JURNAL BINA PRAJA
Journal of Home Affairs Governance

ARTICLE

The Effect of Special Allocation Fund for Agriculture on Food Security in Indonesia

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Abstract: Indonesia's Food Security Index has decreased in the food availability category in 2022, influenced by food production. The government's efforts to achieve food security with DAK Non-Physical Food Security and Agriculture are a form of funds transfer to the regions. This study uses the robust fixed-effects panel data method to determine the effect of DAK Physical Agriculture and DAK Non-Physical Food Security and Agriculture on food security. The data used are secondary data from IKP and the realization of DAK Physical Agriculture and DAK Non-Physical Food Security and Agriculture from 2021 - 2023. The unit of analysis used is districts/cities in Indonesia. The dependent variable, the food security index, and the independent variable, DAK Food Security and Agriculture, are used to consider the factors of government spending, GRDP per capita, rice production, and population. The results of the analysis show that the Physical DAK has a significant influence on food security. At the same time, the Non-Physical DAK for Food Security and Agriculture is not significant for food security. The control variable of regional expenditure has a significant positive relationship with food security and population, which has a significant negative relationship with food security. The existence of a DAK Non-Physical Food Security and Agriculture budget that is too low and as a complementary fund causes not optimal outcomes from DAK Non-Physical Food Security and Agriculture. So, it is expected that in the future, there will be an increase in the portion of the allocation of DAK Non-Physical Food Security and Agriculture.

Keywords: DAK Physical Agriculture; DAK Non-Physical Food Security and Agriculture; Food Security; Fixed Effect.

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OPEN ACCESS

Citation: Meliala, E. S., & Djamaluddin, S. (2024). The Effect of Special Allocation Fund for Agriculture on Food Security in Indonesia. *Jurnal Bina Praja, 16*(2), 251–260. https://doi.org/10.21787/jbp.16.2024.251-260

Submitted: 16 July 2024

Accepted: July 2024

Published: August 2024

1. Introduction

Food security is an important global issue in fulfilling basic human needs. In addition to impacting socio-economic conditions, food problems can also cause political instability. Handling food security issues involves various sectors, including production, food availability, and health issues. In 2022, Indonesia's food security was still lower than the global average, with an index of 62.2 and below the target the Ministry of Agriculture made in 2022, with a score of 66.9 (National Food Agency, 2022). One of the reasons why Indonesia's Food Security Index in 2022 is still low is because the score of one of the food security index indicators, namely, availability in Figure 1, has decreased. This statement is reinforced by the National Food Agency (2022), which revealed that if the four pillars of food security are not fulfilled, a country cannot be considered to have adequate food security.

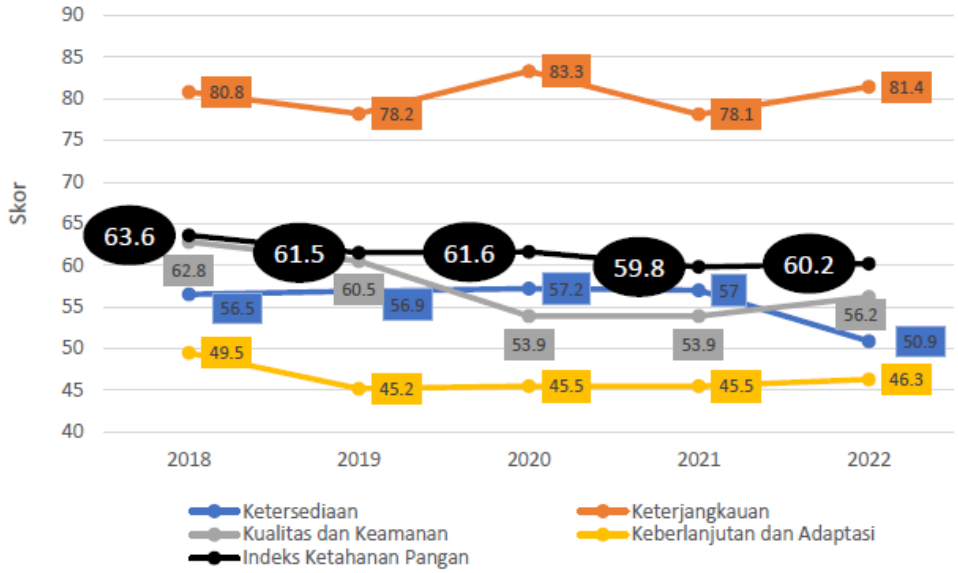

Figure 1. Indonesia's Food Security Index (2018-2022)

Source: *National Food Agency (2022)*

Food availability is a situation where food is available through domestic production, food stocks, imports, and food aid. One of the causes of the decline in the food availability score is food production. There is an increase in the average production of food commodities, but it is not proportional to the average population growth (National Food Agency, 2022). Population growth in a region also contributes to the increasing demand for food. If the population increases beyond the country's ability to produce food, then malnutrition will increase (Luan et al., 2013). According to Fróna et al. (2019) when the population increases it puts pressure on agricultural resources such as land, resulting in agricultural productivity and food production due to competition for land for agriculture, housing and other activities.

The same thing applies to research conducted by Widada et al. (2017), which says population density significantly negatively affects Indonesia's food security. The existence of a negative relationship indicates that high population growth and macroeconomic instability reduce the average adequacy of the food energy supply (Tayal, 2019). Kasilikika-Mlagha's research (2021) examines the impact of public agricultural spending on food security in SADC using fixed effects. This study states a negative relationship exists between population and food security because it can hinder food accessibility, which may contribute to reduced daily energy supply.

Therefore, the government is focusing on food security by distributing DAK Physical Agriculture and DAK Non-Physical Food Security and Agriculture to local governments.

The Special Allocation Fund is a form of fund transfer with the nature of specific purpose grants, where the Central Government has the authority to determine the use of these funds. The central government's effort to distribute regional development by providing fiscal balance funds to local governments. These funds aim to increase regional independence and community welfare throughout Indonesia (Purba et al., 2023). According to Wicaksono (2012), decentralization policy is based on first forming smaller government units because many countries consider centralized government regimes to be dictatorial. Second, the authority of the central government should be reduced to too broad level, which in turn leads to the accumulation of government administration work in central government institutions. Third, to bring people closer to the government and encourage public participation in regional decision-making. The proximity of the community to the local government can increase the accountability of the local government and facilitate the process of monitoring government activities.

There are differences in the objectives of DAK Physical Agriculture and DAK Non-Physical Food Security and Agriculture. Namely, DAK Physical Agriculture is directed at the development/improvement of basic physical facilities and infrastructure for agricultural development in order to support the achievement of the target of increasing food security and economic added value of agricultural commodities, while DAK Food Security and Agriculture is implemented to support community food independence, increasing community food security, and provide agricultural information through activities such as data collection, training, and mentoring (Ministry of Agriculture of the Republic of Indonesia, 2020). So that the differences in targets certainly cause differences in output and budget.

The Food Security Index (FSI) in western Indonesia is better, and the realization of DAK Physical Agriculture and Non-Physical Food Security and Agriculture is higher than in eastern Indonesia. This shows an imbalance in the distribution of government funds that should focus more on areas of greatest need, such as eastern Indonesia, to improve and enhance food security in the region. This disproportionate distribution of funds can have a negative impact on efforts to improve national food security evenly. In accordance with Aminah's research (2015), the high number of households classified as very food insecure is 14.5 percent, namely the fulfillment of consumption of less than 70 percent of the recommended needs for a healthy life. Households in Central and Eastern Indonesia, such as Kalimantan, Nusa Tenggara, Maluku, and Papua are particularly at risk of food shortages.

According to research by Timmer (2014), in overcoming food problems in the long term, macroeconomic policies can be implemented with fiscal policies that can impact sustainable poverty reduction and access to nutritious and healthy food. Another study by Giavazzi and McMahon (2013) stated that expansionary fiscal policy can effectively increase household consumption, especially in low-income households. In addition, based on research conducted by Tagkalakis (2008) which states that fiscal policy can increase private consumption during a recession.

In accordance with the research that has been conducted in several countries and the results show that government spending and fiscal decentralization affect food security (Chandio et al., 2016; Kamenya et al., 2022) which uses four indicators of food security as the dependent variable and government spending as the independent variable. According to Anderu and Omotayo (2020), the importance of government making policies for the long term on agricultural output can have a direct impact on food security. In contrast, research conducted by Fontan Sers and Mughal (2019) and

Kasilikika-Mlagha (2021) in nine Southern African Development Community (SADC) countries using four food security indicators from 2000-2016 to see the differences between the MDGs and SDGs eras stated that government spending had no impact on food security because government spending on food security was still below the required standard.

This study was conducted to understand the effect of DAK Physical Agriculture and DAK Non-Physical Food Security and Agriculture on food security in Indonesia and various issues related to achieving food security. Many studies state that government budget allocations for food security have different effects nationally and globally. Some policies positively and negatively affect food security (Koeswara, 2016). The DAK Physical Agriculture policy began in 2015, and the DAK Food Security and Agriculture policy began in 2021. However, no research discusses the effect of DAK Agriculture and DAK Non-Physical Food Security on food security nationally. There is a need for further research related to the influence on food security because good food security can help reduce poverty levels and create economic opportunities such as increased agricultural production, food industry development, and sustainable livelihoods. By looking at the effect of fiscal policies related to food security and agriculture, this research is expected to be a policy recommendation related to food security programs for the government, especially the Ministry of Agriculture and the Regional Government in the Regency/City area which is the implementer of this policy program, as well as the Ministry of Finance as the party that distributes the Special Allocation Fund for Food Security and Agriculture.

2. Methods

This research uses a three-method approach to estimation techniques with panel data models, so the Lagrange Multiplier, Chow, and Hausman Test are used. The first Chow test compares the fixed effect model with the common effect model, showing that the fixed effect model is better. However, the Hausman test compares the fixed effect model with the random effect model and shows that the fixed effect model is better. Thus, this study chose the fixed effect model as the panel data analysis method because the test results showed that this model is more efficient and appropriate. The fixed-effect linear model has a significant advantage because it automatically controls all district characteristics (Syah Putra, 2017). Especially for the variables of DAK Physical Agriculture and regional expenditure using time lag because the programs budgeted in the form of physical infrastructure, it is expected to get an accurate estimation of the policy results. It requires a time interval to see the results. As has been used in several previous studies (Apriliani, 2020; Kurniasih, 2023).

Regression Model Estimation:

$$IKP_{it} = \beta 0 + \beta 1\ lnDAKnonphysical_{it} + \beta 2\ lnDAKphycsical_{it-1} + \beta 3\ lnlocal\ expenditure_{it-1} + \beta 4\ lnPDRB_{it} + \beta 4\ ln\ rice\ production_{it} + \beta 5\ ln\ population_{it} + \varepsilon it$$

IKP it	= Food Security Index of district/city i in year t
DAKnonphysical it	= realization of DAK for Food Security and Agriculture in district/city i in year t
DAKphycsical it-1	= realization of DAK for Agriculture in district/city i in year t
Local expenditure it-1	= local government expenditure in district/city i in year t
PDRB it	= PDRB per capita of district i in year t
Rice production it	= rice production of district i in year t
Population it	= population of district i in year t
ε	= error term
i	= district/city data (1, 2,,514)
t	= time unit 2021-2023

3. Results and Discussion

The model testing results in panel data, namely Fixed Effect Robust, with the estimation results, namely the coefficient of determination (R2) of 0.0236. The R2 value means that in 2021-2023, 2.36% of the independent variables can explain the dependent variable. Meanwhile, 97.14% of the variation is explained by other models outside the model.

Variables	Food Security Index without control (FE)	Food Security Index with control (FE)
LnDAKNonPhysical	0.1923	0.0322
	(0.2155)	(0.2157)
Lag-LnDAKPhysical	0.8956***	0.6887 ***
	(0.2404)	(0.2447)
Lag-		6.2410 **
Lnregionalexpenditure		(2.4683)
LnPDRB		0.2057
		(0.7020)
LnRice production		-1.0105
		(0.7022)
Population		-0.8400 **
		(0.4506)
Cons.	50.2423***	-98.1204
	(5.1370)	(70.4249)

Numbers in parentheses are standard errors
*** significant at 1%, ** significant at 5%

Source: *Secondary Data Analysis, 2024 (STATA 18 output)*

The estimation results above show that the independent variable DAK Non-Physical Food Security and Agriculture does not significantly affect food security. This shows that DAK Non-Physical Food Security and Agriculture has not been optimal in improving food security in Indonesia. The estimation results stating that the DAK for Food Security and Agriculture has no significant effect on food security can be explained as follows:

a. Low DAK Non-Physical Budget Allocation for Food Security and Agriculture

The realization of DAK Non-Physical Food Security and Agriculture in 2021-2023 is still very low compared to other budget sources that have the same goal of improving Indonesia's food security. The budget for the food security sector is channeled through the expenditures of Ministries and institutions, non-ministries and institutions, and transfers to regions and village funds. The realization of DAK Non-Physical Food Security and Agriculture is only 0.23-0.28% each year of the total budget realization in the food security sector. This low budget may cause limitations in programs related to DAK Non-Physical Food Security and Agriculture.

If viewed from the micro side, the DAK Non-Physical Food Security and Agriculture budget per year is allocated to more than 450 districts/cities with a total budget of around Rp200-300 billion/year. The average district/city will get a maximum fund of Rp1 billion annually. Then, the funds will be divided into sub-districts that are targeted by the Food Security and Agriculture Non-Physical DAK program. From the allocation

results, each sub-district will get approximately Rp50 million if each district/city is budgeted for 20 sub-districts. In addition, many administrative costs and official travel must be paid, which takes up a larger proportion of the total budget and results in less funds available for program activities that directly benefit the community. Programs run with small budgets may not be sustainable in the long term due to limited funds for program maintenance and development. Therefore, the contribution of DAK Non-Physical Food Security and Agriculture to food security is very low, and its influence is not visible.

b. DAK Non-Physical Food Security and Agriculture as a complementary fund to DAK Physical Agriculture

DAK Non-Physical Food Security and Agriculture do not significantly relate to food security as they complement DAK Physical Agriculture, which is more important in directly improving agricultural productivity and food security. The main focus of DAK Physical Agriculture is to provide the basic infrastructure that enables the improvement of the quality and quantity of food production, such as building irrigation, farm roads, harvest storage warehouses, etc., while DAK Non-Physical Food Security and Agriculture only funds extension, farmer training, and animal health services.

Although it is suspected that the two DAKs are related, the portion of the budget allocated to the Non-Physical DAK for Food Security and Agriculture tends to be smaller than the Physical DAK for Agriculture. It can be seen in Table 4.3 that the proportion of DAK Physical Agriculture for 3 years is 14%-17%, while the proportion of DAK Non-Physical Food Security and Agriculture is 0.22%-0.28% of the total food security budget from the center. With a relatively smaller budget and a complementary role, the direct contribution of DAK Non-Physical Food Security and Agriculture to improving food security is limited. Its effectiveness is highly dependent on the success of infrastructure programs funded by DAK Physical Agriculture. Therefore, without strong synergies and effective implementation of the DAK Physical Agriculture, the impact of DAK Non-Physical Food Security and Agriculture on food security cannot be significantly felt.

c. Non-physical DAK allocation targets for food security and agriculture that are not yet appropriate

The realization of DAK Non-Physical Food Security and Agriculture each year has increased, but not 100% can be realized. In addition, several recipient regions were initially proposed to receive DAK Non-Physical Food Security and Agriculture, but the absorption was not 100%. Changes influence the absorption of DAK Non-Physical Food Security and Agriculture due to changes in three programs that are part of DAK Non-Physical Food Security and Agriculture. The animal health center sector experienced an increase in budget from 2021 to 2023 of 68.07%. This was followed by an increase in the target allocation of DAK Non-Physical Food Security and Agriculture by 24% from 2022 to 2023. Animal health centers are only included in the DAK Non-Physical Food Security and Agriculture budget in 2022 because the government is increasingly aware of the vital role of Puskeswan in maintaining livestock health, which will ultimately support the availability and access of animal food for the community. Animal Health Centers (Puskeswan) aim to ensure the availability of safe and quality food for the community. To reduce the risk of disease spread from livestock to humans through animal products. Good animal health is essential to ensure optimal and safe animal production, thereby helping to improve community food security. The agricultural extension center sector experienced a budget increase of 48% from 2021 to 2023 but experienced fluctuations in the DAK Non-Physical Food Security and Agriculture target

allocation. Meanwhile, the field of sustainable food yards experienced a 24% decrease in budget, followed by a 25.27% decrease in target allocation from 2021 to 2023.

However, the three programs do not all directly affect food security but can contribute to increasing food availability and people's access to balanced and sustainable food. Only Pekarangan Pangan Lestari can directly help increase food availability by developing more productive yards and can also increase income for farmers and communities in both rural and urban areas. The Agricultural Extension Center cannot directly influence food security but can improve people's access to agricultural information. This is because effectiveness depends on adoption by farmers and external conditions, an operational scale often limited to local communities, and dependence on the availability of adequate resources and financial support. Animal health centers focus primarily on livestock health rather than direct food production, dependent on other production factors such as feed and cultivation techniques. The impact is often limited to a local scale and requires integration with broader food production efforts; the program also has long-term effects that take time to be seen in increased food availability and economic and market factors that affect animal food access and affordability. Therefore, DAK Non-Physical Food Security and Agriculture is still not fully targeted to achieve its ultimate goal of promoting food security and food sovereignty.

In addition, the indicators that make up the food security index are very broad and diverse, covering aspects such as food accessibility, availability, and utilization. These indicators cover more than just agricultural outputs or the specific programs funded by DAK Non-Physical Food Security and Agriculture. Thus, even if DAK Non-Physical Food Security and Agriculture contributes to an increase in production capacity or agricultural operational costs, its impact on the overall food security index may not be significantly visible due to the presence of many other indicators that also affect the food security index.

DAK Physical Agriculture has a significant relationship with food security. This significance indicates that each 1% increase in DAK Physical Agriculture will increase food security by 0.6887 points. The DAK Physical Agriculture is allocated in the form of several programs, namely, the construction of water sources and supporting facilities, construction of agricultural roads, renovation of Agricultural Extension Centers (BPP) in the district and provision of supporting facilities, construction of community food barns (LPM) in rice production centers and construction of community food barns (LPM) and provision of supporting facilities in vulnerable flood-prone areas. These efforts to increase production directly impact food availability in the region, strengthening food security. In addition, these programs also play a role in improving the efficiency and effectiveness of agricultural systems, ensuring that resources are used optimally to achieve maximum results. Thus, all programs funded by the DAK Physical Agriculture encourage increased production and directly improve the region's food security.

Regional expenditure has a significant relationship with food security. This significant value indicates that each 1% increase in the regional expenditure will increase food security by 6.2410 points. With an increase in the regional expenditure each year, it should be able to improve infrastructure development and people's welfare so that it can directly affect the indicators that make up the food security index that is not related to agricultural production output.

The natural logarithm of the GRDP per capita control variable is not significant to the Food Security Index. Although GRDP per capita can provide a general picture of people's purchasing power, this indicator may not be comprehensive enough to describe all dimensions of the food security index, which is quite broad. GRDP per

capita is only one of the indicators, namely food access, which is one of the three main pillars of IKP. Therefore, even though the GRDP per capita of a region is high, if other indicators such as food availability and utilization are not met, the IKP of the region can still be low. Thus, it can be concluded that GRDP per capita does not significantly affect the Food Security Index (FSI) because it only fills in a few constituent indicators of the FSI. There are many other factors that play a greater role in determining the level of food security in a region.

This research is not in accordance with the research of Kamenya et al. (2022), which states that an increase in GDP per capita can increase individual income, thereby enabling the consumption of nutritious food and improving food security. This is followed by research Different from Aji's research (2022), which states that the allocation of Village Funds and GRDP significantly affects district/city poverty. The Village Fund is still used to build physical village facilities and infrastructure that do not have a multiplier effect in improving the community's economy. Compared to the construction of physical facilities and infrastructure, which reached 84 percent, the utilization of the Village Fund for community empowerment is still relatively small, at only 6.5 percent. In addition, it is also supported by several regions that have just experienced expansion. According to Temenggung et al. (2020) and Paellorisky and Solikin (2019), the contribution of government expenditure to GRDP is also greater in the new autonomous regions compared to the parent regions. Although poverty reduction occurred in all regions, regional expansion has encouraged the movement of poor people from the parent region to the expansion region, both provincial expansion and new autonomous regions. The data shows that the poor are concentrated in the new autonomous regions. Unlike the research (Subarna, 2012), household expenditure is divided into food and non-food consumption. The higher the household expenditure, the higher the level of purchasing power and, in general, the better the welfare. The level of household welfare can also be seen based on shifts in the structure of expenditure, where a lower proportion of food expenditure indicates an improvement in welfare.

The regression result of the control variable rice production has an insignificant relationship with food security. Although rice production is one of the important components in the food security index, this indicator is not sufficient to illustrate all the broad dimensions of food security. The food security index not only includes the availability of food in quantity but also involves various other factors, such as people's access to food and the utilization of food in a good and nutritious manner. Therefore, monitoring rice production alone is insufficient to provide a comprehensive picture of the food security status of a region. Other indicators that reflect various aspects of food security are needed, such as agricultural productivity, diversification of food production, people's income and purchasing power, food distribution infrastructure, and healthy and nutritious food consumption practices and habits. This is different from Kasilikika-Mlagha's research study (2021), which says that an increase in agricultural production will positively impact food security because agricultural production usually leads to an increase in food availability, which can contribute to an increase in a country's food energy supply. During the COVID-19 pandemic, research conducted by Louie et al. (2022) showed that countries such as the United States and Australia, which were previously considered to have high levels of food security, experienced vulnerabilities in food supply. Communities at risk of hunger include the unemployed and international students in Australia.

The total population has a significant negative relationship with food security. This significant value indicates that each 1% increase in population will decrease food security by 0.8400 points. The increasing population can greatly challenge a country's

food security. The larger the population, the higher the demand for food. This can lead to scarcity of food supply and rising food prices, resulting in limited access to food. In addition, a large population can also encourage the conversion of agricultural land into residential or industrial land, reducing the availability of land for food production. As a result, food productivity tends to be difficult to increase and may even decline. Furthermore, overexploitation of natural resources by large populations can degrade environmental quality and reduce it carrying capacity for food production. Kasilulika-Mlagha's research (2021) research examined the impact of public agricultural spending on food security in the Southern African Development Community (SADC) using fixed effects. This study states that there is a negative relationship between population and food security because it can hinder food accessibility, which may contribute to a reduced daily energy supply.

4. Conclusion

From the results of this study, it can be concluded that DAK Non-Physical Food Security and Agriculture does not have a significant effect on food security in Indonesia, while DAK Physical Agriculture has a significant relationship with food security in Indonesia. This may be due to the allocation of the DAK Non-Physical Food Security and Agriculture budget, whose nominal value is still low compared to other budgets, the allocation targets and programs of DAK Non-Physical Food Security and Agriculture, which do not have a direct relationship to the food security index and DAK Non-Physical Food Security and Agriculture as a complement to DAK Physical Agriculture so that the outcome of DAK Non-Physical Food Security and Agriculture is not optimal. Meanwhile, the control variable that has a significant effect on food security is regional expenditure, which has a significant positive effect on food security. In contrast, population has a significant negative effect on food security. Control variables that are not significant to food security are GRDP per capital and rice production.

Acknowledgment

We would like to express our sincere gratitude to the West Papua Provincial Treasury Regional Office for their invaluable support and assistance during this study. The cooperation and resources they provided were instrumental in enabling us to access critical data and information needed for our research. The guidance and facilitation provided by the staff in the office significantly improved the depth and quality of our work. We appreciate their commitment to supporting research and development in the region, and their contribution was crucial in achieving the objectives of this study.

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