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The Importance of Government Subsidies and Wealth to Create A Better Food Security in Java Island

Sony Kristiyanto[1*], Andre Yesevin Hutabarat[2]
[1] Faculty of Economics and Business, Wijaya Kusuma Surabaya University, Indonesia
[2] Genwiz Learning Center Surabaya, Indonesia

**Corresponding Author: sonykristiyanto@uwks.ac.id*

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ABSTRACT

Food security is a major development issue because it directly ties to economic stability and social welfare. In Indonesia, especially on Java Island, which is the country's economic center, government action and wealth distribution are crucial for maintaining adequate food availability and access. This research is important to provide a deeper understanding of the influence of various factors believed to influence food security on the island of Java. The factors in question are welfare, public rice consumption, government subsidies, and poverty. The aim of this study is to identify and analyze the influence of each of these variables on food security on the island of Java. This research uses a quantitative approach with panel data from all regencies and cities on Java Island, covering the period from 2018 to 2024. We obtained secondary data from official government sources and used panel regression techniques to explore how macro-level factors affect food security. We looked at statistical significance to understand the strength of each variable's impact. The results show that government food subsidies positively impact food security on Java Island. Community welfare also plays an important role, while poverty levels and per capita rice consumption do not show a meaningful relationship with food security. This research concludes that two factors influence food security in Java: community welfare and government subsidies. Both have a positive and significant impact on food security in Java.

Keywords: Food Security, Subsidies, Welfare, Poverty

INTRODUCTION

Food security is a challenge faced by all countries all over the world. The importance of food security reflected in the inclusion of food security as one of the targets in the Sustainable Development Goals (SDGs) (Nur & Andaru, 2025). Prasada & Masyhuri, (2019) food security is defined as a condition in which all people have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs for an active and

healthy life. All countries in the world, both developed and developing countries, experience the same problem regarding fulfilling the food needs of their citizens. Furthermore, Indonesia faces its own challenges regarding food security. The complexities faced by Indonesia in addressing food security issues may differ from those faced by other countries. Indonesia's geographical location, consisting of thousands of islands and its very large population, are just a few factors that are suspected to pose challenges for Indonesia, but not for other developing countries (Miyasto, 2014).

By definition, food security is the condition of ensuring adequate food security, from the national level down to the individual level (Miyasto, 2014; Oktalia et al, 2025). This condition of food security is reflected in the availability of food at affordable prices for the majority of the community. This food availability includes food ingredients on a wider scale, namely staple foods which are generally food ingredients used to fulfill carbohydrate needs such as rice, corn, cassava and other carbohydrate-rich foods (Putra et al, 2020). Food availability is not only focused on the availability of food in the form of staple foods, but also food ingredients to fulfill protein, vitamins and minerals which are generally obtained from plant and animal sources.

Several research have shown clearly that food security will be able to influence the economy on a macro scale (Waha et al., 2018; Zemba et al, 2025; Zhao, 2023). Excellent food security can strengthen a country's human resources, both physically and mentally, and empower them to perform effectively, ultimately leading to increased human productivity. Better productivity of the workforce will lead to higher national output (Febrian, 2025; Miyasto, 2014). The relationship between food security and the macro economy is especially visible in developing countries. Meanwhile, in developed countries, food security has generally reached an optimal point and national production is driven more by the use of technology (Kang & Suh, 2023; Widada et al, 2017).

The importance of food security is also evident in several government programs aimed at maintaining food security at the community level. One thing the government can do is ensure that food production is at a level sufficient for all the people (Rumawas & Nayoan, 2021). The government's way of ensuring food production is through various subsidies aimed at ultimately achieving food security. Government subsidies for fertilizer, subsidies for high-quality agricultural seeds, adequate irrigation infrastructure for agricultural land, and the provision of special train carriages for farmers are just a few examples of the government's role in ensuring that food security is maintained at the desired level (Li et al, 2022; Ramadhani, 2019). In recent years, government subsidies have begun to shift from program-based subsidies such as rice for the poor to providing direct, cash subsidies to people who are deemed to need government assistance to meet their needs (Oktalia et al., 2025).

Government subsidies aimed at maintaining food production are an effort to maintain food security from the supply side (Zhao, 2023). High food availability will not impact food security if people cannot afford to purchase it. Therefore, purchasing power is another factor

that, in theory, can influence food security (Timmer, 2004). Generally, purchasing power correlates with a society's level of prosperity. Higher levels of prosperity lead to higher purchasing power, which in turn correlates with higher food security. Higher levels of prosperity make it easier for people to purchase food, thus directly supporting food security.

The food security index is measured using three key metrics: availability, affordability, and utilization of food. Asian countries generally have high rice consumption. This condition is normal because rice is a staple food for most people in Asia. Therefore, one indicator of food security is rice consumption (Hjelm et al, 2016; Pailler et al, 2015). High rice consumption indirectly indicates that rice is available in sufficient quantities, that people can afford to consume rice, and that they are able to utilize this food. Higher rice consumption indicates greater food security.

Poverty, which is also a fundamental macroeconomic issue, is a major obstacle to food security (Hjelm et al., 2016). Poverty makes it impossible for people to afford essential food. The inability or reduced purchasing power of people due to poverty demonstrates an inverse relationship between poverty and food security. The deeper the poverty level, the more difficult it is for them to afford food. Evidence from household surveys in Indonesia suggests that households with higher incomes will convert increased income into a diverse diet, while poorer households prioritize meeting basic needs such as carbohydrates and must have their own strategies to meet protein needs (Oktalia et al., 2025).

However, (Mukhlis et al, 2021) revealed that poverty and food security are not related to each other. The complexity of poverty that occurs, especially when it occurs in big cities, makes it difficult to measure and categorize the level of poverty itself. The research also revealed that there are certain groups in society who register themselves in the poor category, but basically the level of welfare they have does not reflect that these people are in the poor category. This condition causes the measurement to be biased and leads to the conclusion that poverty and food security are not related.

Previous research has linked the influence of government subsidies in the agricultural sector to food security (Azwardi, et al, 2016; Ramadhani, 2019). Therefore, the effect of subsidies is indirect, as it first passes through agricultural variables. Meanwhile, this research tries to explore government subsidies that are distributed directly to the community through the government food subsidy scheme.

Java plays a vital role both economically and socially. This condition is because half of Indonesia's population lives and works on the island of Java. This dense population contributes to a high level of economic activity compared to other islands in Indonesia. In the context of food security, this high economic activity has the consequence of putting pressure on the provision of sufficient food for the population on the island of Java. In addition to facing pressure from the food demand side of the population on the island of Java, the natural conditions of the island of Java have quite high variability which will naturally affect overall food production. These various facts are sufficient reasons to choose Java as the location for

this research on food security.

This research has an urgency to provide more comprehensive insight into the influence of several factors that are suspected of having an impact on food security on the island of Java. The factors in question are welfare, public rice consumption, government subsidies, and poverty. The aim of this research is to determine and analyze the influence of each of these variables on food security on the island of Java.

Based on the description that has been stated in the previous section, the hypothesis that will be developed in this study are: the level of welfare has a positive and significant effect on food security, rice consumption has a positive and significant effect on food security, government subsidies have a positive and significant effect and poverty has a negative and significant effect on food security.

METHODS

This research uses a panel data approach by taking research locations as many as district cities on the island of Java. The data used in this research is secondary data and refers to data issued by the Central Statistics Agency and the Directorate General of Fiscal Balance of the Republic of Indonesia. All data used in this research is public data that can be downloaded via the official website. There are 118 regencies and cities on the island of Java, and the research period is from 2018 to 2024. Therefore, the total data observed in this research is 826 observations. The modeling used in this research is stated in equation 1.

$$Y_{it} = \beta_0 + \beta_1 LX_{1it} + \beta_2 X_{2it} + \beta_3 LX_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \quad (1)$$

Based on equation (1), it can be explained that the dependent variable in this research is food security, which in this research is proxied by the food security index number. The calculation of the Food Security Index (IKP) in Indonesia, released by the National Food Agency, uses a composite index method of 9 indicators (district) or 8 indicators (city) covering three aspects: availability, affordability, and utilization of food. Indicators are standardized using z-score or distance to scale (0–100), then multiplied by their respective weights to determine the food security ranking. The independent variables in this research are: the level of community welfare, which is proxied by the level of community per capita expenditure (LX_{1it}), the level of community rice consumption (X_{2it}) in kilograms per week. The government subsidy variable, which in this research is measured by the value of social food assistance issued by the government (LX_{3it}), and the community poverty level variable, which is measured by the poverty level in percent units (X_{4it}).

The consequence of using panel data is the existence of three possible models: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM) (Verbeek, 2017). To determine which model to use, the Chow Test, the Hausman Test, and the LM Test are required. Logarithmic transformations for the variables of community welfare level and government subsidies are intended for data smoothing (Gujarati, 2009). The classical assumption tests used in this research are the multicollinearity test, the

autocorrelation test, the heteroscedasticity test, and the normality test (Gujarati, 2009; Verbeek, 2017).

Determining significance, both partial and simultaneous, can be done by comparing the probability value with the error degree value used in this research. If the probability value is lower than the error degree value, the variable is declared statistically significant (Gujarati, 2009; Verbeek, 2017). This research used an error rate of 5% or 0.05. Furthermore, significance testing can also be done by comparing the calculated t-value and the table t-value. If the (absolute) t statistics value is higher than the table t-value, the variable is declared statistically significant (Gujarati, 2009; Verbeek, 2017).

RESULT AND DISCUSSION

The discussion in this study begins with a descriptive statistical analysis. The descriptive analysis will cover all variables used in this study, the results of which are as follows:

Table 1. Descriptive Statistical Results

	Food Security	Welfare	Rice Cosumption	Subsidies	Poverty
Mean	80.06841	12995.05	1.428763	1.54E+11	9.215206
Median	80.88000	12265.50	1.411000	1.11E+11	9.020000
Maximum	94.20000	25068.00	2.210000	9.84E+11	23.76000
Minimum	51.39000	7785.000	0.967000	3.51E+08	1.680000
Std. dev.	6.684322	3289.128	0.214267	1.55E+11	4.439086

Source: Data Processed

Based on the data displayed in table regarding the results of descriptive statistics, several things can be reviewed as follows: the average food security score in regencies/cities on the island of Java is 80.88 with the highest index score being Salatiga City with a food security index score reaching 94.2 achieved in 2023 and the lowest food security index score is in the Administrative City of Kepulauan Seribu with an index score of 51.39. Per capita community expenditure which is a representation of the average level of welfare in regencies/cities on the island of Java is Rp. 12,995 million per year with the highest level of expenditure being in Bandung City in 2024 at Rp. 25,068 million per year and Kabupaten Pemalang with the smallest expenditure, namely Rp. 7785 million per year in 2018. The average rice consumption in regencies/cities on the island of Java is 1.42 kilos per week per capita with the highest rice consumption in Kabupaten Pandeglang in 2022 with a consumption rate of 2.21 kg per week per capita and the lowest rice consumption is Yogyakarta City in 2018 with a rice consumption of 0.967 kg per week per capita. The highest average government subsidy for food aid is in Kabupaten Bogor in 2021 at Rp. 9.84 billion and the lowest subsidy was issued by Depok City in 2018 at Rp. 3.51 billion. The highest poverty rate is in Kabupaten Sampang with a poverty rate of 23.76% in 2021 and the lowest poverty rate is in South Tangerang City with a rate of 1.68% which occurred in 2018.

In this section, the next step is to interpret the results of the panel data regression. The results of panel data regression in this study are as follows:

Table 2. Panel Data Regression Results

Variabel	CEM		FEM		REM	
	Coefficient	t-statistic	Coefficient	t-Statistic	Coefficient	t-statistic
Constant	39.29489*	3.609670	-176.3268	-8.77407*	-74.75765	-4.89793*
LX_1	1.337362	1.258261	24.99725	11.58974*	14.14370	8.838681*
X_2	-13.34393*	-13.0406	0.323364	0.153320	-4.595109	-2.98210*
LX_3	1.974166*	14.04036	0.729386	7.232374 *	1.071977	11.46215 *
X_4	-0.233138	-4.17059	0.177396	0.998512	0.111186	1.125102
Adjusted R^2	0.276848		0.814147		0.274357	
F Statistic	79.86403*		30.83148*		78.88622*	
Prob (F-stat)	0.000000*		0.000000*		0.000000*	

Source: Data, processed

*: Significant at $\alpha = 5\%$

The selection of the most appropriate modeling used in this research uses the Chow Test, the Hausman Test, and the LM Test. The results of these tests are as follows:

Table 3. Chow Test Result

Effects Test	Statistic	d.f.	Prob.
Cross-section F	21.261621	(117, 703)	0.0000
Cross-section Chi-square	1247.903573	117	0.0000

Source: Data processed

Table 4. Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	84.213103	4	0.0000

Source: Data processed

The results of the Chow and Hausman tests indicate the same result: the Fixed Effects Model (FEM) is the most appropriate panel data model for this research. This is indicated by the probability values falling below the specified error rate for both the Chow and Hausman tests. Given these similar results, the LM test is unnecessary in this research as it will not affect the overall results.

Before conducting the significance test, the following are the results of the classical assumption test consisting of the multicollinearity test, autocorrelation test, heteroscedasticity test and normality test. The results of the classical assumption tests consisting of the Glejser test for heteroscedasticity, the partial correlation test for multicollinearity, the Durbin Watson

test for autocorrelation and the Jarque-Bera normality test will be presented successively as follows:

Table 5. Glejser Test Result

Variable	Coefficient	T-Statistic	Probability
Constant	4.289	0.2315	0.8170
LX_1	0.6609	0.3324	0.37397
X_2	-0.359	-0.1846	0.8535
LX_3	-0.249	-2.069	0.0730
X_4	-0.249	0.4507	0.6523
F-Stat	1.2226		
Probability F-Stat	0.8387		

Source: Data, processed

Table 6. Multicolinearity Test

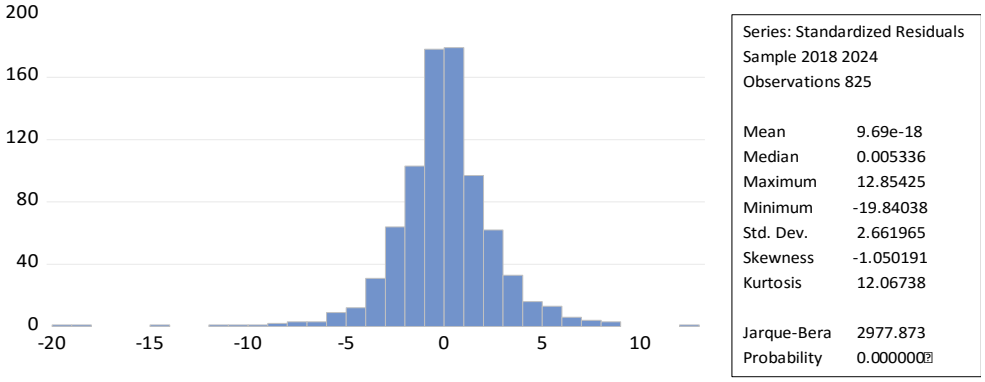
LX_1	1.00			
X_2	-0.28064	1.00		
LX_3	-0.13377	0.35104	1.00	
X_4	-0.57630	0.151461	0.235626	1.00

Source: Data, processed

Table 7. Autocorrelation Test

Durbin-Watson Stat	1.906
du	1.874
dl	1.894

Source: Data, processed



Source: Data, processed

Figure. Jarque-Bera Normality Test

Based on the results of the classical assumption test presented in table (5), (6), (7) and (8) the proposed model is free from classical assumptions. The Glejser test results indicate that no independent variables show significance on the dependent variable, which is the absolute value of the error. The partial correlation value between the independent variables does not exceed 0.8, indicating that there is no relationship between the independent variables. The statistical DW value is between the dl and 4-dl values, meaning it is in the autocorrelation-free region. The normality test uses the Jarque-Bera test which shows that the data is not normally distributed, which is indicated by a probability value less than the specified degree of error value, but follows the central limit theorem which states that data is considered normal if the number of observations is more than thirty observations. Referring back to the results presented in tables (3) and (4), the interpretation used in this research will refer to modeling with a Fixed Effect Model approach.

Rewriting the modeling produced in the previous section, this research will be based on the following modeling:

$$Y_{it} = -176.32 + 24.997LX_{1it} + 0.3233X_{2it} + 0.7293LX_{3it} + 0.1773X_{4it} + \varepsilon_{it} \quad (2)$$

Of the four independent variables offered in this research, there are two independent variables that are statistically significant and two independent variables that are not statistically significant. The two variables that are statistically significant in this research are the variables of public welfare and food subsidies issued by the government. This can be seen from the T-statistic value which is higher than the T-table value. Meanwhile, the variables of national rice consumption and poverty have no effect on food security in cities and districts located on the island of Java. This can be shown by the T-statistic value which is lower than the T-table value. The four variables in this research together are able to influence the food security index of regencies and cities on the island of Java. This condition is indicated by the F-statistic value which is higher than the F-table value. The coefficient of determination in this research is 0.8141 which means that 81.41 percent of the change in the food security index can be explained by the four variables offered in this research, while the remaining 18.59 percent is explained by other variables outside the variables offered in this research.

Furthermore, based on equation (2) it can be seen that if the per capita expenditure level increases by one percent, it will be followed by an increase in the food security index of 0.2499 points and every increase in government subsidies by one percent will be followed by an increase in the food security index of 0.00729 points. These two variables have the same direction of relationship as the direction of the relationship in theory, so it can be said that the results of this research are in accordance with the theory put forward in the previous section. The variables of rice consumption and poverty also have a positive direction of relationship but do not have a significant influence on food security in district cities on the island of Java during the observation period.

Food security is a crucial issue for economies worldwide, especially those in developing countries. Besides being a target within the SDGs, food security impacts a wide range of factors. Several economic metrics will be difficult to achieve if food security is not optimal. In several cases, especially in developing countries, many social cases such as high crime rates are found to originate from the high level of food insecurity in those countries. Economic metrics such as life expectancy will fall short of their targets if food security falls short of expectations.

The results of this research indicate that economic factors play a significant role in achieving food security on the island of Java. Welfare, proxied in this research by per capita expenditure, is one indicator that determines food security in a community. Higher levels of well-being make it easier for the community to achieve their desired level of resilience. Higher levels of well-being correlate with higher incomes, so the easiest way to achieve higher levels of well-being is to raise community incomes. Community income will increase if the economy, in general, is moving well, generating economic activity, ultimately resulting in higher incomes for the community. Economic activities have a very vital role in being able to produce a level of prosperity for society in general.

One of the government's crucial responsibilities is to ensure food self-sufficiency. In a broad sense, food self-sufficiency is defined as the availability of food at reasonable prices for the general public, so that people are able to obtain food at affordable prices. Providing affordable food prices can be achieved through several steps. For countries with an agricultural character, efforts to increase agricultural production in the country are the most appropriate thing to do. Increasing agricultural production can be done either by intensifying agricultural land by relying on superior seeds, the availability of fertilizer and sufficient irrigation for agricultural land, or by using an agricultural extensification strategy, namely by opening new agricultural land. Meanwhile, for countries that are not agricultural, the government must be able to guarantee food availability through international trade channels.

For developing countries like Indonesia, where the government's role in the economy is still very high, government intervention is still very necessary. This government intervention is generally reflected in the provision of subsidies with the ultimate aim of increasing food security for the general public. The subsidies provided to the community can take various forms. One of the most common is fertilizer subsidies and seed subsidies from the government. The provision of subsidies for fertilizer has an impact on lowering the price of fertilizer and seeds at the farmer level so that farmers do not have difficulty in the next planting process. Subsidies can also be in other forms, such as logistics subsidies that can ensure food distribution reaches remote areas of the country. Subsidies given to the underprivileged community can be in the form of providing low prices for certain products such as rice and cooking oil.

The provision of various types of subsidies will basically result in one thing, namely the availability of food at cheaper prices and affordable for the community. Without subsidies

from the government, it is possible that the price of food will not be as cheap as if there were no subsidies from the government. The fiscal strength of the government in distributing subsidies is the main key to the success of distributing these subsidies. This is because the success or failure of the subsidy program cannot be seen if the subsidy is only given once. The subsidy program, especially for food security, must be a sustainable program.

Food availability plays a crucial role in achieving the desired level of resilience. Without sufficient food availability, food security will be impossible. However, another crucial factor in food supply is the price of food itself. The availability of food at a relatively high price will have the same impact as its absence. High prices make it difficult for people to obtain food. In this situation, the government's role is crucial.

The general level of community welfare plays a significant role in food security. Food availability in the market will not have an impact if it is not balanced with purchasing power at the community level. With better welfare, it will be easier for people to consume more sufficient food, both in terms of quantity and quality. This welfare factor ultimately creates different consumption patterns between people with high middle incomes and those with lower middle incomes. People with upper middle incomes will find it easier to vary the food they consume, while people with lower middle incomes tend to fulfill their consumption of staple foods that are more focused on carbohydrate content.

Improving welfare is one way that the government can improve food security. In addition to using subsidy instruments, the government can use a mix of policies, both fiscal and monetary, which ultimately aim to improve public welfare. Fiscal policies such as tax adjustments or providing subsidies with appropriate schemes will essentially enable people to spend more on food, which will ultimately increase food security figures.

CONCLUSION

This research confirms that government assistance in the form of food subsidies plays a crucial role in supporting the community's food needs. The higher the government subsidies, the greater the potential for food security. Similar results are evident for welfare levels. The higher the level of welfare, the easier it is for people to access food, so improving welfare is essential to raising food security. With the results presented, this research supports several previous studies that have also examined the influence of subsidies and welfare on food security.

On the other hand, poverty and rice consumption have no impact on food security figures. Generally, people living in poverty will focus on efforts to escape from that poverty. Food security figures reflect the adequacy of food consumption in general and across the board, not just staple food consumption. Therefore, rice consumption figures are not comprehensively representative.

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