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Price fluctuations of curly red Chilli and their effects on farmers' welfare in Pringsewu regency, Lampung: The influence of government policy and household income

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Abstract: This research aims to analyze the income levels and overall welfare of households engaged in curly red chili farming in Pringsewu Regency, Lampung Province. The location was specifically selected because Pringsewu is a key center for curly red chili production in the area. Fifty-eight respondents were chosen through simple random sampling methods. Data was collected between October and November 2023. The analysis methods employed include assessments of household income and welfare levels. Information was gathered through interviews with curly red chili farmers using structured questionnaires. The study revealed that the average annual household income for these farmers is IDR 64,469,509.97. This income is primarily derived from core on-farm activities (65.03%), followed by supplementary on-farm sources (26.09%), off-farm sources (3.25%), and non-agricultural sources (5.63%). In terms of welfare, the majority of the farmers' households (70.69%) are considered to have a decent standard of living, while 29.31% are classified as having a moderately decent standard of living.
Keywords: *Household income, Household welfare level, Nonfarm income, Offfarm income, Onfarm income.*

1. Introduction

The agricultural sector plays a vital role in Indonesia's economy, making substantial contributions to both the Gross Domestic Product (GDP) and the nation's food security. It also serves as a key driver in the country's export market. With a range of production methods from small-scale subsistence farming to large commercial plantations, the sector supports a diverse selection of export commodities [1]. Despite facing global challenges such as the energy crisis stemming from the Russia-Ukraine conflict and the economic fallout from the COVID-19 pandemic, agriculture in Indonesia has shown strong resilience. Based on data from Badan Pusat Statistik Provinsi Lampung [2] agriculture contributed 12.40% to Indonesia's GDP in 2022, reinforcing its status as a cornerstone of national economic growth, especially in rural areas. This resilience is evident in the sector's ability to sustain moderate growth even as other industries experienced declines during global economic disruptions [3].

Horticulture, especially the cultivation of curly red chilli (Capsicum annuum L), represents an important subsector of Indonesia's agricultural industry, offering considerable economic benefits [4]. Curly red chilli is in high demand for household consumption, export purposes, and the food processing industry, playing a notable role in driving economic activity [4, 5]. This crop is considered a vital commodity due to its ability to be grown throughout the year during both dry and rainy seasons and its strong demand in both domestic and global markets [6]. In Lampung Province, especially in Pringsewu

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Regency, curly red chilli production reaches significant volumes. As one of the main production centers in the region, Pringsewu contributes meaningfully to food security and supports the local economy [2].

Local government initiatives, like the Simultaneous Movement to Plant Chilli (Gertam Cabai), were implemented to enhance chilli production and lessen reliance on external sources and imports [7]. However, this initiative has yet to fully achieve its intended goals, particularly in meeting local demand and ensuring price stability. Studies have shown that the Gertam Cabai program has had minimal impact on the amount of chilli purchased by households. Several challenges have been identified, including a mismatch between the chilli varieties distributed and consumer preferences, as well as a high rate of plant failure [8]. These findings suggest that efforts to control inflation by increasing chilli production face significant obstacles and require more in-depth evaluation and improvement.

The government has made efforts to reduce fluctuations in chilli prices, notably through the implementation of reference pricing policies. However, this strategy has been considered ineffective in curbing price volatility [9]. Chilli prices often experience sharp fluctuations, with drops of up to IDR 20,000 per kilogram and spikes reaching IDR 30,000 per kilogram, which significantly impact farmers' incomes. These price swings not only influence consumers' purchasing power but also directly affect the financial stability and welfare of chilli farmers. To address this, the government has introduced import programs aimed at cushioning the impact of extreme price changes and stabilizing the local market. While this policy may benefit both consumers and producers, its actual effectiveness in improving farmers' welfare requires further evaluation [10].

The income of households involved in chilli farming is influenced not only by revenue from farming activities but also by additional income from non-agricultural sources, such as off-farm and non-farm earnings. Diversifying income streams is vital for improving household welfare. Seasonal fluctuations in farm income can disrupt household expenditures and savings. To cope with these challenges, many households adopt adaptive strategies such as seasonal migration or taking up alternative jobs [11, 12]. Studies have shown that increasing non-farm income can notably alleviate poverty and enhance household consumption, as evidenced by research conducted in Uganda [13]. Therefore, effective management and diversification of income sources can improve the economic resilience of farming households despite the volatile nature of agricultural earnings.

Moreover, asset ownership plays a crucial role in supporting farmer welfare. Productive assets such as land, farming tools, and modern technologies empower farmers to better navigate economic challenges and improve their incomes. A study in Nigeria found that households with higher asset ownership experienced better welfare outcomes and stronger resilience against economic disruptions [14]. Asset accumulation is closely linked to the sustainability of farming operations and the overall quality of life of farmers. Given the ongoing challenges in chilli farming, there is a need for targeted research to evaluate the welfare of chilli farmers in Lampung Province. This study seeks to examine the income levels and overall wellbeing of curly red chilli farmers in Pringsewu Regency, Lampung Province.

2. Materials and Methods

2.1. Site and Research Period

This study was conducted in Pringsewu Regency, chosen specifically because it is a key production hub for curly red chilli in Lampung Province. Data collection took place between October and November 2023.

2.2. Research Procedure

The study employed a survey approach, selecting participants via simple random sampling. The sample size was determined using the Slovin formula [15]:

$$N = \frac{\lambda^2.N.P.Q}{}$$

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$$d^2.(N-1) + \lambda^2.P.Q$$

Information:
n = Number of samples
λ = Trust level (90% = 1,645)
N = Number of population (387 farmers)
d = Degree of deviation (10% = 0.10)
P = Chance of being correct (0.5)
Q = False chance (0.5)
Using the Slovin formula for calculation, a total of 58 curly red chilli farmers were chosen as the sample.

2.3. Data Analysis

This study drew on both primary and secondary data sources. Primary data was collected through field research, while secondary data was sourced from relevant literature, including previous studies, books, academic journals, and institutional records such as those from BPS and the Pringsewu Regency Agriculture Office. Data was collected through direct interviews with curly red chilli farmers, using structured questionnaires.

a. Analysis of Farming and Household Income of Curly Red Chilli Farmers

Income was calculated by subtracting the total production costs from the total revenue generated during one growing season of curly red chilli. Income from chilli sales depends on market prices and the amount of produce harvested. Total production costs include both fixed and variable components, covering expenses for seeds, fertilizers, labor, and pest control measures [16-18]. According toShinta [19] the formula applied to calculate income from curly red chilli farming is as follows:

$$\pi = TR - TC$$
$$\pi = Y.P_y - \Sigma X_i.Px_i - BTT$$

Information:
π = Curly red chili farming income (Rp)
Y = Production amount (kg)
Py = Unit price of production (Rp)
X = Production factor (unit)
Px = Price of production factor (Rp/unit)
BTT = Total fixed fee (IDR)

Based on Soekartawi [20] the comparison between farm revenues and costs was analyzed using the R/C ratio analysis, calculated using the following formula:

$$R/C = \frac{TR}{TC}$$

Information:
R/C = Ratio of receipts and fees
TR = Total revenue or total revenue (Rp)
TC = Total cost (Rp)

If the R/C (Revenue-Cost) ratio is greater than 1, it indicates that cultivating curly red chilli is profitable and worth pursuing. An R/C ratio below 1 signifies a loss, while a value of exactly 1 means the farmer is breaking even.

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The analysis of household income for curly red chilli farmers aims to determine the structure and total amount of income earned by farming families in Pringsewu Regency. Household income is calculated by summing all revenue sources, both from agricultural and non-agricultural activities. Most of the income earned by farmers originates from farming and livestock, with non-agricultural income playing a relatively minor role [21, 22]. However, income from non-farming activities has been shown to significantly improve household welfare, including positive impacts on poverty reduction and consumption levels, as observed in Uganda [13]. This underscores the importance of income diversification in improving the wellbeing of farming households. The formula used to calculate household income is as follows [23]:

Prt = P farming of curly red chili (on farm main) + P farming other than curly red chili (on farm not main) + P non-farming (off farm) + P non-farm (non-farm)

Information:
P_rt = Farmer's household income (IDR)
P red chili farming = Income from curly red chili farming (main on farm) (IDR)
P farming other than red chili = Income from farming other than curly red chili (on farm not main) (IDR)
P non-farming = Income from non-farming activities (off farm) (IDR)
P outside farm = Income from non-farm (IDR)

b. Analysis of the Household Welfare of Curly Red Chili Farmers

To assess the welfare of farming households, the criteria outlined by Sajogyo [24] were applied to evaluate the well-being of curly red chilli farmers in Pringsewu Regency. This evaluation centered on measuring the satisfaction of daily, weekly, monthly, and yearly needs. The total household expenditure is defined as follows:

$$C_t = C_a + C_b$$

Information:
C_t = Total household expenditure of curly red chili farmers (IDR/year)
C_a = Expenditure on food (IDR/year)
C_b = Expenses for non-food (IDR/year)

Annual per capita household expenditure is converted into its rice equivalent (in kilograms) to assess the welfare level of farmers. According to Sajogyo [24] a household is considered affluent if its rice consumption surpasses 960 kilograms per person per year. The calculation of per capita annual expenditure and its rice equivalent can be expressed through the following formulas:

$$Expenditure/capita/year = \frac{\text{Household expenditure/year (IDR)}}{\text{Number of family dependents (people)}}$$

$$\frac{\frac{Expenditure}{capita}}{year\ equivalent\ to\ rice\ consumption\ (Kg)} = \frac{\text{expenditure/sapita/year (IDR)}}{\text{Rice price (IDR/kg)}}$$

According to the classification (Sajogyo, 1977), welfare criteria are grouped into six groups:
1) The poorest : 180 kg of rice equivalent/year
2) Very poor : 181–240 kg of rice equivalent/year
3) Poor : 241–320 kg of rice equivalent/year
4) Almost poor : 321–480 kg of rice equivalent/year
5) Enough : 481–960 kg of rice equivalent/year
6) Decent living : >960 kg of rice equivalent/year

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3. Results and Discussion

The results and discussions covered various aspects of the respondents' characteristics, such as land size, farmers' age, farming experience, number of household dependents, highest educational attainment, secondary occupations, and land ownership status. The study also examined the diverse types of curly chilli farming enterprises, focusing on farm income, household revenue, and an evaluation of the welfare of curly red chilli farming households.

3.1. Characteristics of Respondent Farmers

The following table provides a summary of the attributes of the farmers involved in the study.

Table 1.
Characteristics of red chili farmers in Pringsewu Regency, Lampung Province.

Characteristis	Average	Standard Deviation
Land area (ha)	0.35	0.18
Age (year)	44.12	9.60
Farming experience (Year)	14.36	9.10
Family dependents (people)	3	0.67
Educational qualification	Junior High School	
Side Jobs	None	
Status of land ownership	Owner	

Based on the data in Table 1, most of the curly chili farmers in Pringsewu District have quite a long farming experience, and their average age shows that they are in the productive age range. This means that these farmers are experienced enough and are still at an active age to work. In addition, most curly chili farmers manage relatively small farms. While larger farms generally generate higher incomes, they also require higher costs. Farmers who own small plots of land tend to spend most of their income on meeting basic needs (such as food and daily necessities). On the other hand, farmers with larger landholdings tend to use part of their income to purchase durable goods (such as household appliances, vehicles, or other investments) and for social activities, such as participating in community events or activities [25, 26]. Most farmers have only completed junior high school, reflecting a lower level of education. Those with higher educational qualifications are more likely to adopt innovative farming practices and engage in commercial farming, which can boost their income [27]. The absence of secondary employment for most farmers indicates that agriculture is their main source of income, reflecting a primary focus on farming with few additional resources.

3.2. Performance of Curly Red Chili Farming

The curly red chilli planting pattern in Pringsewu Regency occurs annually, with a duration of around 7-8 months. Chilli farming begins in the rainy season around October and ends between April and May. After the chilli harvest season is over, farmers typically plant other crops such as food crops (e.g., rice or corn) or horticultural plants (such as vegetables and fruits) on the same land.

In terms of crop rotation, most farmers in the region opt to plant corn after the chilli season ends. Around 32.76% of farmers in Pringsewu Regency practice crop rotation with corn. This rotation is essential for maintaining soil fertility and preventing a decrease in yield from planting the same crops continuously on the same land. By alternating different types of crops, farmers can maximize land use and improve the sustainability of their farming practices.

Curly red chili farmers in Pringsewu Regency typically use Kitavi F1 hybrid seeds, applying an average of 102.30 grams per hectare. In terms of fertilization, farmers use a mixture of manure, urea, NPK, SP-36, and solid organic fertilizers, with approximately 18,203.61 kg of manure applied per hectare. Despite heavy reliance on chemical fertilizers and pesticides, the high costs and environmental impacts have led farmers to seek alternatives such as organic fertilizers and biopesticides [28, 29]. The rising prices of fertilizers and pesticides are negatively affecting farmers' profits and decision-making.

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The increase in fertilizer prices, particularly phosphates, has led to reduced usage and changes in crop production practices [30]. urthermore, nutritional deficiencies in crops may hinder productivity, highlighting the need for more efficient agricultural practices and better resource management [31].

Most curly red chilli farmers in Pringsewu Regency rely on liquid pesticides to control pests and diseases on their crops, with an average usage of approximately 11.26 liters per hectare. Additionally, they use silver-black plastic mulch (MPHP) at an average rate of about 146.62 kg per hectare to help maintain soil moisture, reduce weed growth, and increase soil temperature, which supports plant growth. In addition to chemicals, farmers have also started applying biofertilizers and biogas sludge, which have been proven to enhance plant growth and increase capsaicin content in curly red chillies [32]. When applied in appropriate amounts, these organic fertilizers can improve plant health and productivity, which is essential for the success of annual farming practices. However, these seasonal farming efforts are challenged by issues like climate change and unpredictable weather, which pose significant risks to production [33]. As a result, effective planning and risk management are crucial for maintaining profitability in curly red chilli farming.

Farmers also use various farming tools, including raffia ropes and yarn, with an average usage of 17,206.90 yarn rods and 36.77 rolls of raffia rope per hectare. Most of the labor during harvest is outsourced, with an average of 110.97 HKP per hectare. Agricultural machinery, such as sprayers, tends to have the highest depreciation, with an average useful life of about six years.

a. Analysis of Farm Income and Curly Red Chili Farmer Households

3.3. Farming Income

In 2023, the curly red chilli yield in Pringsewu Regency is projected to reach 7,970.76 kg per hectare, with an average market price of IDR 23,921.57 per kg. This translates to an estimated farmer income of IDR 178,680,049.26 per hectare. The highest yield occurred during the 8th harvest, reaching 1,040.14 kg per hectare, followed by a decline in subsequent harvests. Elevated temperatures can significantly impact chilli production, with temperatures exceeding 32.86°C causing a 50% reduction in yield, and exposure to 39°C potentially leading to a decline of up to 87.52% [34].

Harvest timing and pruning techniques are crucial factors that influence both the yield and quality of the fruit. The highest yield was observed approximately 164.83 days after planting, with pruning helping to enhance the spiciness and overall quality of the fruit [35]. Methods like choosing suitable seedbeds, properly preparing the soil, and employing specialized planting techniques can improve fruit set rates, minimize diseases, and ultimately increase yields [36].

The agricultural success is evaluated using the Revenue to Cost Ratio (R/C), which assesses the relationship between income and costs. The results presented in Table 2.

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Table 2.
Income analysis of curly red chili farming in Pringsewu Regency, 2023.

No	Description	Farming per 0,35 ha Total Value (IDR)	Farming per 1 ha Total Value (IDR)
1	Total Admissions	62.538.017,24	178.680.049,26
2	Production Cost		
a.	Cash Fee		
	Variable Costs		
	Seed	463.103,45	1.323.152,71
	Seed	2.331.751,56	6.662.147,32
	Ajir	2.152.155,17	6.149.014,78
	Raffia rope	96.000,00	274.285,71
	Silver mulch	1.708.017,24	4.880.049,26
	Urea fertilizer	19.189,66	54.827,59
	Pearl NPK fertilizer	1.613.275,86	4.609.359,61
	NPK phonska fertilizer	371.137,93	1.060.394,09
	SP36 Fertilizer	282.241,38	806.403,94
	Dolomite lime fertilizer	709.551,72	2.027.290,64
	Manure (Kohe)	2.566.810,34	7.333.743,84
	MPK Fertilizer for Farmers	19.706,90	56.305,42
	Fertiphos fertilizer	89.310,34	255.172,41
	Organic fertilizer (solid)	68.706,90	196.305,42
	Liquid organic fertilizer EM4	34.965,52	99.901,48
	Pesticide costs	5.936.155,17	16.960.443,35
	Kindergarten outside the family	3.443.453,82	9.838.439,49
	Sack cost	62.172,41	130.049,26
	Fixed Fees		
	Land lease	2.333.333,33	8.809.523,81
	Tax	47.829,31	136.655,17
	Electricity costs	159.583,33	455.952,38
	Farmer group contributions	25.000	71.428,57
	Total Cash Charges	25.283.451,36	72.238.432,47
b.	Cost Calculated		
	Variable Costs		
	Kindergarten in the family	2.446.837,80	6.990.965,13
	Fixed Fees		
	Shrinkage of the tool	453.206,43	1.294.875,51
	Land lease	3.171.153,85	9.060.439,56
	Total Costs Calculated	6.071.198,07	17.346.280,21
c.	Total Cost	31.354.649,44	89.584.712,67
3	Revenue on cash costs	41.922.130,66	119.777.516,17
	Revenue on total costs	35.952.379,77	102.721.085,06
4	R/C on Cash charges	2,47	2,47
	R/C on Total cost	1,99	1,99

The income from curly red chilli farming in Pringsewu Regency, as detailed in Table 2, shows that revenue from cash expenses is Rp119,777,516.17 per hectare, while the income from total expenses is Rp102,721,085.06 per hectare. The Revenue to Cost Ratio (R/C) analysis reveals an R/C of 2.47 for cash expenses, meaning that for every Rp10,000 spent on cash expenses, the revenue generated is Rp24,700. For total expenses, the R/C is 1.99, indicating that for every Rp10,000 in total costs, the revenue generated is Rp19,900. This is consistent with previous research, such as Rahmadanti, et al. [37] which reported an average income per hectare of Rp273,381,482.57.

The results indicate that curly red chilli farming in Pringsewu Regency is profitable, with an R/C ratio greater than one (R/C > 1), aligning with findings by Maharti [38] who reported an R/C of 2.18

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for cash costs and 1.63 for total costs in Pesawaran Regency. Additionally, Maharti [38] found an R/C ratio of 2.83 for total costs, further supporting the profitability of red chilli farming.

Other studies also emphasize the significant financial benefits of cultivating curly red chilli, enhancing household income and welfare. The R/C analysis suggests that farmers in the region experience relatively high household exchange rates, classifying them as prosperous [37]. Research shows that the R/C ratio for red chilli farming ranges from 1.62 to 2.89, highlighting substantial profitability[38]. Agricultural income is a major factor in household spending, with farmers being classified as wealthy [37].

Income levels are heavily influenced by factors such as land size, labor, and fertilizer expenses, while the costs of seeds and pesticides have a lesser impact [39]. Revenue from curly red chilli farming can fluctuate, often due to pests and diseases that can cause significant crop losses by weakening plant health and reducing overall productivity [22, 40, 41]. Pests, particularly fruit flies (Bactrocera spp.), represent a major threat to curly red chilli crops, leading to lower yields and reduced income [42].

Farmers who implement pest control measures, such as using pullers, tend to see higher revenues compared to those who do not [42]. Climate conditions also play a critical role in crop yields, with rising temperatures, changes in rainfall patterns, and extreme weather events potentially reducing production and increasing vulnerability to pests and diseases [22, 40, 41]. These climatic changes contribute to reduced yields and increased susceptibility to pests and diseases [43, 44].

3.4. Farmer Household Income

The income of curly red chilli farmers in Pringsewu Regency is generated from three key areas: on-farm activities (including the cultivation of curly red chillies, other crops, aquaculture, and livestock), off-farm work (such as agricultural labor, nursery operations, and trading farm products), and non-farm activities (like grocery sales, handicrafts, workshop services, and other types of work). This combination of income sources helps fulfill household needs and enhances the farmers' overall quality of life.

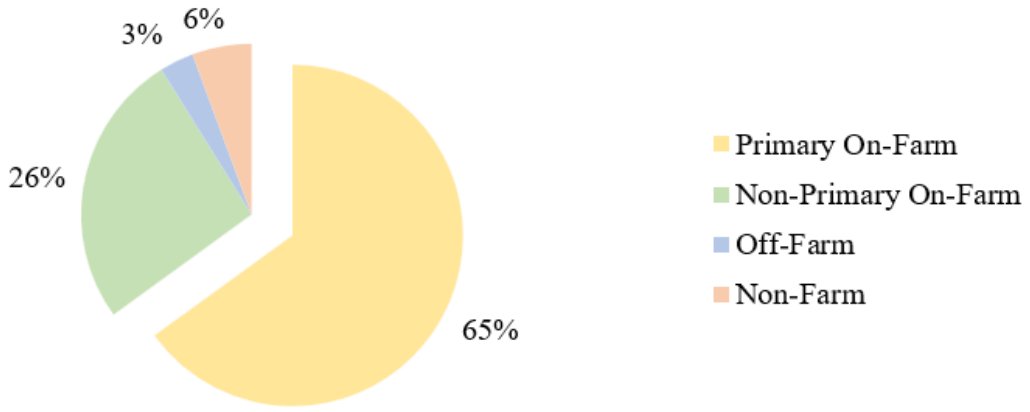

Figure 1.
Distribution of household income percentages among curly red chilli growers in Pringsewu Regency.

The annual household income of curly red chilli farmers in Pringsewu Regency amounts to IDR 64,664,251.51, which averages to IDR 5,372,459.16 per month. The bulk of this income (91.12%) is derived from on-farm activities, which are the farmers' primary focus due to the availability of land and natural resources. These on-farm activities include the cultivation of both curly red chillies and other crops, with curly red chilli farming generating the largest portion of 65.03% (IDR 41,922,130.66 annually), while non-curly red chilli farming contributes 26.09% (IDR 16,821,862.07 annually). Participation in non-agricultural activities can further enhance household income and improve consumption levels.

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The influence of non-agricultural work on household income can differ depending on how many household members participate in these activities [45-47]. However, these activities can also limit the time and labor available for agricultural tasks [48-50]. The significant contribution of agriculture, particularly on-farm activities, to the overall household income of curly red chilli farmers in Pringsewu Regency mirrors findings by Pranata, et al. [51] who noted that most farmers rely on agricultural income rather than non-agricultural sources. This study's findings are consistent with research by Alimah, et al. [39] which showed that red chilli farming contributed 72.16% of total income for farmers in Tegineneng District. Moreover, studies emphasize the strong connection between household income and food security, as many agricultural households struggle with inadequate energy intake, highlighting the importance of improving economic conditions to enhance food security [52].

b. Analysis of the Household Welfare of Curly Red Chili Farmers

3.5. Farmer Household Expenses

Household spending, as defined by Badan Pusat Statistik Provinsi Lampung [2] refers to the expenses for various needs incurred over a period, both monthly and annually. The consumption expenditure approach is the primary indicator used to assess household welfare. The value of household expenditures typically fluctuates based on the income generated from various sources. In situations of limited income, food needs take precedence, resulting in low-income households spending a large share of their income on food.

However, as income increases, spending patterns change, with a reduced share spent on food and a higher allocation for non-food items [7]. Low-income individuals are often more vulnerable to food security issues, as their purchasing decisions are driven by cost considerations rather than safety. Research shows that such individuals may opt for cheaper, potentially unsafe food choices due to financial constraints [53]. Low-income consumers also tend to rely on public distribution systems for food, emphasizing their demand for affordable alternatives. This behavior highlights the need to ensure the availability of affordable food to address food insecurity [54].

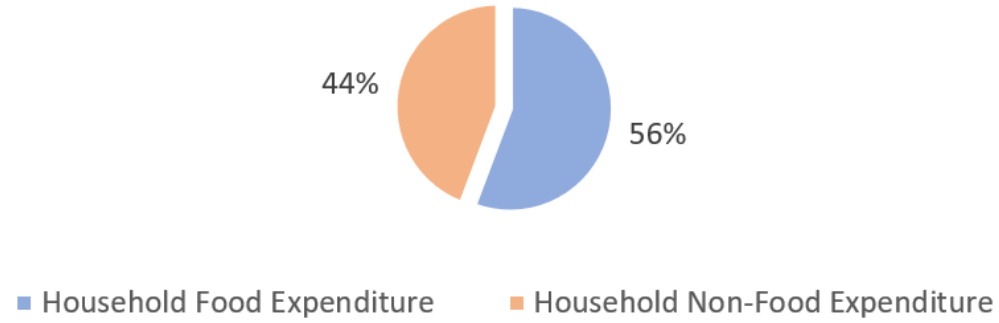

Figure 2.
Distribution of the percentage of household expenditure of curly red chili farmers in Pringsewu Regency.

In Pringsewu Regency, the food expenses of curly red chilli producers surpass non-food expenses, accounting for 55.79% of their total expenditures. This suggests that these farmers devote a higher proportion of their income to food expenses rather than non-food items. This observation is consistent with the study by Fatimah and Syamsiyah [55] which discovered that rice farmers dedicate 60% of their household budget to food expenses and 40% to non-food expenses.

Study by Andriadi, et al. [56] shows that food expenses (51.02%) exceed non-food expenses (48.98%) among curly red chilli farmers, emphasizing the importance these households place on meeting their food needs, which is further affected by the number of dependents. Research in Indonesia indicates that rice farming households typically have a steady income, with a large portion allocated to food costs,

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highlighting their priority on meeting basic needs in stable economic conditions. This approach to income management enhances food security and supports the overall well-being of farming households [57]. Expenditure on consumption serves as a strong indicator of household welfare, with participation in agricultural programs having a notable impact on spending patterns, ultimately reflecting the overall well-being of the household [58]. Additionally, consumption is viewed as a more reliable indicator of well-being compared to income alone [45].

3.6. Farmer Household Welfare Level

Assessing welfare through local rice prices offers valuable insights into the purchasing power and economic well-being of households. Rice consumption plays a crucial role in determining the prosperity and living standards of farming families, especially in fulfilling basic needs. A 35% increase in rice prices may result in a 1.72% increase in the number of people living below the poverty line, highlighting the substantial effect of rice prices on household welfare. Households with lower incomes, which allocate up to 40% of their food budget to rice, are particularly susceptible to price hikes [59, 60].

In the study area, rice prices ranged between IDR 12,000.00 and IDR 14,000.00 per kilogram, with an average price of IDR 13,034.48 per kilogram. These figures were used to compare annual per capita expenditure with the local rice prices near the homes of curly red chilli farmers, providing an assessment of their purchasing power. The findings from these calculations are summarized in Table 3.

Table 3.
Distribution of household welfare levels of curly red chili farmers in Pringsewu Regency, 2023.

No	Category	Score Interval (Equivalent to Rice/Year)	Number of Household Members	(%)
1	Poorest	<180 kg	0.00	0.00
2	Extremely Poor	181-240 kg	0.00	0.00
3	Poor	241-320 kg	0.00	0.00
4	Near Poor	321-480 kg	0.00	0.00
5	Adequate	481-960 kg	17.00	29.31
6	Decent Living	> 960 kg	41.00	70.69
	Total		58.00	100.00

In Pringsewu Regency, 70.69% of households engaged in curly red chilli farming are classified as having a good standard of living, while 29.31% fall into the "sufficient" category. The average annual per capita expenditures for households in the "fair" category range from IDR 12,608,500.00 to IDR 28,219,000.00, corresponding to rice consumption of 969.88 to 2,015.64 kilograms per person per year. The study concludes that curly red chilli farmers in the region are considered prosperous, as their income enables them to maintain a decent standard of living by fulfilling their basic needs through various income-generating activities.

The welfare of farmers can be assessed through the household income exchange rate, which is relatively high for curly red chilli farmers, reflecting their affluent status [39]. There is a strong positive correlation between income levels and living conditions, indicating that higher income contributes to improved standards of living [61]. Therefore, boosting farmers' household income is essential for improving their overall well-being. Access to capital, technology, and markets is crucial for farmers making the shift from subsistence farming to commercial agriculture. Credit availability allows farmers to invest in their operations, while technology enhances crop yields and production efficiency. Market access ensures farmers can sell their products at profitable prices. These interconnected factors are vital for increasing farmers' income and welfare by promoting more professional and sustainable farming practices [27].

In conclusion, the welfare of curly red chilli farming households is reflected in their food expenditure, which signals economic stability. Many agricultural households achieve a reasonable standard of living, largely through income derived from agriculture. Studies indicate that higher income

is linked to better living standards, with access to capital, technology, and markets being crucial for farmers' transition from subsistence to commercial farming. As a result, policies that enhance access to these resources are essential for improving farmers' welfare and ensuring sustainable food security [39, 61, 62].

The Chilli Planting Movement (Gertam) program, designed to meet local chilli demand and stabilize prices, has not fully met its objectives. However, other supportive policies can help tackle these issues. For example, import regulations focused on price stabilization have shown positive effects on producers, consumers, and society, ensuring broader welfare benefits [10]. Furthermore, enhancing agricultural organizations like cooperatives can boost production coordination, improve market access, and stabilize farmers' income [63].

Policies that encourage the preservation of native chilli varieties through economic incentives can greatly enhance local chilli production, especially when farmers collaborate directly with local retailers rather than depending on wholesalers [64]. In addition, enhancing access to capital and market resources can motivate farmers to shift towards commercial agriculture, allowing them to integrate advanced technologies into their operations [27]. Increasing domestic chilli production using hybrid seeds, optimized fertilization techniques, and better irrigation systems proves to be more profitable than depending on imports [39]. The chilli farming sector demonstrates strong competitiveness in terms of profitability, both for individual farmers and the community as a whole [65]. Strengthening the chilli agribusiness through enhanced price information, fostering stronger collaborations among industry stakeholders, and addressing distribution challenges is a strategic approach for sector growth [66]. To achieve long-term success, the Gertam program needs support from comprehensive policies that emphasize price stability, enhanced market access, and infrastructure development.

4. Conclusion

The study's findings indicate that most households of curly red chilli farmers maintain a decent standard of living, with agriculture particularly chilli farming serving as the primary source of income. While the Chilli Planting Movement (Gertam) program, designed to meet local chilli demands and stabilize prices, has had some impact, it has yet to fully achieve its objectives, especially in terms of price stability and local chilli supply. A considerable portion of farmers' income is dedicated to food expenditures, underscoring the need to address basic needs. Although government policies, including import regulations and support for farmer organizations, have shown positive effects, there is still room for improvement. This includes enhancing farmers' access to capital and advanced agricultural technologies. Key policy recommendations include increasing support for market access and price stability to ensure sustained economic security for farmers.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Authors' Contributions

DH: Developing ideas, writing, and responding to reviewer's comment; IS and VPT: collecting data and analyzing data; MR: writing, reviewing, editing preparation; FS: writing, reviewing the manuscript, and translating.

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