: Intercept.
β − β8: Regression coefficient (i = 1, 2, 3, 4, 5, 6, 7, 8).
X_1: Age (Year).
X_2: Education (Year).
X_3: Family members (Person).
X_4: Duration in palm oil farming (Year).
X_5: Land acreage (ha).
X_6: Palm oil income (Rp).
X_7: Household income (Rp).
D_1: Farming pattern: 0 = Independent; 1 = Partnership.
μ: *Error term.*

3. RESULT AND DISCUSSION

3.1. Farmers Characteristic

The pattern of people's palm oil cultivation in Lampung Province is that 50.34 percent are partner farmers and the remaining 49.66 percent are independent farmers. Independent palm oil farmers are spread across Central Lampung, South Lampung, Pesisir Barat, Way Kanan, Tulang Bawang, and Mesuji Districts, with a total of 295 households. The largest independent palm oil farmers are in Central Lampung Regency, namely 33.22 percent.

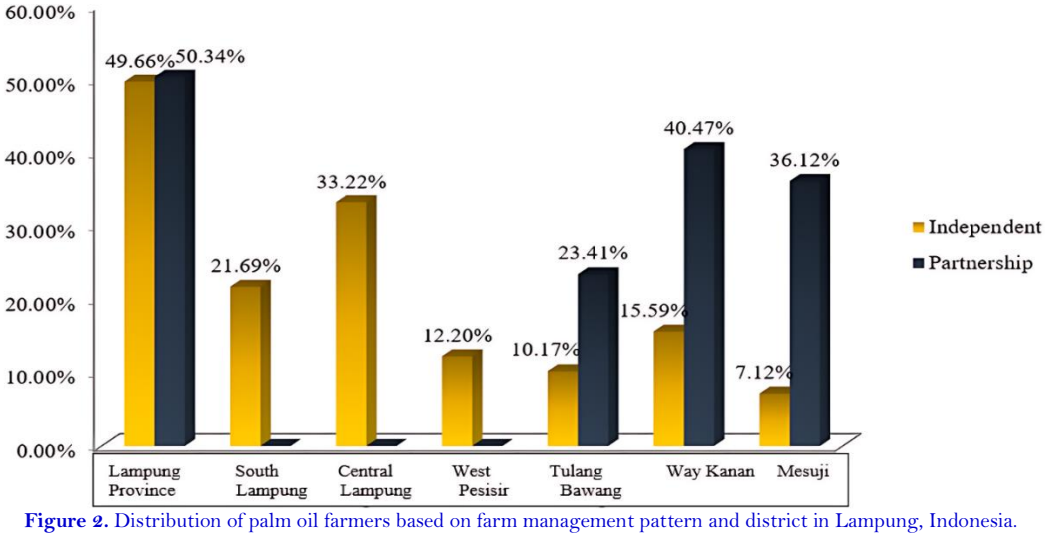

Figure 2. Distribution of palm oil farmers based on farm management pattern and district in Lampung, Indonesia.

Partnership pattern of palm oil farmers in Lampung Province is only found in three districts, Tulang Bawang, Mesuji, and Way Kanan, and totals 299 farmers, with the largest percentage being in Way Kanan District (40.47%). These three districts have a greater number of partner palm oil farmers than independent palm oil farmers. Figure 2 illustrates the distribution of palm oil farmers in Lampung Province who operate both independent and partner businesses.

Table 2 presents the farmer's age, education level, family member, farming duration, and land area of palm oil plantation. The average age of palm oil cultivation is 24.52 years. The majority (81.80 percent) were in the 22-31 year range. In fact, the productive life of palm oil is only 25 years. However, palm oil is still one of the commodities that farmers rely on to meet their household needs.

Table 2. Characteristics of smallholder palm oil farmers in Lampung province.

Characteristics	Pattern of farming	
	Independent	Partenership
Farmer age (Year)	56	57
Education level	Elementary school	Elementary school
Family members (Persson)	4	3
Farming duration (Year)	23	25
Palm oil land acreage (Ha)	1.01	0.98

The majority of palm oil farmers in Lampung Province are still in the productive age range, with an average of 57 years for partnership pattern farmers and 56 years for independent farmers. In accordance with what Manyamsari and Mujiburrahmad (2014) stated, the age group 15–64 years is classified as a productive group for work in producing goods and services.

The education level of palm oil farmers in Lampung Province varies in seven levels, namely no school, elementary school, middle school, high school, D2, D3, and S1. The majority (59.76 percent) of both independent and partner farmers have an elementary school education. According to Pranomo and Yuliawati (2019), a person's level of education influences a person's ability to accept new innovations, as well as influencing farming activities. Economic factors were one of the things that caused palm oil farmers not to receive education at that time.

The number of dependents influences the size of the farmer's household expenses. On the other hand, if family dependents are of productive age and help in farming activities, this will reduce the use of labor outside the family, thereby reducing the costs of palm oil farming. The responsibilities of independent and partner farming families are not much different. Most of the dependent families of independent palm oil farmers are 4 people, while partner farmers are 3 people.

The farming experience of palm oil farmers can influence their success in farming. The experiences of independent and partner farmers are not much different. The average experience of independent farmers is 23 years, while that of partner farmers is 25 years. The average area of palm oil land cultivated is 0.99 ha, with a range between 0.13 ha and 2.00 ha. The average land area for independent farmers is 1.01 ha, while for partner farmers it is 0.98 ha. It turns out that palm oil farmers with independent business patterns have slightly larger areas of palm oil land than partner palm oil farmers. The results of the study by Moeis, Dartanto, Moeis, and Ikhsan (2020) show that agricultural land is an important asset for agricultural households in addition to its role as the main production factor in the agricultural sector.

Apart from palm oil farming, household income for palm oil farmers also comes from other sources of income, such as non-palm oil farming income, off-farm income, and non-farm income. All of these sources of income have an important role in helping palm oil farmers to meet their household needs. Table 3 displays the distribution of household income contributions from palm oil farmers in Lampung Province.

Table 3. Distribution of contribution to household income of palm oil farmers in Lampung province.

Component	Independent		Partnership	
	(Rp/Thn)	(%)	(Rp/Thn)	(%)
Palm oil incomes	7,056,525	18.56	10,097,087	21.33
Farming incomes exclude palm oil	14,506,922	38.15	20,766,693	43.87
Household off farm incomes	5,899,356	15.52	4,240,535	8.96
Household non-farm incomes	10,559,661	27.77	12,237,793	25.85
Total household incomes	38,022,464	100.00	47,342,108	100.00

Table 3 showed that the largest contribution to household income of palm oil farmers in Lampung Province comes from farming income other than palm oil, namely 38.15 percent for independent farmers and 43.87 percent for partner farmers. The contribution to income from palm oil farming for both independent farmers and partner farmers is only in third place. This is in line with research by Ismono et al. (2019) that, although palm oil farming is the main livelihood, it is not the largest contributor to the household income structure of palm oil farmers in Lampung Province. Mehraban, Kubitza, Alamsyah, and Qaim (2021) said that palm oil farmers engage in more non-agricultural activities that help facilitate income and fulfill consumption needs. The low percentage contribution of palm oil farming income to household income is due to the relatively old age of palm oil plants, namely an average of 24.52 years old. The old age of palm oil plants has an impact on decreasing production levels. This decrease in production will affect the revenue and income of palm oil farming. Research by Aristiyani, Arifin, and Lestari (2021) concluded that palm oil farming

income in the plant age group of 22-25 years had the lowest income because the palm oil plants were old and less productive.

3.2. The Level of Welfare of Palm Oil Farmer's Households

Figure 3 clarifies that the normal add-up to consumption of free agriculturist family units in Lampung Territory is IDR 28,257,944 per year, whereas that of accomplice agriculturists is IDR 26,535,683 per year. The share of nourishment consumption by free agriculturists and accomplice ranchers is 49.40 percent and 49.36 percent, respectively. The non-food use offers of autonomous agriculturists and accomplice ranchers are 50.60 percent and 50.64 percent, respectively. So, the share of non-food consumption is more prominent within the add-up to family consumption structure. The families with a high level of welfare will be able to meet their needs not as it were for nourishment, but moreover for non-food things (Praza & Shamadiyah, 2020). This is often comparable to what applies to Engel's Law, that the extent of add-up-to-consumption apportioned to nourishment will diminish with expanding wages.

If we look at the percentage of food and non-food expenditure, independent and partner palm oil farmers are prosperous families because their food expenditure is smaller than their non-food expenditure. If a household can meet its non-food needs, it will undoubtedly meet its food needs as well. This is because the greater the non-food expenditure, the more guaranteed the availability of food needs.

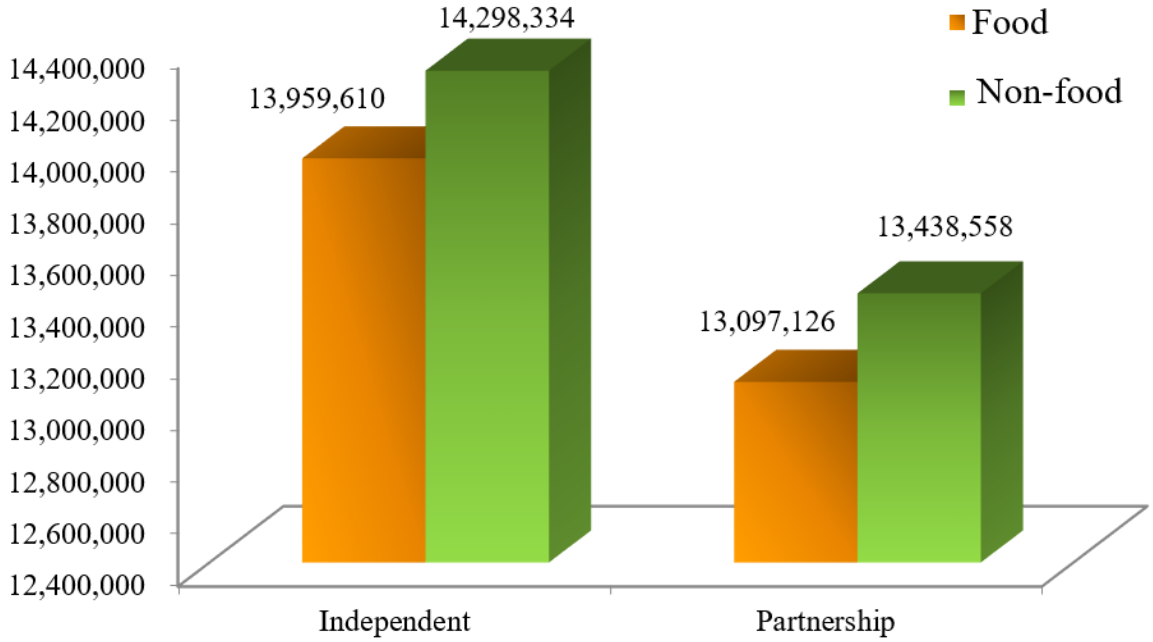

Figure 3. Food and non-food expenditure of palm oil farmers in Lampung province.

Furthermore, based on Sajogyo (1997) criteria, the level of welfare of palm oil farmer households in Lampung Province is presented in Figure 3. It can be seen in Figure 3 that the majority of palm oil farmers are in the sufficient group (54.24 percent) for independent farmers and 47.49 percent for partner farmers. For the decent living category, the number of independent farmers and partner farmers is the same, namely 25.08 percent. So there are 79.32 percent of independent farmers and 72.57 percent of partner farmers in Lampung Province who are classified as prosperous. This is due to the diversity of income sources for households, so that the total income generated is able to meet household needs, both food and non-food.

However, in Figure 4, it can also be seen that there are farmers in the categories of almost poor, poor, very poor, and even the poorest, although only 20.68 percent for independent farmers and 27.43 percent for partner farmers. This shows that there are still quite a lot of independent and partner farmers who are not yet prosperous.

In general, the results of this research are in line with Yanti, Nuraerni, and Rasyid (2022) who found that the level of welfare of palm oil farmer households in Pebatae Village is classified as a prosperous household. This result is also in line with Lalita, Ismono, and Prasmatiwi (2019) who found that for both palm oil farmers who have small, medium, and large areas of land in Lampung Province, the majority (62.39 percent) are in the sufficient category.

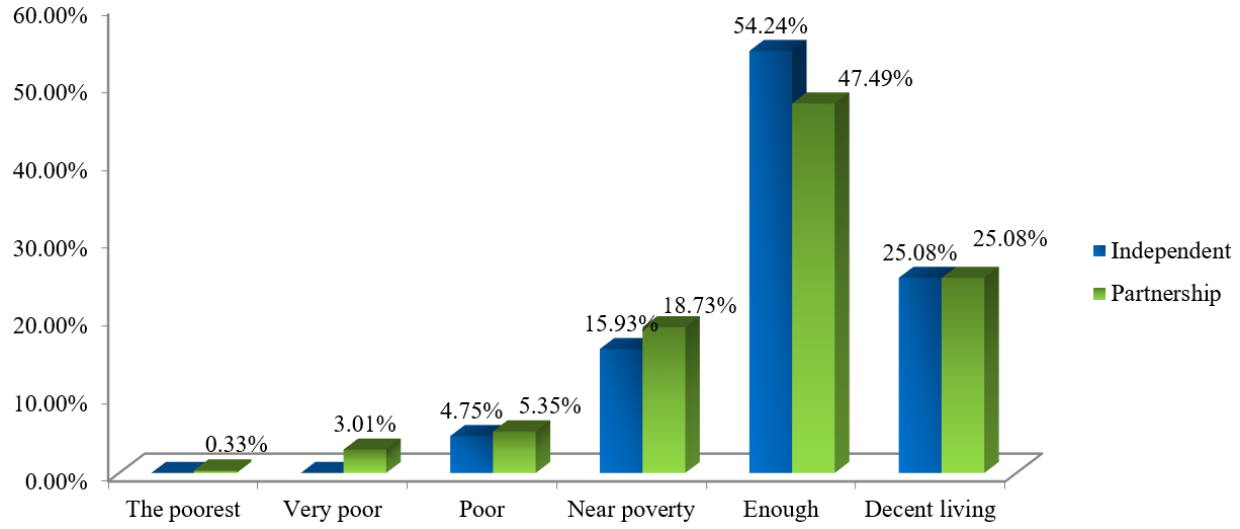

Figure 4. Distribution of farmer welfare in Lampung province according to Sajogyo criteria.

3.3. Factors that Influence the Level of Welfare of Palm Oil Farmer Households

The Parallel Lines Test results show that the Chi-Square value is 58.374, which means the slope coefficient is the same for all response variables with a confidence level of 99 percent (Table 4). Furthermore, the simultaneous test results show that the Chi-Square value is 68.457 with a confidence level of 99 percent. These results show that there is a decrease in the -2 Log Likelihood value from Intercept Only to Final, namely 1448.963 to 1380.506, with a confidence level of 99 percent (Table 5). This means that a model with independent variables is better than a model with only an intercept, so it can be concluded that the regression model formed is a fit model.

Table 4. Test results of parallel lines.

Model	-2 log likelihood	Chi-square	df	Sig.
Null hypothesis	1380.506			
General	1312.132[b]	58.374[c]	32	0.000

Note: b: Significant level at α 0,01; c: Significant level at α 0,05

Table 5. The model fitting information.

Model	-2 log likelihood	Chi-square	df	Sig.
Intercept only	1448.963			
Final	1380.506	68.457	8	0.000

Table 6. Pseudo R-square result

Indicator	R-square
Cox and Snell	0.109
Nagelkerke	0.119
McFadden	0.047

Testing the coefficient of assurance utilizing a few strategies appears that the Nagelkerke score gives the biggest esteem compared to others, specifically 0.119 (Table 6). This implies that 11.90 percent of the variety in openings for palm oil agriculturist family units to realize family thriving can be clarified by the factors of age, final instruction, number of family dependents, length of palm oil cultivating, range of arrive developed, salary from palm oil cultivating, family pay., and palm oil development designs, whereas the remaining 88.10 percent is clarified by other factors not included within the show.

The parameter estimation comes about for components that impact the welfare of palm oil cultivating family units in Lampung Territory and is displayed in Table 7.

Based on Table 7, it showed that the age of palm oil ranchers incorporates a negative impact on the openings for palm oil agriculturists to move forward family welfare with a certainty level of 99 percent. The chances proportion esteem of 0.98 demonstrates that for every one year the age of palm oil farmers increases, the opportunity for palm oil agriculturists to realize thriving diminishes by 0.98 times. More seasoned agriculturists don't essentially have superior information than more youthful agriculturists.

Ryan, Prihtanti, and Nadapdap (2018) expressed that agriculturists of profitable age will work way better than ranchers of non-productive age. Sumekar, Prasetyo, and Nadhila (2021) expressed that ranchers of beneficial age ordinarily have adequate capacity and vitality and are simple to get it and assimilate data and innovation.

Table 7. Parameter estimation results for factors that influence the welfare of palm oil farming households in Lampung province.

Variables		Estimate	Std. error	Wald	df	Sig.	95% confidence interval	
							Lower bound	Upper bound
Threshold	[Y = 1]	-6.762	1.218	30.796	1	0.000	-9.150	-4.374
	[Y = 2]	-4.429	0.760	33.997	1	0.000	-5.918	-2.940
	[Y = 3]	-2.960	0.708	17.486	1	0.000	-4.347	-1.573
	[Y = 4]	-1.414	0.693	4.157	1	0.041	-2.773	-0.055
	[Y = 5]	1.027	0.691	2.208	1	0.137	-0.328	2.382
Characteristics	Age ($X1$)	-0.021***	0.007	7.695	1	0.006	-0.035	-0.006
	Education (X_2)	-0.004	0.028	0.019	1	0.890	-0.059	0.051
	Family members (X_3)	0.104	0.064	2.632	1	0.105	-0.022	0.230
	Farming duration (X_4)	-0.004	0.018	0.055	1	0.814	-0.040	0.032
	Land acreage (X_5)	0.147	0.196	0.564	1	0.452	-0.237	0.532
	Palm oil incomes (X_6)	0.026***	0.012	4.455	1	0.035	0.002	0.050
	Household incomes (X_7)	0.014***	0.003	23.583	1	0.000	0.008	0.020
Component	Pattern farming management (D_1)	-0.416***	0.166	6.310	1	0.012	-0.740	-0.091

Note: ***= Significance α = 0.01.

Furthermore, the regression model based on Table 5 as follows.

$$Y_1 = -6.762 - 0.021X_1 - 0.004X_2 + 0.104X_3 - 0.004X_4 + 0.147X_5 + 0.026X_6 + 0.014X_7 - 0.0416D_1$$
$$Y_2 = -4.429 - 0.021X_1 - 0.004X_2 + 0.104X_3 - 0.004X_4 + 0.147X_5 + 0.026X_6 + 0.014X_7 - 0.0416D_1$$
$$Y_3 = -2.960 - 0.021X_1 - 0.004X_2 + 0.104X_3 - 0.004X_4 + 0.147X_5 + 0.026X_6 + 0.014X_7 - 0.0416D_1$$
$$Y_4 = -1.414 - 0.021X_1 - 0.004X_2 + 0.104X_3 - 0.004X_4 + 0.147X_5 + 0.026X_6 + 0.014X_7 - 0.0416D_1$$
$$Y_5 = 1.027 - 0.021X_1 - 0.004X_2 + 0.104X_3 - 0.004X_4 + 0.147X_5 + 0.026X_6 + 0.014X_7 - 0.0416D_1$$

Palm oil farming income has a real and positive effect on palm oil farmers' opportunities to improve household welfare with a confidence level of 95 percent. The odds ratio value of 1.03 indicates that every time there is an increase in palm oil income by one thousand rupiah, the opportunity for palm oil farmers to improve household welfare will increase by 1.03 times. This is in line with research by Wahyudi, Sissah, and Ifazah (2023) which concluded that income has a positive effect on the level of welfare of palm oil farmers.

The household income of palm oil farmers has a real and positive effect on the opportunities for palm oil farmers to improve household welfare with a confidence level of 99 percent. The odds ratio value of 1.01 indicates that every time there is an increase in the household income of palm oil farmers by one thousand rupiah, the opportunity for palm oil farmers to improve household welfare will increase by 1.01 times. Similar results were obtained by Oleh (Alhudhori & Amali, 2020) who found household income had a positive and significant effect on the welfare of families of palm oil farmers in Muaro Jambi Regency. This supports Chrisendo, Siregar, and Qaim (2022) who stated that palm oil cultivation can improve living standards and human resource formation in small farmer households.

Palm oil cultivation patterns have a negative effect on palm oil farmers' opportunities to improve household welfare with a confidence level of 95 percent. The odds ratio value of 0.66 indicates that partner farmers have a 0.66-time chance compared to independent farmers to improve household welfare. The independent palm oil cultivation pattern has a higher chance of increasing household welfare when compared to the partner palm oil cultivation pattern. Ismono et al. (2019) stated that the lower income of partner farmers compared to independent farmers is due to poor implementation of partnerships, especially in terms of transparency in profit sharing and costs incurred by large companies.

Recent education, number of family dependents, length of palm oil farming, and land area do not have a significant effect on opportunities to improve the welfare of palm oil farmers. The education level of palm oil farmers in Lampung Province is mostly elementary school (ES). This more varied and relatively low level of education means that its influence on the level of household welfare is not real. Pranata, Widjaya, and Silviyanti (2020) state that education has no guarantee of increasing crop yield, which can directly affect the welfare of farming households and also revealed that the farmer's education level has no effect on the amount of income they earn.

The number of family dependents you have got will decide the family's needs. As the number of family members increases, the family's needs become more pressing. Welfare can diminish due to the expansive consumption of people in a family. The huge number of family obligations, without being met with by an increment in pay, can decrease the level of welfare of agriculturists (Pratama, Zulfanetti, & Umiyati, 2021). In differentiating to Pratama's investigation, this ponder found that the number of family dependents had no real impact on the opportunity to extend the welfare of palm oil agriculturists. Most of the subordinate families of palm oil agriculturists in Lampung Area are, as it were, four individuals. Seeing this, the number of family dependents possessed by palm oil agriculturists in Lampung Area is moderately low with less assortment, so it does not influence the welfare of agriculturist family units.

The length of farming does not have a significant effect on the opportunity to increase the welfare of palm oil farmers. A farmer's experience in palm oil farming does not guarantee the farmer's success in producing palm oil. The length of experience in palm oil farming, which is not accompanied by the use of technology and innovation in palm oil

farming, can have an impact on the resulting palm oil production. This is in line with Hendrayana, Kurniati, and Kusrini (2020), who stated that rubber farmers' farming experience does not have a significant effect on farmers' welfare.

Land area is a production factor that is used as arable land for farming production. The amount of land cultivated by farmers should influence the production obtained. However, the results of this study found that land area had no real effect on the opportunity to increase the welfare of palm oil farmers because the sample of farmers was limited to farmers with a maximum of 2 ha of land with an average of 0.99 ha, so there was less variation.

4. CONCLUSION

Indonesia must continue to fight against the negative issue of oil palm deforestation because, on the other hand, it is proven that the majority of smallholder oil palm farmers in Lampung Province with limited land and old plantations, both with independent and partner business patterns, are in the adequate category and live a decent life or prosper. Oil palm farming income and household incomes of oil palm farmers have the opportunity to increase welfare, while the age of farmers has the opportunity to reduce welfare. The independent business pattern has a higher chance of improving welfare than the partner business pattern.

Funding: This research is supported by Palm Oil Plantation Fund Management Agency (Grant number: PRJ-74/DPKS/2018).
Institutional Review Board Statement: The Ethical Committee of the Lampung University, Indonesia has granted approval for this study on 13 March 2018 (Ref. No. PRJ-74/DPKS/2018).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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