

Government Agricultural Intervention and Farm Household Income

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ABSTRACT

Purpose – This study examines the effect of government agricultural intervention on farm household income and production across major agricultural subsectors.

Design/methodology/approach - A quantitative approach was employed using data from 247 farmers who received government assistance across seven agricultural commodity-producing districts and cities. The analysis combines descriptive statistics and t-tests to assess changes in production and household income following intervention.

Findings/Results - Government intervention increased agricultural production by approximately 7% overall. The largest increase occurred in the food crop subsector at 10%, followed by plantations at 8%, while the lowest increase was 4%. The t-test results confirm that government intervention significantly improves farm household income, with the strongest income response observed among food crop farmers.

Originality/Value - This study demonstrates that government agricultural intervention can improve both production and household income, although its effectiveness varies across subsectors. The findings highlight the importance of combining production support with farm diversification and downstream processing to strengthen the sustainability of rural household income.

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1. Introduction

The agricultural sector has an important contribution to the Indonesian economy. This can be seen from its contribution to Indonesia's GDP of 12.61% in 2024 (BPS, 2026) and its ability to absorb 26.15% of Indonesia's total workforce (Ministry of Agriculture, 2024). The agricultural sector also makes a significant contribution to West Sumatra's economy. The contribution of the agricultural sector to West Sumatra's GDP in 2021 was 21.71%, down 0.67% from the previous year; however, the agricultural sector remains the largest contributor to West Sumatra's GDP (West Sumatra in Figures, 2022). However, the relatively large economic contribution of the agricultural sector has not been fully followed by an optimal increase in labor productivity. Various challenges and obstacles in the agriculture and plantation sectors include the conversion of agricultural land, farm labor increasingly scarce, and the problem of marketing agricultural products still constrained. Low technology adoption, limited access to financing, low product added value, and high dependence on climate and market conditions. Therefore, efforts to strengthen the agricultural sector need to be carried out through technological innovation, farmer capacity building, improved market access, and sustainable policy support are very important. To address problems in the agricultural and plantation sectors, programs and activities are implemented (West Sumatra Horticultural and Plantation Food Crops Office, 2019).

The limitations faced by farmers in the agricultural sector will hinder their efforts to increase household income. The obstacle to increasing farmers' household income is farmers' ability to carry out their business production activities. This is due to weak capital, technology, facilities, and infrastructure, as well as farmers' human resources, which will affect farmers' ability to increase production.

The provincial government of West Sumatra has allocated 10 percent of its budget to increase farmers' and fishermen's incomes. The West Sumatra government is trying to intervene in the program by providing seed and equipment, such as tractors and cultivators, and holding training for farmers, which is expected to increase farmers' productivity and household income. So, it is necessary to evaluate the interventions provided and to assess their extent in increasing farmers' household income.

Therefore, a more comprehensive study examining the effects of interventions on farmers' household income is needed. Therefore, research on the intervention of the West Sumatra Provincial Government's agricultural program is important to assess whether seed/seed assistance, agricultural equipment and machinery assistance, and farmer training actually increase farmers' household incomes. This study aims to analyze the influence of interventions on farmers' income in West Sumatra.

2. Literature Review & Hypothesis Development

Various studies have shown that agricultural interventions, such as input assistance, technology, mechanization, extension, training, and farmer empowerment, can affect farmers' productivity and household incomes, although the impact is not always uniform. Prasetyo and Kadir (2024) found that government assistance to food crop farmers can increase production yields, but the effectiveness of interventions depends on the type of assistance provided, the accuracy of distribution, and the suitability of the assistance to farmers' needs. Feryanto, Herawati, Rifin, and Tinaprilla (2022) show that corn farmers in Indonesia who use mechanization have higher average productivity and income than those who do not. Similar research was also conducted by Amrullah et al. (2019) on the use of combine harvesters in rice

farming in Indonesia, showing that harvest mechanization can reduce yield loss, lower harvest costs, and speed up harvest. A combine *harvester, assistance* is positioned as one of the government's policy instruments to increase rice farmers' production and income. Adu-Baffour, Daum, and Birner (2019) examined the impact of agricultural mechanization on the income and consumption of smallholder households in Zambia. The results of the study show that farmers who receive tractor services can increase their income by expanding planting areas.

From the aspect of extension, Rokhani et al. (2021) examined the influence of access to agricultural extension on the performance of smallholder sugarcane farmers in Indonesia, which shows that extension plays a very important role in increasing farmers' productivity and income because extension can improve farmers' knowledge, skills, and abilities in better cultivation practices. In addition, Adam (2022) analyzes farmer empowerment policies, which show that these policies increase the inputs and outputs of rice farming businesses, but their effectiveness is influenced by the problem of farmer regeneration and farmers' capacity to manage farming.

Research on the influence of interventions on farmers' productivity and households is more widely conducted worldwide, whereas in Indonesia, there is little research. Several studies have examined the effects of interventions on farmers' household incomes, but the interventions investigated remain partial. In general, the results of the research show that the intervention has a positive effect on both farmers' production and household income, increasing farmers' household productivity and income. For example, research by Wordofa et al. (2021) shows that farmers who adopt agricultural technology earn higher household income than those who do not. Wonde, Tsehay, and Lemma (2022) examined the impact of farmer training through *farmer training centers* on crop productivity and household income, showing that training increased wheat yield by 26.66 percent, corn yield by 10.10 percent, and increased farmers' annual net income from wheat production.

Hemming et al. (2018), through a systematic study of agricultural input subsidies in low- and lower-middle-income countries, showed that input subsidies can increase farmers' productivity and incomes, but their impact often varies depending on the program design, targeting mechanisms, input-output market conditions, and the fiscal sustainability of the program. These findings are important because input assistance, such as seeds, fertilizers, and means of production, does not always yield the same results for all groups of farmers. Some of the studies above have examined the effects of partial interventions on farmers, particularly on farmers' productivity and income. Therefore, a more comprehensive study examining the effects of interventions on farmers' household income needs to be carried out.

3. Methodology

The research was conducted in districts/cities that received program interventions in West Sumatra. The research was conducted from July 2023 to September 2023. The research was conducted in the sub-sectors of food crops, horticulture, and plantations. This research is descriptive, using a survey method, on farmer households who are members of farmer groups that receive government intervention in districts/cities in West Sumatra.

3.1. Measurement and Data Collection

The data used are cross-sectional, sourced from both *primary* and secondary data. Primary data was obtained through interviews with key informants and through questionnaires to farmers. Primary data includes farmers' and farmer households' identities, and farming data

includes the use of inputs, labor, production, and income of farmers from farming and non-farming businesses.

3.2. Population and Sampling

Sampling was carried out using the *Stratified Random Sampling* Method, which involves selecting samples based on interventions received in districts and cities. The sample farmer group was deliberately selected, considering that the group received government intervention. The number of samples taken was 52 farmer groups. The number of samples taken in each sub-sector was 33 percent for the site group, 33 percent for the food group, 21 percent for the horticulture group, and 13 percent for the plantation group. The number of farmers sampled was 247. The site group is represented by farmer groups in Tanah Datar Regency and Solok Regency, the food intervention group is represented by farmer groups in 50 Kota Regency, Padang Pariaman, and Dharmasraya, the horticultural intervention group is represented by farmer groups in Agam Regency, and the plantation intervention group is represented by farmers in South Pesisir Regency.

3.3. Variables and Data Analysis

The aspects observed, and the variables measured include: Interventions given, Value of interventions given, Sources of intervention, Allocation of outpouring, Changes in production, Business diversification, and changes in household income.

Data analysis for the first purpose uses household economic analysis to calculate each household's net income.

Table 1. Summary of the Calculation of the Farmer Household Income Analysis

Description	Quantities
A. Gross Revenue from Farming (Production*Price)	xx
B. Fees paid	xx
C. Cost of Calculated	xx
D. Household Income from Farming (A-B)	xx
E. Household income from non-agricultural	xx
F. Total income of farmer households (D+E)	xx

The analysis to answer the second objective was using a t-test (paired t-test) on the pre-intervention and post-intervention values on the following variables: Household income, Production, and Household Kindergarten Outflow.

4. Result and Discussion

The results showed a 7% increase in the average production of commodities receiving program intervention, from 2,132.99 kg to 2,284.57 kg per planting season. Table 2 shows that the largest increase in production occurred in the food sub-sector, with a 10% increase, and the smallest in the footprint, at 4%. However, there was also a 10% decrease in production in the horticulture sub-sector. The decline in production in the horticulture sub-sector is due to crop failure caused by pest and disease attacks, especially on chili plants. This is especially the case in Agam Regency, which is a center of horticultural crops and a large recipient of horticultural interventions. The variety of chili plants provided is also not in accordance with farmers' needs, as production levels remain low and are susceptible to pests and diseases. The decline in production in the horticulture subsector shows that seed assistance needs to be

complemented by pest and disease control, because FAO (2024) emphasizes that the disruption of plant pest organisms is one of the main factors that hinder the sustainability of agricultural production

Table 2. Changes in Average Production Before and After Program Intervention per Growing Season

Sub-sector	Production before	After production	Production changes
Horticulture	358.50	323.00	-10
Food	2,364.41	2,606.93	10
Plantation	1,275.00	1,375.00	8
Tapak	2,354.93	2,450.14	4
Total	2,132.99	2,284.57	7

The results of the statistical tests comparing average production before and after the intervention are presented in Table 3. Overall, based on the test results, $t = 3.68$ and $p = 0.0003$, which is smaller than $p = 0.05$. These results indicate that the average production after the intervention was significantly higher than before. Table 3 shows that significant changes occurred in the horticulture and food subsectors, whereas in the plantation and site subsectors, average production did not increase significantly between the before and after periods. There was no significant increase in the plantation sub-sector because the assisted plant seeds had not yet produced, but the increase in production was more due to the production of existing plantation crops and an increase in rice production, which was also sought by farmers who received plantation interventions.

Table 3. Production Change Hypothesis Testing Results

Sub sector	Nilai t	Nilai p
Horticulture	-2.28	0.03*
Food	4.14	0.00*
Plantation	1.69	0.15
Tapak	1.28	0.20

* significant at $\alpha = 5\%$

The results of the study showed that the average income of farmers receiving program interventions increased by 10% from Rp. 23,558,695.57 to Rp. 25,861,531.24 per planting season. Table 4 shows that the largest increase in income occurred in the plantation sub-sector, by 48%. The smallest increase occurred at the site, at 7%. The greater increase in income for the beneficiaries of plantation interventions was due to increases in the prices of plantation commodities cultivated, as well as in the prices of rice, which are also widely cultivated by farmers.

Table 4. Changes in Farmers' Income Before and After Program Intervention per Growing Season

Sub-sectors	Previous income (Rp)	After-income (Rp)	Income changes (%)
Horticulture	11,885,916.15	10,702,340.00	-10
Food	25,148,583.11	28,580,472.95	14
Plantation	6,802,348.48	10,100,833.33	48
Tapak	25,743,809.64	27,508,875.90	7
Total	23,558,695.57	25,861,531.24	10

The t-test results showed a significant increase in farmers' income who received the intervention, with a confidence level of 5%. However, based on the test results for the sub-sector, the significant increase in income occurred only in the food sub-sector; there was no increase in income in the plantation and site sub-sectors. Prasetyo and Kadir (2024) also found that government assistance, such as seeds and fertilizers, can improve crop yields if distributed in a timely manner and in accordance with farmers' needs. Meanwhile, there was a significant decrease in revenue in the horticulture sub-sector at the 5% confidence level.

Table 5. Results of Income Change Hypothesis Testing

Sub sector	Nilai t	Nilai p
Horticulture	-2.28	0.03*
Food	4.20	0.00*
Plantation	1.66	0.16
Tapak	1.39	0.17

*significant at $\alpha = 0,05$

Based on interviews with farmers, most respondents (81%) reported no increase in the amount of household labor provided to businesses that received program interventions.

Table 6. Changes in Labor Outflow

Perception	Number of samples	Percentage (%)
STS = strongly disagree = 1	2	1
TS = Disagree = 2	164	80
N = Neutral = 3	4	2
S = Agree = 4	34	17
SS = Strongly agree = 5	1	0

Several obstacles, including those faced by farmers in the program, prevented production from increasing enough. The obstacles and challenges faced by farmers are shown in Table 7 below. The obstacles farmers face are not due to a single factor; they also face problems with pests and diseases, as well as with difficult, expensive irrigation. Most of the problems faced by food crop farmers are pest and disease attacks, amounting to 18.18 percent. Farmers face pest and disease problems, as well as difficult and expensive irrigation, and pest and disease problems accompanied by expensive fertilizers. each by 12.12 percent. Obstacles related to the seeds themselves are 6 percent. This shows that the increase in farmers' production is not only due to the availability of seeds.

If you look at the problems with the intervention received by farmers, in plantation crop recipients, plant seedlings die due to floods, pests, and diseases. Effective seed assistance is provided when it is accompanied by appropriate-quality fertilizer assistance to meet farmers' needs, as well as assistance with facilities and infrastructure. The problems in food and site interventions are largely the same: many seeds are not used by farmers, and many are not distributed to farmers due to inaccurate timing of rice seed assistance and seed quality issues. Problems in horticultural interventions are also related to the quality of the seeds provided. In horticultural and plantation assistance, it is necessary to first provide farmers with planting hole requirements so that assistance can be carried out effectively. In addition, it is necessary to empower seed breeders to increase farmers' incomes and maintain seed availability at the farmer level.

Table 7. The Problems of Farming

	Percentage (%)
Hard water, Pests, and diseases	12.12
Water that is difficult to get and problematic	15.15
Difficult road access, difficult irrigation, pests, and diseases	3.03
Numerous leafhopper pests, rodents, and plant diseases	18.18
Pests and diseases in rice plants, fertilizers that have been obtained	12.12
Broken Irrigation and Expensive Fertilizers	3.03
Ketersediaan pupuk tidak sesuai dengan yang dibutuhkan sehingga	
Scarcity of fertilizers and unbalanced fertilizer use	9.09
Fertilizer is hard to come by, fertilizer is expensive, and rice is attacked by pests	12.12
The subsidized fertilizer provided is not in accordance with the government's recommendations (insufficient needs), uncertain weather, and armyworm pest attacks	3.03
Seeds that do not meet the needs	6.06
Technical counseling and training are scarce	6.06
Total	100

If viewed from the needs and desires of farmers for the programs provided, it can be seen that there is a relationship between the problems faced by farmers and the needs of farmers. Program interventions can increase production if combined or supplemented with other programs. In the food and horticulture sub-sector, in addition to seed assistance, it should also be equipped with fertilizer assistance and cultivation techniques. In plantation intervention, in addition to providing seeds, it also includes providing quality fertilizers according to farmers' needs and ensuring the completeness of the infrastructure. In addition, farmers should be asked to prepare planting holes in advance so that assistance can be provided properly. This is consistent with Nguyen (2023), who shows that agricultural input interventions, especially high-quality seeds and fertilizers, can increase farmers' productivity and income when appropriately designed and aligned with local needs.

5. Conclusion and Suggestion

The government's intervention increased the average production of commodities receiving program interventions by 7%, from 2,132.99 kg to 2,284.57 kg per planting season. There was a 7% increase in the average production of commodities that received program interventions. The largest increase in production occurred in the food sub-sector, with an increase of 10%, followed by the plantation sub-sector by 8%, and the smallest increase in the footprint by 4%. However, there was also a 10% decrease in production in the horticulture sub-sector. The decline in production in the horticulture sub-sector is due to crop failure caused by pest and disease attacks, especially on chili plants. This shows that the increase in farmers' production is not only influenced by the form of intervention received but also driven by other variables, such as plant pests and diseases, irrigation problems, and problems with the quality and quantity of fertilizers received that do not meet farmers' needs. Farmers' needs for intervention are correlated with the problems they face across every district in West Sumatra. Government interventions can significantly increase farmers' household incomes. The results of the study showed that the average income of farmers receiving program interventions increased by 10%

from Rp. 23,558,695.57 to Rp. 25,861,531.24 per planting season. However, in the sub-sector, interventions significantly increase food farmers' household income.

6. Limitations and Future Research

This study only used the t-test to examine the effect of the intervention on farmers' household production and income. The Propensity Score Matching method can be used to further examine the effect of interventions on household income.

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