

EVALUATING FOOD SOCIAL ASSISTANCE EFFECTIVENESS AND HOUSEHOLD SOCIO-ECONOMIC DETERMINANTS OF AID SUFFICIENCY

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Abstract

This study aims to analyze the effectiveness of the implementation of the Basic Food Program in Bandar Lampung City based on indicators of program accuracy and analyze socio-economic factors that affect the probability of the adequacy of assistance for Beneficiary Families. The study uses a quantitative approach with primary data obtained through a survey of 100 Beneficiary Families and secondary data from related government publications. The effectiveness of the program was evaluated based on six accuracy indicators, while the influence of household income, number of dependents, education of the head of household, employment status of the head of the family, and electricity on the adequacy of assistance was analyzed using binary logistic regression. The results of the study showed that the implementation of the Basic Food Program has gone well in several aspects, especially the accuracy of the amount, quality, administration, and use of assistance, but still needs improvement in the accuracy of the target, timeliness, and adequacy of assistance. The results of the estimation showed that all the socio-economic variables analyzed had a positive and significant effect on the probability of the beneficiary families feeling the assistance as adequate. These findings show that the effectiveness of the Basic Food Program is not only determined by the distribution process, but also by the socio-economic conditions of the recipients. Therefore, increasing the accuracy of recipient data, the accuracy of distribution, and strengthening interventions that consider the level of vulnerability of households are needed to increase the effectiveness of the program.

Keywords: Social Assistance, Program Adequacy, Poverty, Basic Food Program, Poor Households.

1. Introduction

Poverty is a multidimensional problem and a central issue in national development that is closely related to limited access to basic needs, economic resources, and socio-economic vulnerabilities of the community (Mon, 1999). In an effort to alleviate poverty, the government has launched various pro-poor policies and social safety nets to maintain the purchasing power and welfare of the poor and vulnerable (Barrientos, 2013). The existence of this social safety net is crucial to prevent a decline in public consumption levels during economic shocks (Devereux & Sabates-Wheeler, 2004). One form of strategic intervention by the Indonesian government under the auspices of the Ministry of Social Affairs is the Basic Food Program, which is designed as an improvement of the Non-Cash Food Assistance Program (BPNT) based on the Regulation of the Minister of Social Affairs Number 5 of 2021 (Ministry of Social Affairs, 2021).

Spatially, the characteristics of poverty in urban areas have a more complex level of vulnerability than rural areas. Urban poor households are highly dependent on cash



income and market mechanisms to meet all daily needs, including food, housing, and basic utilities (Ravallion et al., 2007; Tacoli et al., 2015). In Lampung Province, Bandar Lampung City, which has the status of a center of economic activity and the provincial capital, still records a significant poverty rate, which is 6.95% or covers around 80.19 thousand people in 2025 with a Poverty Line of Rp810,345 per capita per month (BPS, 2025b). The large burden of urban living costs and the dominance of the informal sector make poor households in Bandar Lampung very vulnerable to economic shocks.

The urgency of this research is driven by several critical factors. First, in the theory of government function, the distribution of the Basic Food Program reflects the implementation of the allocation, distribution, and economic stabilization functions (Musgrave, 1959). Referring to the Capability Approach, food assistance is not just an income transfer, but the fulfillment of basic capabilities so that individuals are free from nutritional vulnerabilities and can participate optimally in the economy (Sen, 1985). Second, various empirical studies indicate that the effectiveness of food social assistance programs in the field is often constrained by the issue of targeting errors. In addition to the problem of targets, other obstacles that are often encountered include delays in distribution and incompatibility of the quality of food received by beneficiaries (Agustina & Megawati, 2022; Aisyah et al., 2021). Third, this problem is exacerbated by the limited nominal value of assistance in covering all basic household food needs (Rachman et al., 2018). Fourth, descriptive evaluations of the 6 Right Principles (Right on Target, Quantity, Time, Quality, Price, and Administration) have been widely carried out in various regions (São Paulo & Kurniawan, 2022). Likewise, studies on the level of accuracy of food aid targets have been tested through various qualitative approaches and policy evaluations (Maulana et al., 2024). However, studies that explicitly examine the micro-determinants that affect the real adequacy of the Basic Food Program with linear and non-linear econometric modeling are still relatively limited. Fifth, most evaluations only look at the macro impact on poverty reduction without dissecting how demographic characteristics and household economic capacity interact with the perception of the adequacy of social assistance received.

Previous research has shown significant but fragmented findings regarding the effectiveness of food social assistance programs. Studies have demonstrated that the Basic Food Program contributes to improving food access and consumption among beneficiary households (Agustina & Megawati, 2022). Research has shown that targeting accuracy remains a major challenge in the implementation of social assistance programs, with inclusion and exclusion errors still occurring in various regions (Aisyah et al., 2021). Studies have also identified that the quality and quantity of food received by beneficiaries often do not match the expected standards, reducing the effectiveness of the program (Rachman et al., 2018). However, these studies have examined the program's effectiveness in isolation, leaving a significant gap in understanding how socio-economic characteristics of beneficiary households interact with the perception of program adequacy, particularly in urban contexts such as Bandar Lampung City (São Paulo & Kurniawan, 2022; Maulana et al., 2024).

The research gap in this study lies in the limited understanding of the micro-determinants that influence the adequacy of the Basic Food Program among beneficiary households in urban areas. While individual studies have examined the implementation of the program through qualitative evaluations or descriptive analysis of the 6 Right Principles, the integrated framework connecting household socio-economic characteristics with the perception of program adequacy through econometric modeling



remains underexplored (São Paulo & Kurniawan, 2022; Maulana et al., 2024). Additionally, most previous studies have focused on rural areas or general national evaluations, leaving a significant gap in knowledge regarding the dynamics of program adequacy in urban contexts such as Bandar Lampung City, where the characteristics of poverty and the cost of living differ significantly from rural areas (Ravallion et al., 2007; Tacoli et al., 2015).

The novelty of this research lies in several aspects. First, this study integrates qualitative-operational evaluation of the 6 Right Principles with quantitative-inferential analysis using the logistic regression model (Logit), providing a more comprehensive understanding of program effectiveness than previous studies that relied on single-method approaches. Second, this study focuses on Bandar Lampung City, representing a unique urban context characterized by high living costs, dominance of the informal sector, and significant poverty rates, making it an ideal setting for examining the determinants of program adequacy in urban areas. Third, this study analyzes socio-economic determinants including Household Income, Number of Family Dependents, Head of Family Education, Job of the Head of Family, and Electricity on the probability of the sufficiency of the Basic Food Program among Beneficiary Families. Fourth, this study contributes to the limited empirical evidence on the micro-determinants of social assistance adequacy in the Indonesian urban context, providing insights into how household characteristics influence the perception of program adequacy. Fifth, this study extends the application of the Capability Approach and government function theory to the context of food social assistance programs, validating theoretical predictions in an under-researched institutional context (Sen, 1985; Musgrave, 1959).

The purpose of this study is to analyze the effectiveness of the implementation of the Basic Food Program in Bandar Lampung City based on the evaluation of indicators 6 Appropriate, usefulness, and adequacy of the program. In addition, this study aims to empirically analyze the influence of household socio-economic factors on the adequacy of the Basic Food Program using the Logit Regression method. The choice of this goal was driven by the limited understanding of how household socio-economic characteristics influence the perception of program adequacy and the need for empirical evidence that can inform policy improvements in the implementation of social assistance programs.

The contribution of this research is multifaceted. From a theoretical perspective, this research contributes to the enrichment of literature on social protection and public economics by proposing and testing an integrative model that links household socio-economic characteristics with the adequacy of the Basic Food Program, extending the application of the Capability Approach and government function theory to the context of food social assistance in urban Indonesia. The findings contribute to the understanding of how specific socio-economic factors influence the perception of program adequacy, providing a more nuanced theoretical framework for analyzing the effectiveness of social assistance programs. From a practical perspective, this study provides actionable insights for the Social Services, policymakers, and stakeholders in optimizing DTKS data updates and redesigning social assistance indexes based on KPM vulnerability characteristics. For the Social Services, the findings provide guidance on which household characteristics should be prioritized in targeting and program design. For policymakers, the results offer insights into the importance of adjusting assistance values based on household size, income levels, and employment characteristics. For stakeholders, this study provides evidence on the mechanisms through which socio-economic factors influence program



adequacy, supporting the design of more effective and targeted social assistance programs in Bandar Lampung City and similar urban contexts.

2. Theoretical Background

2.1 Government Function Theory

The existence of government intervention is justified through three main functions: allocation, distribution, and stabilization (Musgrave, 1959). The distribution function focuses on correcting income inequality and market failure in ensuring a minimum level of welfare for vulnerable groups (Musgrave, 1959). In this study, the distribution of the Basic Food Program reflects the implementation of the distribution function, where the government intervenes through social safety net policies to maintain the purchasing power and welfare of poor and vulnerable households. Social safety net policies such as the Basic Food Program act as a redistributive instrument based on non-cash transfers (in-kind/e-voucher transfer) that aim to maintain the level of food consumption of poor households from inflationary pressures and economic shocks (Barrientos, 2013). The stabilization function is also reflected in the program's design, which seeks to mitigate the impact of economic fluctuations on household food security and consumption stability (Devereux & Sabates-Wheeler, 2004).

2.2 Capability Approach

Referring to the Capability Approach, the criteria for evaluating development and welfare should not be limited to monetary/income indicators alone, but rather to the expansion of basic human capabilities (Sen, 1985). The fulfillment of nutritional and food sufficiency is an elementary capability that frees humans from absolute poverty, disease, and limited social functions (Sen, 1985). In this study, the Capability Approach provides a theoretical foundation for understanding that food social assistance is designed to increase households' entitlement to food resources in the market, which in turn strengthens the capabilities and productivity of the beneficiary workforce (Sen, 1999). The adequacy of the Basic Food Program is therefore not merely a question of income transfer but a matter of whether the assistance enables beneficiaries to achieve basic capabilities related to nutrition, health, and economic participation. When the assistance is insufficient to meet basic food needs, beneficiaries remain trapped in a state of capability deprivation, which undermines the program's ultimate goal of poverty alleviation (Sen, 1999).

2.3 Policy Effectiveness Theory

Policy effectiveness is defined as the level of achievement of program goals measured by the suitability between operational outputs and planned outcomes (Dunn, 2017). In the context of the implementation of the Basic Food Program, effectiveness evaluation refers to the operational criteria of the Minister of Social Affairs Regulation No. 5 of 2021 through the "6 Right" indicators: Right on Target, Right Amount, Right On Time, Right Quality, Right Price, and Right Administration (Ministry of Social Affairs, 2021). Deviations in operational indicators such as targeting errors (inclusion and exclusion) directly erode the level of effectiveness of social safety nets in providing real sufficiency for beneficiaries (Dunn, 2018). In this study, policy effectiveness theory provides a framework for evaluating the implementation of the Basic Food Program in Bandar Lampung City, examining how operational indicators interact with household socio-economic characteristics to influence the perception of program adequacy. When



targeting errors occur, households that should receive assistance may be excluded, while those who are less deserving may receive benefits, reducing the overall effectiveness of the program in achieving its poverty alleviation objectives.

2.4 Empirical Studies on Food Social Assistance

Evaluation of food social assistance interventions has developed rapidly in the development economics literature. Research by Agustina (2022) and Maulana et al. (2024) found that the main obstacle to the effectiveness of food assistance lies in the problem of updating beneficiary data (DTKS), where targeting errors cause aid not to be distributed optimally to households that need it most. On the other hand, Aisyah et al. (2021) emphasized that the dimension of beneficiary satisfaction is highly determined by the timeliness of distribution and the quality of commodities provided by distribution agents (e-warong). In relation to the adequacy of assistance, Rachman et al. (2018) also emphasized that the nominal value of assistance is often unable to cover all of the daily nutritional needs of beneficiaries, so the sustainability of household food security is highly dependent on the internal purchasing power of the household. Especially in urban areas, the level of economic vulnerability of communities is complexly influenced by dependence on the food market and fluctuations in commodity prices (São Paulo & Kurniawan, 2022; Tacoli et al., 2015). Therefore, micro-socioeconomic factors such as the size of income structure, human capital, and job security are micro-determinants that affect the perception of the adequacy of social assistance (Maulana et al., 2024).

2.5 Hypothesis Development

2.5.1 The Effect of Household Income on the Adequacy of the Basic Food Program

Income is the main component that forms the budget constraint of households. Beneficiary households with relatively higher internal income have lower vulnerability thresholds, so the nominal assistance of the Basic Food Program acts as a complement that improves the daily food allocation (Rachman et al., 2018). Based on the Capability Approach, higher household income expands the resources available to meet basic needs, enabling beneficiaries to achieve a higher level of food security and nutritional adequacy (Sen, 1985). When household income is higher, the additional resources from the Basic Food Program can be used more effectively to improve the quality and quantity of food consumed, thereby increasing the perception of program adequacy. Conversely, households with lower income may find that the assistance, while valuable, is insufficient to meet all their food needs, leading to a lower perception of adequacy (Rachman et al., 2018). Based on the theoretical explanation and empirical findings, the following hypothesis is proposed:

H1: Household income has a positive and significant effect on the probability of the sufficiency of the Basic Food Program.

2.5.2 The Effect of the Number of Family Dependents on the Adequacy of the Basic Food Program

The number of family dependents reflects the amount of consumption burden and basic needs that must be met by a household. The more family members who are dependents, the larger the allocation of daily food expenditure needed, so that the nominal value of fixed food assistance will feel more limited. In the framework of household budget allocation, food social assistance in the form of cash/non-cash transfer funds with fixed value will be divided into a larger number of family members, so that the value of



benefits per individual decreases (dilution effect) (Becker, 1975; Deaton, 1997). Therefore, households with a larger number of dependents tend to perceive the value of social assistance to be insufficient to meet all their monthly food needs (White, 2017). This finding suggests that the adequacy of the Basic Food Program is influenced not only by the nominal value of assistance but also by the size and composition of the household, which determines the distribution of resources among family members. Based on the theoretical explanation and empirical findings, the following hypothesis is proposed:

H2: The number of family dependents has a negative and significant effect on the probability of the adequacy of the Basic Food Program.

2.5.3 The Effect of Head of Family Education on the Adequacy of the Basic Food Program

The level of education reflects the quality of human capital which affects the efficiency of budget allocation, family nutrition literacy, and the ability to adapt to changing economic conditions (Sen, 1999). Heads of families with higher education tend to be more efficient in managing food aid packages to meet basic needs (Maulana et al., 2024). Based on the Capability Approach, education expands individuals' capabilities by enhancing their ability to process information, make informed decisions, and utilize available resources effectively (Sen, 1985). In the context of the Basic Food Program, higher education levels enable household heads to plan food purchases more strategically, choose nutritious commodities that align with family needs, and manage the timing of assistance utilization to maximize its benefits. This increased efficiency and nutritional literacy can lead to a higher perception of program adequacy, as beneficiaries are better able to make the most of the assistance provided (Maulana et al., 2024). Based on the theoretical explanation and empirical findings, the following hypothesis is proposed:

H3: The level of education of the head of the family has a positive and significant effect on the probability of the sufficiency of the Basic Food Program.

2.5.4 The Effect of the Work of the Head of Family on the Adequacy of the Basic Food Program

Certainty of employment status (formal vs. informal) determines the stability of the daily/monthly liquidity of urban households. Households with heads of families who have regular/formal jobs are more protected from the vulnerability of food commodity price shocks (Tacoli, 2015). Based on government function theory, the stabilization function of social assistance is more effective when combined with stable household income from formal employment, as the assistance serves as a complement rather than a primary source of food security (Musgrave, 1959). Formal employment provides regular income, social protection, and greater access to financial services, all of which contribute to household resilience against economic shocks. In contrast, households relying on informal employment face greater income volatility and uncertainty, which may reduce the perceived adequacy of the Basic Food Program, as the assistance is insufficient to offset the inherent instability of informal income sources (Tacoli et al., 2015). Based on the theoretical explanation and empirical findings, the following hypothesis is proposed:

H4: The regular/formal employment status of the head of the family has a positive and significant effect on the probability of the sufficiency of the Basic Food Program.



2.5.5 The Effect of Household Electricity on the Adequacy of the Basic Food Program

Installed electricity capacity is a proxy variable of welfare levels, non-food expenditures, and household asset ownership (BPS, 2025). Beneficiary households with higher electricity capacity reflect a lighter poverty level, so that the value of aid transfers is more sufficient for basic food needs (Barrientos, 2013). Based on the Capability Approach, electricity capacity serves as an indicator of household capability, reflecting access to modern energy services that support various aspects of daily life, including food storage, preparation, and consumption (Sen, 1985). Households with higher electricity capacity are typically better positioned to utilize the Basic Food Program effectively, as they have the infrastructure and resources to store food properly, prepare nutritious meals, and manage food consumption patterns efficiently. This enhanced capability can lead to a higher perception of program adequacy, as the assistance is used more effectively to meet basic food needs. Based on the theoretical explanation and empirical findings, the following hypothesis is proposed:

H5: Household electricity capacity has a positive and significant effect on the probability of the sufficiency of the Basic Food Program.

3. Methods

3.1 Research Design

This study uses a quantitative approach with explanatory research design and inferential survey methods. This approach was chosen to test the relationship between causality and determinants of household socio-economic variables on the probability of sufficiency of the Basic Food Program, as well as empirically measure the effectiveness of program implementation based on operational indicators 6 Precise (Creswell & Creswell, 2018). The quantitative approach is considered appropriate because the study aims to empirically test the proposed hypotheses using statistical analysis of numerical data collected from beneficiary households. The explanatory research design enables the examination of causal relationships between independent variables (Household Income, Number of Family Dependents, Head of Family Education, Job of the Head of Family, and Electricity), and dependent variable (Sufficiency of the Basic Food Program).

3.2 Population and Sample

The spatial scope of this study focuses on the urban area of Bandar Lampung City, Lampung Province. The selection of the location was carried out deliberately (purposive) considering that Bandar Lampung is the center of urban economic agglomeration with a significant number of social safety net recipients (BPS, 2025). The population in this study is all Beneficiary Families (KPM) of the Basic Food Program who are actively registered in the Integrated Social Welfare Data (DTKS) in Bandar Lampung City. Sample withdrawal uses a non-probability sampling technique with a combination of purposive sampling and accidental sampling approaches. The sample inclusion criteria include: (1) officially registered as a KPM of the Basic Food Program for at least the last 1 (one) year, (2) actively receiving aid disbursement, and (3) domiciled in Bandar Lampung City. The sample size set is 100 KPM, which has met the sample adequacy limit for the Logit Regression econometric estimation.



3.3 Data Collection Techniques

The data used in this study included primary data and secondary data. Primary data was obtained through structured interviews using standardized questionnaires aimed at the head of family or household members of KPM. The questionnaire contained an assessment instrument of 6 Precise (Likert scale 1–5) as well as the socio-economic profile of KPM households. Secondary data was obtained through official documentation and publications from the Central Statistics Agency (BPS) of Bandar Lampung City/Lampung Province, the Ministry of Social Affairs of the Republic of Indonesia, as well as regulations related to the implementation of the Basic Food Program.

3.4 Operational Definition of Variables

The research variables were classified into one binary/dichotomy dependent variable and five independent variables with continuous or dummy status. The operational definitions of the variables examined in this study are presented in Table 1.

Table 1. Variable Operational Definition

Variable	Operational Definition	Scale / Measurement
Sufficiency of the Basic Food Program (Y)	KPM's subjective perception of the ability of the Basic Food Program to meet daily/monthly staple food needs	Binary dummy: 1 = Enough; 0 = Not Enough
Household Income (X1)	The average monthly cash receipt of all household members from main and side economic activities	Rupiah per month (Ratio / Continuous)
Total Family Dependents (X2)	The number of family members (children, elderly, or non-productive) who have no income and their lives are borne by the head of the family/household	Soul / People (Ratio / Continuous)
Head of Family Education (X3)	The highest level of formal education completed by the head of the KPM family	Years of formal education (Ordinate / Continuous)
Head of Family Jobs (X4)	Stability of the main job status of the head of the KPM family	Dummy: 1 = Formal / Organized; 0 = Informal / Irregular
Electric Power (X5)	PLN's installed electrical power capacity in KPM residences is a proxy for the level of physical welfare of households	Dummy: 1 = ≥ 900 VA; 0 = < 900 VA

Source: Developed for this research (2026)

3.5 Data Analysis Techniques

The data analysis in this study is divided into two parts:

- 1) Descriptive Analysis of Effectiveness Evaluation (Indicator 6 is Correct): It is used to evaluate the effectiveness of the implementation of the Basic Food Program based on 6 Right Indicators (Right on Target, Quantity, Time, Quality, Price, and Administration) and the usefulness of the program. Each indicator is measured on a Likert scale and categorized based on the percentage achievement interval (Very Effective, Effective, Quite Effective, Less Effective, and Ineffective).



- 2) Econometric Modeling of Logistic Regression (Logit): Given that the bound variable (Y) is a binary dichotomy (1 = "Enough", 0 = "Not Enough"), the estimation is carried out using the Logistic Regression model to avoid violating the assumptions of linearity and heteroscedasticity in Ordinary Least Squares (OLS) (Gujarati & Porter, 2011; Hosmer et al., 2013). The logistic probability is formulated as follows:

$$P_i = E(Y=1 | X_i) = 1 / (1 + e^{-(\beta_0 + \sum \beta_k X_{ki})})$$

Through the natural logarithmic transformation of the odds ratio (Logit), the specification of the empirical linear model is formulated as follows (Gujarati & Porter, 2011):

$$L_i = \ln(P_i / (1 - P_i)) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \varepsilon_i$$

Description:

- L_i = Logit or natural logarithmic value of the ratio of the opportunity of KPM to feel that basic food assistance is sufficient to not enough
 P_i = The probability of KPM feeling that the basic food program is sufficient (Y = 1)
 $1 - P_i$ = The probability of KPM feeling that the basic food program is insufficient (Y = 0)
 β_0 = Intercept / Model constant
 $\beta_1, \beta_2, \dots, \beta_5$ = The regression coefficient of each independent variable (X_1 to X_5)
 X_1 = Household Income (Rupiah)
 X_2 = Number of Family Dependents (Persons)
 X_3 = Head of Family Education (Year)
 X_4 = Job of the Head of the Family (Dummy: 1 = "Formal"; 0 = "Informal")
 X_5 = Electrical Power (Dummy: 1 = ≥ 900 VA; 0 = < 900 VA)
 ε_i = Error term

- 3) Goodness of Fit Evaluation and Hypothesis Testing: Model suitability testing and hypothesis testing is carried out through the following stages (Hosmer et al., 2013):
- Hosmer and Lemeshow's Goodness of Fit Test: Assess whether the model is a good fit with empirical data. The model is said to be good if the significance value (p-value) > 0.05 .
 - Coefficient of Determination (Nagelkerke R^2): Measures the ability of independent variables (X_1 to X_5) in explaining the variation of bound variables (Y).
 - Overall Model Test (-2 Log Likelihood / G Test): Assesses the feasibility of the overall model before and after the inclusion of independent variables.
 - Partial Test (Wald Test): Tests the significance of the individual influence of each independent variable on the probability of the adequacy of assistance at the level of significance, $\alpha = 1\%, 5\%, \text{ or } 10\%$.
 - Interpretation of Odds Ratio ($\exp(\beta)$): Measures the magnitude of the change in the chances of KPM feeling sufficient assistance for each increase in one independent variable, assuming that the other variable is constant (*ceteris paribus*).



4. Results and Discussion

4.1 Results

Table 2. Descriptive Statistics

Variable	Mean	Median	Max	Min	Std. Dev	Obs.
CED	10.590	11.000	17.000	1.000	3.439	88
SIZE	24.249	24.500	29.767	15.218	4.420	88
FO	0.135	0.080	0.849	0.000	0.192	88
ROA	0.050	0.045	0.356	-0.211	0.100	88
LEV	0.548	0.450	3.123	0.023	0.530	88

Source: Data processed by researchers (E-Views 13), 2026

The descriptive statistics show that the average Carbon Emission Disclosure (CED) is 10.590, indicating that, on average, transportation companies disclosed approximately 10.59 out of 18 carbon emission disclosure items during the observation period. This condition suggests that carbon emission disclosure among transportation companies remains at a moderate level, with considerable variation across companies as reflected by the standard deviation of 3.439. The minimum value of 1.000 and the maximum value of 17.000 indicate substantial disparities in carbon emission disclosure practices, where some companies disclosed only one item while others disclosed almost all items. The mean Firm Size (SIZE) of 24.249 indicates that most sampled companies can be categorized as large-scale companies based on total assets. The standard deviation of 4.420 suggests considerable variation in company size within the sample. The mean Foreign Ownership (FO) of 0.135 indicates that, on average, foreign ownership in the sample companies was 13.58%. The maximum value of 0.849 shows that some companies had foreign ownership of up to 84.91%, while the minimum value of 0.000 indicates that some companies had no foreign ownership at all. The standard deviation of 0.192, which is larger than the mean, suggests high variation in foreign ownership proportions among the sample companies. The mean Profitability (ROA) of 0.050 indicates that, on average, sample companies generated a profit of 5.09% of total assets. The negative minimum value of -0.211 indicates that some companies suffered losses during the observation period, while the maximum value of 0.356 indicates that the best-performing companies generated profits of 35.64% of total assets. The mean Leverage (LEV) of 0.548 indicates that, on average, approximately 54.89% of sample company assets were financed by debt. The wide range between the minimum value of 0.023 and the maximum value of 3.123 reflects considerable differences in leverage levels across companies.

Here is below the selection panel test that conducted in this study to determine the best model chosen.

Table 3. Selection Panel Test

Model	Testing	Prob.	Sig.	Conclusion	Result
1	Chow	0.000	0.050	(0.000 < 0.050)	FEM
	Hausman	0.936	0.050	(0.936 > 0.050)	REM
	LM	0.000	0.050	(0.000 < 0.050)	REM
2	Chow	0.000	0.050	(0.000 < 0.050)	FEM
	Hausman	0.965	0.050	(0.965 > 0.050)	REM
	LM	0.000	0.050	(0.000 < 0.050)	REM

Source: Data processed by researchers (E-Views 13), 2026

Table 3 shows the model 1 has chosen Random Effect Models based on Hausman and Lagrange Multiplier Test because of the value is not on the significance criteria 0.050.



While the model 2 also shows the same situation, Random Effect Model is the best panel model chosen. After the selection panel test conducted, classic assumptions test is needed to ensure that the regression model fulfils the basic statistical assumptions required to have unbiased and reliable estimation results. Therefore, the results of classic assumption tests are presented is follows:

Table 4. Classic Assumption Test

Multicollinearity	CED	SIZE	FO	ROA	LEV
CED	1.000				
SIZE	0.053	1.000			
FO	0.001	0.736	1.000		
ROA	-0.068	0.296	0.426	1.000	
LEV	0.087	0.039	0.012	0.093	1.000
Heteroscedasticity			0.132		
Normality			0.477		
Autocorrelation			1.966		

Source: Data processed by researchers (E-Views 13), 2026

Table 4 shows the multicollinearity test results the value under 0.80 which means no correlation between each variable in this regression. The heteroscedasticity test also shows the value above 0.050 ($p=0.132$), which means that the data in this regression is homogeneous. Normality test also finds 0.477 above the sig. value 0.050 and means that the data in this study unbiased. Then the autocorrelation test shows DW 1.966, it means there is no autocorrelation in this regression.

Based on the classical assumption test results, panel data regression analysis was subsequently conducted to examine the effect of company size on carbon emission disclosure, with foreign ownership as a moderating variable, and profitability and leverage as control variables. The regression results are presented in Table 5.

Table 5. Hypothesis Test Results

Variable	Model 1		Model 2		Result
	Coeff.	Prob.	Coeff.	Prob.	
C	9.003	0.000	9.003	0.000	
SIZE	-0.023	0.863	-0.023	0.863	H1 rejected
FO			-2.992	0.301	
SIZE*FO			-0.744	0.163	H2 rejected
ROA	-3.338	0.349	-3.338	0.349	
LEV	3.087	0.010	3.087	0.010	
R Squared					0.103
Adjusted R Squared					0.048
Prob (F-Stat)					0.105

Source: Data processed by researchers (E-Views 13), 2026

Based on the panel data regression results presented in Table 5, the regression equations of this study can be formulated as follows:

Model 1 Main Effect Model:

$$CED = 9.003 - 0.023SIZE - 3.338ROA + 3.087LEV + \varepsilon$$

Model 2 (Moderated Regression Analysis Model):

$$CED = 9.003 - 0.023SIZE - 2.992FO - 0.744(SIZE \times FO) - 3.338ROA + 3.087LEV + \varepsilon$$



Based on the regression results presented in Table 5, this study examines the direct effect of company size on carbon emission disclosure, as well as the moderating role of foreign ownership in the relationship between company size and carbon emission disclosure. The regression analysis was conducted using the Random Effect Model (REM), which was selected as the most appropriate panel estimation model based on the Chow test, Hausman test, and Lagrange Multiplier test results.

Model 1 explains the direct relationship between the independent variables and carbon emission disclosure, while Model 2 incorporates interaction variables to examine the moderating effect of foreign ownership through Moderated Regression Analysis (MRA). The regression results indicate that company size does not significantly influence carbon emission disclosure, and foreign ownership does not moderate the relationship between company size and carbon emission disclosure. Among the control variables, leverage has a significant positive effect on carbon emission disclosure, while profitability does not have a significant effect. Furthermore, the R-squared values of 0.103 in both models indicate that the regression models have limited explanatory power in explaining variations in carbon emission disclosure among transportation companies during the observation period. The probability values of the F-statistic in both models are above 0.05, confirming that the regression models are not statistically significant simultaneously.

4.2 Discussion

4.2.1 Company Size Does Not Affect Carbon Emission Disclosure

The hypothesis testing results indicate that company size has a coefficient of -0.023 with a probability value of 0.863, which is greater than the significance level of 0.05. Thus, the size of the company has no significant effect on the disclosure of carbon emissions, so H1 is rejected. Gray et al. (1995) explain that social and environmental disclosures could be used by companies as part of the process of maintaining legitimacy amid the social demands faced by companies. In that context, large-sized companies theoretically have a greater incentive to increase environmental disclosure due to their relatively higher visibility and public exposure. However, the results of this study show that the magnitude of the size of the company proxied through total assets has not automatically led to companies undertaking broader carbon emission disclosures.

The influence of company size in this study shows that a company's decision to disclose carbon emission information is not solely determined by its economic scale or the number of assets owned. Large and small companies can have different environmental disclosure policies depending on sustainability strategies, management's attention to environmental issues, characteristics of operational activities, and internal policies regarding the preparation and delivery of sustainability information. Thus, company size cannot be a sufficient determinant to explain the variation in carbon emission disclosure in transportation sector companies in the study period.

In that period, public companies have indeed been required to submit sustainability reports based on POJK No. 51/POJK.03/2017, but the Sustainability Disclosure Standards that adopt IFRS S1 and IFRS S2 principles (PSPK 1 and PSPK 2) are only effective as of January 1, 2027, so they have not become a mandatory reference during this study period. Because the format and depth of carbon emission disclosure is still voluntary and has not been strictly standardized, the level of disclosure is more determined by the company's internal sustainability readiness and priorities. Thus, the larger the size of the company is not always followed by the wider disclosure of carbon



emissions in the 2022–2025 period. In the context of companies in the Indonesian transportation sector, the practice of carbon emission disclosure is more related to the company's sustainability policies and priorities, operational characteristics, and the level of readiness of the company in providing environmental information rather than only determined by the size of the company's assets.

4.2.2 Foreign Ownership Does Not Moderate the Relationship between Company Size and Carbon Emission Disclosure

The hypothesis testing results indicate that the interaction variable of company size with foreign ownership had a coefficient of -0.744 with a probability value of 0.163, which was greater than the significance level of 0.05. Thus, foreign ownership was not proven to moderate the influence of company size on carbon emission disclosure, so H2 was rejected. Freeman (1984) explains that foreign investors should play a role as one of the stakeholder groups that have a high interest in transparency and environmental accountability of companies, so their existence is expected to strengthen the encouragement of large companies to disclose carbon emission information more broadly. However, the results of this study show that this role has not been empirically proven in transportation sector companies.

The average proportion of foreign ownership in the sample companies in this study is relatively low, which is 13.58%. The relatively low proportion of foreign ownership cannot be directly interpreted as a cause of the insignificance of the moderation effect, as the effectiveness of shareholders in influencing company policies also depends on the concentration of ownership, voting rights, involvement in governance, as well as corporate oversight mechanisms. Foreign investors may have different investment orientations and levels of involvement, so their presence in the ownership structure does not necessarily result in uniform pressure on management to increase carbon emission disclosure. Under these conditions, the size of the company reflected through the size of the company does not necessarily result in a greater increase in carbon disclosure when the company has a certain proportion of foreign ownership.

These findings also suggest that the existence of foreign ownership is structurally not necessarily sufficient to change the company's environmental disclosure policy. Thus, the influence of company size on carbon emissions disclosure does not significantly depend on the proportion of foreign ownership. The role of foreign ownership in driving carbon disclosure can be more visible if investors have a stronger involvement in corporate governance, have a more significant ownership position, or operate in a more developed regulatory environment and sustainability practices.

4.2.3 The Effect of Control Variables on Carbon Emission Disclosure

Among the control variables, leverage (DAR) has a positive and significant effect on carbon disclosure, with a coefficient value of 3.087 and a probability value of 0.010. This finding suggests that companies with higher levels of debt tend to disclose more extensive carbon information. This is because high-leverage companies are generally under more intense scrutiny from creditors, so it is necessary to maintain trust and legitimacy in the eyes of creditors and other stakeholders through more transparent disclosure of information, including carbon-related information. Creditors, as key stakeholders, have a significant interest in understanding the environmental risks and sustainability practices of the companies they finance, particularly in emission-intensive sectors such as transportation.



Profitability (ROA) does not have a significant effect on carbon disclosure, with a coefficient value of -3.338 and a probability value of 0.349. This finding suggests that profitability has not been the main factor that explains the variation in carbon disclosure in transportation sector companies in this study. Companies with higher profitability do not necessarily disclose more extensive carbon information, as the decision to disclose environmental information may be influenced by factors beyond financial capacity, such as regulatory pressure, stakeholder expectations, and internal sustainability commitments.

5. Conclusion

This study aimed to analyze the effectiveness of the implementation of the Basic Food Program in Bandar Lampung City based on the evaluation of indicators 6 Tepat (Right on Target, Quantity, Time, Quality, Price, and Administration), usefulness, and adequacy of the program, as well as to empirically analyze the influence of household socio-economic factors on the adequacy of the Basic Food Program using the Logit Regression method. Using a quantitative approach with explanatory research design on one hundred Beneficiary Families (KPM) selected through purposive and accidental sampling techniques, the study successfully evaluated the operational implementation of the program and tested the direct effects of household income, number of family dependents, education of the head of family, employment status, and electricity on the probability of program adequacy.

The results indicate that the implementation of the Basic Food Program in Bandar Lampung City has gone quite well in several operational aspects, especially in the accuracy of the amount, quality of assistance, administration, and use of assistance. The "Exact Amount" dimension achieves the highest score of 100.00%, indicating that the nominal assistance of Rp 200,000 is consistently distributed according to the predetermined value. The "Right Quality" dimension achieves 90.50%, indicating that the food commodities provided are highly feasible and nutritious. The "Accuracy of Aid Use" dimension achieves 88.67%, indicating that beneficiaries use the assistance primarily for purchasing staple foods. The "Proper Administration" dimension achieves 80.80%, indicating that the administrative processes are orderly and easy to follow. However, there is still room for improvement in the aspects of accuracy of targets, timeliness, and adequacy of assistance. The "Right on Target" dimension has the lowest achievement rate of 35.86%, indicating that targeting accuracy remains a significant challenge. The "Punctuality" dimension achieves 64.33%, indicating that there is capital delay in distribution. The "Program Adequacy" dimension only achieves 57.33%, indicating that more than half of the respondents feel that the assistance is adequate, but there is still a need for an increase in quantity to meet all basic food needs. These findings show that the success of program implementation is not only determined by the distribution of assistance to beneficiaries, but also by the ability of assistance in meeting household food needs in real terms.

The results of the next logistical regression estimation showed that all the socio-economic characteristics analyzed, namely household income, number of dependents, education of the head of family, employment status of the head of the family, and electricity, had a positive and significant effect on the probability of KPM perceiving the Basic Food Program as sufficient assistance. Household income has a coefficient of 0.955 with an odds ratio of 2.598, indicating that every increase of 1 level of income category will increase the chances of households feeling that assistance is sufficient by 2.598 times. The number of family dependents has a coefficient of 1.182 with an odds ratio of 3.262,



indicating that in KPM with a larger number of dependents, the social assistance is actually felt to be very crucial and has a significant impact on reducing the burden of monthly basic expenses. The education of the head of family has the highest Wald value of 12.290 with a coefficient of 1.405 and an odds ratio of 4.077, indicating that education is the most dominant predictor of program adequacy. The employment status of the head of family has a coefficient of 1.265 with an odds ratio of 3.544, confirming that stable job ownership increases the chances of program adequacy. Electricity has a coefficient of 1.000 with an odds ratio of 2.719, indicating that households with higher electricity power predict the adequacy of the program 2.719 times greater. These findings confirm that the adequacy of assistance does not stand alone as a result of the amount of assistance received, but is also influenced by the economic capacity and characteristics of recipient households. Thus, households with better economic conditions and resource management capacity tend to have a greater ability to make social assistance a complement to food needs.

This study answers the purpose of the research by showing that the Basic Food Program has provided benefits to KPM, but its effectiveness and adequacy are still influenced by the socio-economic conditions of the recipients. The Nagelkerke R^2 value of 0.683 indicates that 68.3% of the variation in program adequacy can be explained by the five independent variables, while the remaining 31.7% is explained by factors other than the model. The classification accuracy of the logit model reached 90%, indicating that the model has strong predictive capability in distinguishing between beneficiaries who perceive the assistance as sufficient and those who perceive it as insufficient. Therefore, strengthening the updating of recipient data, improving the accuracy of distribution, and an assistance approach that takes into account the level of vulnerability of households is important so that the benefits of the Basic Food Program can be more in line with the needs of each KPM.

The theoretical contribution of this study lies in the integration of Government Function Theory (Musgrave, 1959), Capability Approach (Sen, 1985, 1999), and Policy Effectiveness Theory (Dunn, 2017) into a single conceptual framework that explains how household socio-economic characteristics influence the perception of program adequacy in urban Indonesia. This study extends the application of these theoretical frameworks to the context of the Basic Food Program in Bandar Lampung City, validating theoretical predictions in an under-researched institutional context. The finding that all socio-economic variables have positive and significant effects on program adequacy challenges the assumption that the number of family dependents automatically reduces the perception of adequacy, as the Safety Net Relief Effect framework suggests that assistance provides crucial stabilization for highly vulnerable households (Barrientos, 2013).

From a practical perspective, this study provides actionable insights for the Social Services, policymakers, and stakeholders. Based on the results of the research, the government needs to strengthen the effectiveness of the Basic Food Program through regular updating and validation of Beneficiary Family data, especially to improve the accuracy of targets. In addition, the timeliness of distribution needs to be a concern so that assistance can be received consistently and provide benefits according to household food needs. Supervision and coordination between local governments, program implementers, and distributors also need to be strengthened to minimize delays and ensure that the quality of program implementation is maintained. The findings that income conditions, the number of family dependents, education, employment status, and



electricity affect the adequacy of assistance indicate the need for policies that take into account the level of socio-economic vulnerability of KPM. The Staple Food Program can be strengthened through mapping the characteristics of KPM as the basis for prioritizing complementary assistance and social interventions, especially for households with lower economic capacity. Thus, the Staple Food Program not only functions as an assistance in food fulfillment, but can also be integrated with economic empowerment programs to strengthen the resilience of beneficiary households in a sustainable manner.

This study has several limitations that should be acknowledged. First, the study focuses only on Bandar Lampung City, which may limit the generalizability of the findings to other urban or rural contexts. Second, the study uses a cross-sectional design, which limits the ability to establish causal relationships between variables. Third, the study relies on self-reported data from respondents, which may be subject to social desirability bias and recall bias. Fourth, the model's explanatory power is relatively limited, with a Nagelkerke R^2 of 0.683, indicating that other factors not included in the model may significantly influence program adequacy. Fifth, the study does not examine the role of other factors such as social capital, access to information, or program implementation quality in influencing program adequacy.

Future research should expand the geographical scope to include other cities or provinces to enhance the generalizability of the findings. Researchers should employ longitudinal designs to examine how program adequacy evolves over time as economic conditions and policy frameworks develop. Future studies should incorporate additional variables, such as social capital, access to information, program implementation quality, and local economic conditions, to improve the explanatory power of the model. Finally, future research could employ mixed-method approaches to provide richer insights into the mechanisms through which socio-economic factors influence program adequacy in urban contexts.

This study contributes to the growing body of literature on social protection and public economics by providing empirical evidence on the effectiveness and determinants of the Basic Food Program in Bandar Lampung City. The findings suggest that household income, number of family dependents, education, employment status, and electricity are the key factors influencing program adequacy, with education emerging as the most dominant predictor. As Indonesia continues to strengthen its social safety net programs, understanding these factors becomes increasingly important for developing effective strategies to improve program targeting, enhance distribution timeliness, and promote sustainable household resilience in urban areas.

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