

## Food Security Outcomes of Indonesia's Non-Cash Food Assistance Program (BPNT) among Lowest-Expenditure Households

Bayu Kharisma<sup>1\*</sup>, Adhitya Wardhana<sup>2</sup>, Sutyastie Soemitro Remi<sup>3</sup>,  
Devi Irmayanti Fathimah<sup>4</sup>

<sup>1,2,3</sup>Faculty of Economics and Business, Universitas Padjadjaran, Indonesia

<sup>4</sup>Central Bureau of Statistics of Bukittinggi Municipality, Indonesia

E-mail: <sup>1</sup>[bayu.kharisma@unpad.ac.id](mailto:bayu.kharisma@unpad.ac.id), <sup>2</sup>[adhitya.wardhana@unpad.ac.id](mailto:adhitya.wardhana@unpad.ac.id),

<sup>3</sup>[sutyastie.remi@unpad.ac.id](mailto:sutyastie.remi@unpad.ac.id), <sup>4</sup>[devi.irma@bps.go.id](mailto:devi.irma@bps.go.id)

\*Corresponding author

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### ABSTRACT

**Research Originality:** This study provides the first scientific analysis of the effect of the Non-Cash Food Assistance (BPNT) Program on household food security among Indonesia's lowest 20% expenditure group.

**Research Objectives:** This study investigates how the Non-Cash Food Assistance Program (BPNT) influences household food security in Indonesia, specifically among households in the lowest 20% expenditure group.

**Research Methods:** This research utilizes a multinomial logistic regression model to examine the key determinants of food security among households.

**Empirical Results:** The Non-Cash Food Assistance Program (BPNT) plays a significant role in improving the food security of recipient households. Social assistance programs like BPNT can help low-income families by mitigating the negative effects of food price shocks, specifically by promoting dietary diversity.

**Implications:** The government should keep updating data to make BPNT distribution more effective, especially for the poorest 20% of households, who are most vulnerable to food insecurity. It also needs to conduct regular outreach and monitoring to ensure beneficiaries use BPNT properly.

### Keywords:

non-cash food assistance (BPNT); household food security; multinomial logistic regression

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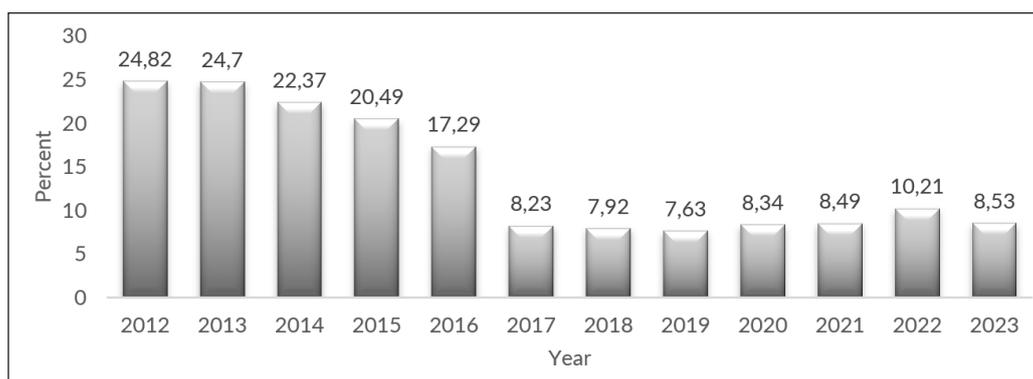
## INTRODUCTION

Poverty remains a persistent challenge in Indonesia. In response, the government implemented the Non-Cash Food Assistance (BPNT) Program, which allocates IDR 200,000 monthly per family for food purchases. As of the 2022 fiscal year, the program achieved 99.25% performance and 98.15% budget realization (Mabruk & Prasoj, 2024). BPNT aims to enhance the welfare and survival of impoverished and marginalized groups by improving food accessibility, thereby addressing the fundamental rights and welfare of the families receiving the aid (KPM).

Initiated in 2017 as a transformation of the Rastra (Prosperous Rice) program, BPNT continues to receive substantial budget allocations. In 2023, it received the largest share of Indonesia's social protection budget, reaching IDR 45.1 trillion and targeting 18.8 million beneficiary families. Although the government has implemented the BPNT program to strengthen the food security of poor and vulnerable households, around 8-9 people out of every 100 Indonesians cannot consume enough food to supply the necessary energy for individuals to function normally and stay physically well.

The COVID-19 pandemic has led to heightened economic unpredictability worldwide, posing challenges to food security in Indonesia. Government interventions like BPNT and PKH have reduced the prevalence of inadequate food consumption from 10.21% in 2022 to 8.53% in 2023, especially in low-income communities. In other words, 8–9 out of every 100 Indonesians consume food but still fail to meet the daily energy requirement of 2,100 kcal necessary to function normally and stay physically well. Although this figure has declined, it remains above the government's 2024 National Medium-Term Development Plan (RPJMN) target of 5.7% (Bappenas, 2020). More intensive efforts are needed to achieve this target. For more details, see Figure 1.

Figure 1. Prevalence of Undernourishment (PoU), 2012-2023



Source: Central Bureau of Statistics (2024)

Poverty significantly limits economic access to food, as most low-income individuals in Indonesia face food insecurity due to difficulties in ensuring the availability of healthy food that complies with standard dietary norms (Zakiah, 2018). One of the key challenges to improving household-level food security is the high proportion of people with limited

purchasing power. In this context, insufficient income is a significant barrier for many households in accessing adequate quantities of quality food (Rachman, 2010). Food consumption is inherently linked to poverty, as poor households prioritize food over non-food expenditures. Consequently, poverty and food insecurity are closely intertwined, with poverty as a primary driver of food insecurity (Ainistikmalia et al., 2022). With a score of 60.2, Indonesia ranks 63rd out of 113 countries in the 2022 Global Food Security Index (GFSI), below the global average of 62.1. Within ASEAN, Indonesia ranks fourth, behind Singapore, Malaysia, and Vietnam. The GFSI assesses food security across several dimensions: affordability, availability, quality, safety, sustainability, and adaptation. Indonesia scored well in affordability (81.4), but lags in availability (50.9) and sustainability and adaptation (46.3). While the country has made progress in ensuring affordable food through robust protection systems, it continues to face challenges in guaranteeing food quality, safety, and long-term resilience (The Economist Group, 2022).

In 2022, domestic strategic food availability increased to 6.40%, surpassing the target of 3.64%, which placed it in the “very successful” category. Production of several key commodities also saw notable gains compared to 2021: rice increased by 2.31%, corn by 9.29%, chili by 10.88%, meat (in yield) by 14.50%, milk by 2.39%, and eggs by 7.28%, although shallots declined by 1.51% (Bappenas, 2024). Despite these improvements in national-level food availability, challenges persist in ensuring food diversity and equitable access across the population (Arif et al., 2020). The abundance of food at the national level is not always matched by household-level access, particularly among low-income groups.

Ariningsih & Rachman (2016) emphasize that most poor households in Indonesia struggle with food insecurity due to limited access to food, hindering their ability to obtain healthy, safe, and nutritious meals. Arif, Isdijoso, Fatah, & Tamyis (2020) identify poverty and the high cost of food relative to income as the primary barriers to food access. Although poverty rates have declined recently, approximately 25.9 million people, equivalent to 9.36% of the population, remained below the poverty line in 2023 (Central Bureau of Statistics, 2023).

Indonesia also faces challenges related to food utilization at the household level. Effective food management is critical, yet issues such as low consumption levels, poor dietary quality, and limited variety remain prevalent. Beyond availability and affordability, food security is also influenced by households' knowledge and awareness of the importance of balanced and diverse nutrition (Saputri et al., 2016). Therefore, this study adopts a comprehensive definition of food security, encompassing four key dimensions at the household level: availability, affordability, accessibility, and utilization.

Household food security can be assessed through a classification that links per capita daily calorie adequacy with the proportion of household expenditure allocated to food (Yuliana et al., 2020). Based on Permenkes RI No. 28 of 2019, Indonesia's recommended daily energy intake is 2,100 kcal per capita. A household is deemed calorie sufficient if it consumes more than 80% of this target (i.e., >1,680 kcal/capita/day), and calorie-deficient if consumption is equal to or less than 80% ( $\leq$ 1,680 kcal/capita/day). The food expenditure share is considered high if it is 60% or greater, and low if it is below 60%.

Cross-classifying these two indicators yields four household food security categories: food secure, food vulnerable, food less secure, and food insecure.

The Indonesian population is divided into five equal-sized expenditure quintiles, ranked from lowest to highest, which serve as a proxy for welfare status (BPS, 2023). As shown in Table 1, the lower the quintile, the greater the share of food expenditure. This trend reflects the limited income available for non-food needs in poorer households, resulting in a disproportionate allocation of resources toward food. Low-income households' high share of food expenditure indicates constrained financial capacity and purchasing power, signaling that food security has not been adequately achieved (Sundari & Nachrowi, 2016).

Table 1. Food Expenditure Share and Calorie Adequacy by Expenditure Quintile in 2023

Expenditure Quintile	Average Monthly Per Capita Expenditure (IDR)	Share of Food Expenditure (% per month)	Calorie Adequacy (kcal/capita/day)
(1)	(2)	(3)	(4)
Quintile 1	522,942	63.37	1,663.05
Quintile 2	786,662	59.98	1,919.42
Quintile 3	1,067,196	57.56	2,082.67
Quintile 4	1,491,891	54.13	2,268.17
Quintile 5	3,390,657	39.42	2,504.91
Total	1,451,870	48.99	2,087.64

Source: Central Bureau of Statistics (2023)

Nationally, the share of food expenditure among the Indonesian population stood at 48.99% in 2023. Among the lowest expenditure quintile (Quintile 1), with an average monthly per capita expenditure of IDR 522,942, the food expenditure share was 63.37%. In Quintiles 2 through 4, the share remained above 50%. Only Quintile 5, the highest expenditure group, had a food expenditure share below 50%, at 39.42%. These figures reflect a clear trend: the lower the income group, the higher the expenditure allocated to food. This pattern suggests that lower-income households must dedicate most of their income to meet basic nutritional needs, leaving little room for non-food expenditures. The high food expenditure share among the poorest households highlights their limited financial capacity and purchasing power, signaling that food security remains unachieved for a significant population segment (Sundari & Nachrowi, 2016).

Calorie adequacy data further reinforces these disparities. In 2023, the average calorie consumption across the Indonesian population was 2,087.64 kcal per capita per day. While Quintile 4 and 5 households consumed 2,268.17 and 2,504.91 kcal, respectively, exceeding the national adequacy threshold of 2,100 kcal, the lower three quintiles fell short. Notably, the lowest quintile recorded an average intake of only 1,663.05 kcal per capita per day, well below the adequacy standard. These findings confirm that the

poorest households cannot access sufficient nutritious food to meet their basic energy needs, primarily due to income constraints (Siddiqui et al., 2020).

Considering how food security fundamentally supports well-being and quality of life, both the private sector and policymakers have a vested interest in influencing consumer behavior and protecting vulnerable groups. The Non-Cash Food Assistance Program (BPNT) is an intervention to improve food access among Beneficiary Families (KPM), households within the lowest 25% of socio-economic conditions. However, program implementation has not been optimal. Only 28.46% of food-insecure households received BPNT in 2022, and its utilization stood at just 86.9%. Moreover, recipients are disproportionately concentrated in higher expenditure groups. BPNT has the lowest absorption rate among poor households compared to other social assistance schemes, just 40% (Arfandi & Sumiyarti, 2022).

Similar programs in other countries offer instructive comparisons. In the United States, the Supplemental Nutrition Assistance Program (SNAP), formerly known as the food stamp program, has existed since 1939. Mousa & Freeland-Graves (2019) found that programs offering supplementary food support, such as pantries and kitchens, positively affect the nutritional quality of household food and overall food security. Ogundari et al. (2022) revealed that compared to non-recipients, SNAP recipient households are more likely to achieve food security. Thus, by improving access to nutritious food, government food assistance programs improve household food security (Ssekate, 2024).

Furthermore, Gundersen et al. (2017) state that the SNAP program helps lower food insecurity rates among families with children. Schmidt et al. (2016) found that participation in key safety net programs—such as TANF, SNAP, or Medicaid/SCHIP—helped reduce both the number of economic hardships and instances of food insecurity among low-income households with children, particularly within non-immigrant, single-parent families. Their study revealed that receiving food or cash assistance was associated with a four percentage point decline in food insecurity. Similarly, Tiwari et al. (2016) investigated government-led cash transfer initiatives in Ghana, Kenya, Lesotho, and Zambia. Their findings indicated that consistent and sufficiently large cash transfers improved the quantity and quality of food consumed and significantly reduced household food insecurity. While climate and weather-related shocks tend to worsen food insecurity, interventions such as Ethiopia's Productive Safety Net Program have shown that cash support can help alleviate these impacts—though food aid alone proved less effective. Households that had savings or opted to sell their harvests at higher prices, rather than consuming them, tended to fare better. However, such strategies remain less accessible for the poorest households, who are also the most vulnerable to food insecurity (Dasgupta & Robinson, 2021).

Meanwhile, several studies in Indonesia, including Syamola and Nurwahyuni (2019) and (2022), found that Raskin receipt does not affect household food security. Mutiah and Istiqomah (2017) found that Raskin significantly increased households' chances of food security, but this research was only conducted in urban areas. Meanwhile, Sundari and Nachrowi (2015) showed that participation in the Raskin program positively influenced

household food security in Indonesia, but did not specifically look at its impact on poor households.

Given the inconsistent findings and the absence of research examining the BPNT program's impact on the lowest-income group, this study seeks to fill that gap. By leveraging 2023 Susenas data, this research aims to evaluate the effectiveness of BPNT in improving food security among households in the bottom 20% expenditure group. This study aspires to make a meaningful empirical contribution to the literature on food assistance and poverty alleviation. As BPNT commanded the most significant budget among social protection programs in 2023, ensuring its effectiveness is essential. The findings will provide important policy insights for better targeting and delivering food assistance to Indonesia's most vulnerable households.

## METHODS

This study utilizes secondary data from the March 2023 National Socio-Economic Survey (Susenas) and its associated Consumption Module, provided by Indonesia's Central Statistics Agency (BPS). Susenas is conducted biannually, in March and September; the March round was selected for this analysis because it provides detailed data at the household level, ensuring comprehensive coverage across the country. The choice of the 2023 dataset reflects a post-pandemic context, offering an up-to-date and relevant snapshot of household conditions following Indonesia's recovery from COVID-19.

The March 2023 Susenas survey surveyed approximately 345,000 households across 34 provinces and 514 districts/cities, achieving a response rate of 99.98%. After data cleaning to ensure completeness and consistency, 341,802 households were retained for analysis in this study. The dependent variable in this study is household food security status. This is determined using a classification framework based on Jonsson & Toole (1991) in Widada et al. (2017), which cross-tabulates two indicators: (1) per capita daily calorie adequacy and (2) the share of food expenditure relative to total household expenditure. Calorie adequacy reflects the household's ability to meet nutritional needs, measured by the number of calories consumed per person per day. According to Indonesia's Ministry of Health Regulation No. 28 of 2019, the recommended daily energy intake is 2,100 kcal per capita. Households are considered calorie-sufficient if their per capita calorie intake exceeds 80% of this threshold ( $>1,680$  kcal/capita/day), and calorie-deficient if intake is equal to or less than 80% ( $\leq 1,680$  kcal/capita/day).

Table 2. Degree of Household Food Security

Calorie Sufficiency	Proportion of Food Expenditure	
	Low (<60%)	High ( $\geq 60\%$ )
Sufficient (>80%)	Food Secure	Food Vulnerable
Lacking ( $\leq 80\%$ )	Food Less Secure	Food Insecurity

Source: Jonsson & Toole (1991) in Widada et al. (2017)

Based on Table 2, household food security status is grouped into four categories, as follows: Category 0 = Food Insecurity; Category 1 = Food Less Secure; Category 2 = Food Vulnerable; Category 3 = Food Security.

The share of food expenditure refers to the proportion of total monthly household spending allocated to food needs. Total household expenditure comprises food and non-food consumption, calculated based on goods and services received, used, or purchased for household purposes within a month, excluding expenses related to business operations or transfers to others. The consumption approach measures the quantity of food consumed during the survey. For non-food consumption, the delivery approach captures goods and services acquired (either purchased or received) and utilized by the household. The share of food expenditure is classified as low if it is less than 60% and high if it is 60% or more. This variable is one of two key indicators in determining household food security status. The study's independent variables capture several dimensions of food security, including food availability, affordability, utilization, and the impact of government interventions. All variables were constructed using responses from the March 2023 Susenas Core Questionnaire (VSEN23.K) and the Consumption Module (VSEN23.KP). Further details are provided in Table 3.

**Table 3. Operationalization of Variables**

Variables	Information
Food Security Status (Dependent Variable)	0 = Food Insecurity 1 = Food Less Secure 2 = Food Vulnerable 3 = Food Security
Business Field (Occupation)	0 = Non-agriculture 1 = Agriculture
Residential Area Classification	0 = Rural 1 = Urban
Per Capita Expenditure	1. First 20% (lowest) 2. Second 20% 3. Third 20% 4. 20% fourth 5. 20% fifth (highest)
Ownership Status of Residential Building	0 = Not Owned 1 = Owned
Credit Access	0 = No Credit Access 1 = With Credit Access
Gender of Head of Household	0 = Female 1 = Male
Education level of household head	1. Elementary School 2. Junior High School 3. High School 4. College
Age of household head	Age of household head
Total number of household members	Total number of household members
Non-cash Food Assistance	0. Non-recipient 1. Recipient

Source: Various studies

This study employs multinomial logistic regression to examine the impact of the BPNT program and other influencing factors on household food security status and estimate the likelihood of these variables affecting that status. This statistical method is suitable when the dependent variable is categorical with more than two possible outcomes, and multiple independent variables are involved.

According to Sundari & Nachrowi (2015), ordinal logistic regression is unsuitable for analyzing food security levels because the categories of the dependent variable do not exhibit a strictly sequential relationship. While “food secure” may be considered better than “food insecure,” the distinctions between intermediate categories—such as “food less secure” and “food vulnerable”—are not necessarily ordinal in nature. Furthermore, this study did not use the ordered logit model because the data did not meet the proportional odds assumption, also known as the parallel lines assumption. In contrast, multinomial logistic regression does not require this assumption and allows for separate coefficients across all dependent variable categories (Amrullah et al., 2019).

This research model modifies the model used by Sundari & Nachrowi (2015) focusing on the households in the lowest expenditure group. Food security status serves as the dependent variable and is categorized as follows:  $Y = 0$  food insecure,  $Y = 1$  food secure,  $Y = 2$  food vulnerable,  $Y = 3$  food secure. Thus, a logistic model with four categories of food security status would have a logit function for  $Y=i$  compared to  $Y=0$  (reference category), as follows:

$$\ln\left[\frac{\pi(Y=i|x)}{\pi(Y=0|x)}\right] = \beta_{i0} + \beta_{i1}BPNT + \beta_{i2}occupation + \beta_{i3}location + \beta_{i4}logincome + \beta_{i5}home + \beta_{i6}loan + \beta_{i7}gender + \beta_{i8}educ_1 + \beta_{i9}educ_2 + \beta_{i10}educ_3 + \beta_{i11}age + \beta_{i12}size + \varepsilon_i, i = 1,2,3 \quad (1)$$

Where  $\beta$  is the logit parameter value, and  $\varepsilon$  is the error term. The probability for each category in the multinomial logistic regression model with four categories is:

$$\pi_i = \pi(Y=i | x) = \frac{e^{z_i}}{1 + e^{z_1} + e^{z_2} + e^{z_3}} \quad (2)$$

With the probability of a household being food insecure ( $i=0$  and  $e^{z_0}=1$ ), food less secure ( $i=1$ ), food vulnerable ( $i=2$ ), or food security ( $i=3$ ). The estimation results of the  $\beta$  coefficient cannot be interpreted directly. To provide a more meaningful interpretation, an interpretation is needed based on the coefficient results of the marginal effect estimation, which refers to the change in probability due to changes in the independent variable. The marginal effect in the multinomial model is calculated differently for each category. The marginal effect can be formulated as:

$$ME_{ij} = \frac{\partial \pi(Y=i|X)}{\partial x_j} = \pi(Y = i|X) \cdot (\beta_{ij} - \sum_{k=0}^l \pi(Y = k|X) \beta_{kj}) \quad (3)$$

## RESULTS AND DISCUSSION

Table 4 shows that in 2023, only 14.49% of households in the lowest expenditure group in Indonesia were classified as food secure, while the remaining 85.51% were not. The most significant proportion of food-insecure categories—36.45%—falls into the food

vulnerable group. This category includes households that meet calorie adequacy standards but must allocate 60% or more of their income toward food. In contrast, 26.13% of households were classified as food insecure, characterized by low food expenditure share but insufficient calorie intake. Meanwhile, 22.93% of households were categorized as food insecure, meaning they fail to meet both calorie adequacy and exhibit a high share of food expenditure. These figures underscore the challenges the lowest-income households face in achieving food security.

Table 4. Summary Statistics

Variables	Food Insecurity % or Mean [SD]	Food Less Secure % or Mean [SD]	Food Vulnerability % or Mean [SD]	Food Security % or Mean [SD]
<i>Status of Food Security</i>	22.93	26.13	36.45	14.49
<i>Employment of Head of Household</i>				
Non-Agriculture	21.52	31.19	32.38	14.91
Agriculture	24.11	21.92	39.83	14.14
<i>Area</i>				
Rural	24.19	23.98	37.98	13.85
Urban	19.88	31.37	32.71	16.03
<i>Ownership of Residential Building</i>				
Not Owned	26.88	30.66	31.61	10.85
Owned	22.39	25.50	37.12	14.99
<i>Access to Credit</i>				
Without Access to Credit	23.48	26.01	36.30	14.21
With Credit Access	20.57	26.65	37.09	15.69
<i>Gender of household head</i>				
Female	16.80	25.60	38.31	19.30
Male	23.77	26.20	36.20	13.83
<i>Education Level of Head of Household</i>				
Elementary school or below	23.27	22.02	40.39	14.32
Junior High School	23.74	28.29	33.78	14.20
High School	21.82	34.78	28.31	15.08
Higher Education	19.08	39.99	25.20	15.73
<i>Non-cash food assistance (BPNT)</i>				
Non-recipient	23.50	28.03	34.28	14.18
Recipients	21.23	20.39	42.98	15.40
Age	47.12	47.41	50.39	50.82
Size	5.07	4.67	4.14	3.84
<b>N</b>	<b>68.361</b>			

Source: National Socio-Economic Survey (2023)

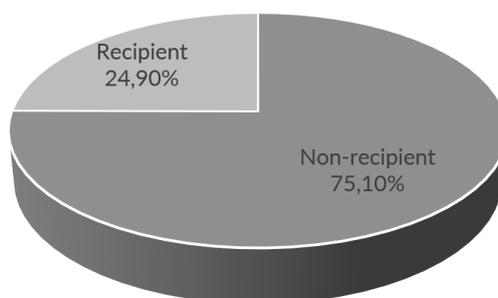
Table 4 summarises how household characteristics relate to food security status. Households categorized as food secure tend to have higher per capita income. In terms

of age, households headed by older individuals are generally more food secure. Similarly, a smaller household size is associated with greater food security, suggesting that fewer dependents reduce the burden on available resources. Concerning occupation, there is no notable difference in food security outcomes between households whose heads work in the agricultural sector and those in non-agricultural employment.

However, other factors influence food security. Households residing in urban areas, owning their homes, having access to credit, and being led by male heads of household with university-level education are more likely to be food secure. Additionally, households that receive BPNT assistance are more likely to attain food security, further emphasizing the importance of targeted government interventions for vulnerable populations.

Meanwhile, Figure 2 illustrates that only 17,025 households, or 24.90% of those in the lowest 20% expenditure group, received BPNT assistance in 2023. This result indicates a relatively low coverage rate, with approximately 75.10% of households in this group remaining unreached by the program. Given that the BPNT program is specifically designed to support households facing the greatest vulnerability to food insecurity, this limited coverage is a critical concern. Ideally, all households in the lowest expenditure quintile should be prioritized as BPNT beneficiaries. The current gap in coverage highlights the need for improved targeting and distribution mechanisms to ensure that the assistance reaches those most in need and effectively contributes to reducing food insecurity among Indonesia's poorest households.

Figure 2. Distribution of Non-Cash Food Assistance (BPNT) to Households in the 20% Lowest Expenditure Group in Indonesia in 2023



Source: National Socio-Economic Survey (2023)

The analysis results are presented in Table 5, showing the multinomial logistic regression estimation. In the first logit function equation  $\ln\left(\frac{\pi_1}{\pi_0}\right)$ , the category of food Less Secure ( $Y=1$ ) relative to food insecurity ( $Y=0$ ), each of the independent variables is significant at the 99% confidence interval ( $\alpha = 0.01$ ). The gender and education dummy variables (*educ*) are not significant in the second logit function equation.  $\ln\left(\frac{\pi_2}{\pi_0}\right)$ , the category of food vulnerability ( $Y=2$ ) relative to food insecurity ( $Y=0$ ). Meanwhile, in the third logit function equation  $\ln\left(\frac{\pi_3}{\pi_0}\right)$ , the category of food security ( $Y=3$ ) relative to food insecurity ( $Y=0$ ), almost all independent variables are significant, except for the field of business/occupation of the head of the household.

The marginal effect results presented in Table 6 indicate that Non-Cash Food Assistance (BPNT) and most other independent variables—except for the employment sector of the head of household (KRT)—are significant at the 99% confidence level ( $\alpha = 0.01$ ). Specifically, receiving BPNT increases the probability of a household being food secure by 1.07% and decreases the likelihood of being food insecure by 1.62%. As a targeted program aimed at strengthening food security among Beneficiary Families (KPM)—those within the lowest 25% of socio-economic status—BPNT demonstrates a clear, positive impact on improving food security outcomes for its recipients.

**Table 5. Multinomial Logistic Regression**

Variables	Food Less secure $\ln\left(\frac{\pi_1}{\pi_0}\right)$	Food Vulnerable $\ln\left(\frac{\pi_2}{\pi_0}\right)$	Food Security $\ln\left(\frac{\pi_3}{\pi_0}\right)$
Occupation of Head of Household (1=Agriculture)	-0.281	0.135	0.005
Area Classification (1=Urban)	0.299	0.073	0.298
Ownership Status of Residential Building (1=Owned)	0.242	0.288	0.627
Credit Access (1=With Credit Access)	0.162	0.302	0.428
Gender of Head of Household (1=Male)	-0.202	-0.021	-0.177
Junior High School	0.224	-0.018	0.205
Senior High School	0.506	-0.035	0.435
University	0.762	0.030	0.638
Age of Head of Household	0.004	0.011	0.011
Number of Household Members	-0.129	-0.326	-0.473
Non-Cash Food Assistance (1=Recipient)	-0.191	0.297	0.170
Constant	0.415	0.995	0.357

$p < 0,01$ ,  $p < 0,05$ ,  $p < 0,1$

Source: National Socio-Economic Survey 2023, processed from sample data

These findings align with previous research by Sundari and Nachrowi (2015), who found that food assistance programs like Raskin helped reduce household spending burdens, increasing the likelihood of food security among beneficiaries. Similar evidence has emerged from studies in the United States. For example, Ogundari et al. (2022), McKernan et al. (2021) and Swann (2017) observed that participation in the Supplemental Nutrition Assistance Program (SNAP) significantly improved household food security, as reflected in reduced levels of food insecurity and hunger among recipient families.

When examining the food-insecure and food-vulnerable groups, the marginal effect analysis reveals that BPNT leads to a 6.78% decrease in the probability of food insecurity, while increasing the probability of being food vulnerable by 7.33%. This suggests that although BPNT may help households avoid the most severe forms of food insecurity, it may not be sufficient to move them into complete food security. One possible explanation is that BPNT allows recipients to reallocate limited income away from food to cover

other urgent needs—such as debt repayment or non-food expenses—thereby leaving them vulnerable despite some improvement. In addition, the assistance amount may not be adequate to meet all nutritional needs. Nevertheless, an increase in the food vulnerable group could indicate a positive transition from food insecurity to complete security. This aligns with the findings of Deb & Gregory (2018), who argue that food assistance programs may have a limited impact on food security at the extensive margin but can meaningfully reduce food insecurity at the intensive margin.

Regarding residential classification, households in urban areas were 2.09% more likely to be food secure than those in rural areas. This suggests that despite lower levels of food production, urban households benefit from greater diversity and accessibility in food supply, contributing to improved dietary quality. Similar patterns were observed by Amrullah et al. (2019) in Indonesia and Fadol et al. (2024) in Sudan. In contrast, Awoyemi et al. (2023) and Grimaccia & Naccarato (2019) noted that rural households may be more food secure due to lower food prices and local availability. However, Abebe (2024) highlighted that urbanization can also contribute to rising food insecurity in densely populated areas, as seen in urban Ethiopia.

**Table 6. Marginal Effect on Households in the Lowest 20% Expenditure Group**

Variables	Marginal Effect			
	Food Insecurity	Food Less Secure	Food Vulnerable	Food Security
(1)	(2)	(3)	(4)	(5)
Occupation of Head of Household (1=Agriculture)	0.0067	-0.0643	0.0544	0.0032
Area Classification (1=Urban)	-0.0325	0.0384	-0.0268	0.0209
Ownership Status of Residential Building (1=Owned)	-0.0550	-0.0030	0.0075	0.0505
Credit Access (1=With Credit Access)	-0.0455	-0.0120	0.0288	0.0287
Gender of Head of Household (1=Male)	0.0191	-0.0292	0.0230	-0.0128
Junior High School	-0.0182	0.0359	-0.0352	0.0175
Senior High School	-0.0407	0.0816	-0.0769	0.0359
University	-0.0672	0.1160	-0.0963	0.0475
Age of Head of Household	-0.0014	-0.0005	0.0014	0.0005
Number of Household Members	0.0467	0.0219	-0.0347	-0.0339
Non-Cash Food Assistance (1=Recipient)	-0.0162	-0.0678	0.0733	0.0107

p < 0,01, p < 0,05, p < 0,1

Source: National Socio-Economic Survey 2023, processed from sample data

Homeownership is another significant factor. Households residing in owned homes were 5.05% more likely to be food secure than those in rented or non-owned dwellings. This finding is consistent with the results of Indrawan et al. (2024), Kharisma & Abe (2020) and Guo (2011). Similarly, access to credit increases the probability of food security by 2.87% and reduces food insecurity by 4.55%. These results support prior findings by

Hassen et al. (2016) and Gebre (2012) in Ethiopia, who noted that access to credit facilitates income-generating activities and helps stabilize household consumption during periods of food stress. This relationship is further reinforced by Bahiru, Senapathy, & Bojago (2023).

Surprisingly, having a male head of household is associated with a 1.28% lower probability of food security and a 1.91% higher probability of food insecurity. This finding contrasts with some expectations and reflects a broader debate in the literature. For instance, Hassen et al. (2016) in Ethiopia, Wiranthi et al. (2014), and Heryanah (2016) found that households headed by women are more likely to achieve food security, possibly due to women's better management of limited resources and stronger prioritization of household nutrition. These findings are supported by the FAO (2014), which emphasized women's critical role in ensuring household food security. However, studies by Ganpule et al. (2023) in India and Swann (2017) in the United States reported that women-headed households may also face greater food insecurity, suggesting that the relationship is context-dependent.

The education level of the household head also plays a crucial role. Compared to those with only primary education or less, households led by individuals with junior high school education are 1.75% more likely to be food secure. This probability increases to 3.59% for senior high school graduates and 4.75% for university graduates. These findings are consistent with prior research from Abdullah et al. (2019) in Pakistan, and Cahyono & Tokuda (2024) found that higher education levels enhance knowledge, income opportunities, and access to nutritious food in Indonesia. Similar conclusions were drawn by Feyisa et al. (2023) in Ethiopia, Adjei-Mantey et al. (2023) in Ghana and Amrullah et al. (2023) in Indonesia.

Although the marginal effect of age is small, it is statistically significant. Each additional year in the age of the household head increases the probability of food security by 0.05%. This suggests that experience and stability associated with older age may contribute positively to food access and decision-making. Similar findings were reported by Megbowon & Mushunje (2018) in South Africa, Ogundari et al. (2022) in the United States, Abdullah et al. (2019) and M. Akbar et al. (2020) in Pakistan.

Finally, the number of household members is inversely related to food security. Each additional household member reduces the probability of being food secure by 3.39% and increases the probability of food insecurity by 4.67%. Larger households are more burdened by limited resources, making it more challenging to meet adequate nutritional needs. This pattern is consistent with the findings of Mutiah & Istiqomah (2017). Similar results were obtained by Beyene & Muche (2010) in Ethiopia and Ogundari et al. (2022) in the United States.

## Robustness Check

Robustness checks were conducted using alternative model specifications to ensure that the results are not solely dependent on the multinomial logistic regression model, following the approach of Cabral et al. (2025). As an alternative, multinomial probit regression was employed, given its structural and conceptual similarity to the multinomial logit model. Both models can handle dependent variables with more than two nominal (non-ordinal) outcome

categories and allow for multiple independent variables. Using the probit model validates the consistency and reliability of the findings obtained from the multinomial logit model.

Table 7 demonstrates that the effect of the Non-Cash Food Assistance Program (BPNT) remains consistent across both the multinomial logit and probit models. In both specifications, BPNT has a statistically significant positive impact on household food security at the 99% confidence level ( $\alpha = 0.01$ ). The marginal effect values are highly comparable across the two models, indicating that differences in estimation techniques do not materially alter the findings. This consistency confirms the robustness of the relationship between BPNT participation and household food security outcomes, reinforcing the validity of the results regardless of the model specification employed.

**Table 7. A Comparison of Multinomial Logistic and Multinomial Probit Regression**

Variables	Logit	Probit
Non-cash Food Assistance (1: Recipient. 0: Non-recipient)		
Coefficient $\beta$	0.170***	0.116***
Marginal Effect		
Food Insecurity	-0.0162***	-0.0182***
Food Less Secure	-0.0678***	-0.0653***
Food Vulnerable	0.0733***	0.0734***
Food Security	0.0107***	-0.0101***

$p < 0,01$ ,  $p < 0,05$ ,  $p < 0,1$

Source: National Socio-Economic Survey 2023, processed from sample data

## CONCLUSION

In addition to BPNT, various socio-economic and demographic factors influence household food security. Households headed by females, those with higher education levels, older heads, fewer members, access to credit, urban residence, and homeownership are more likely to be food secure. These findings emphasize the multifaceted nature of food security and the importance of a targeted, evidence-based approach to social assistance.

To enhance the effectiveness of the BPNT program, it is essential to conduct continuous data updates to improve targeting, especially for the poorest 20% of households, who remain the most food insecure. Furthermore, program socialization and routine monitoring are critical to ensure that beneficiaries are aware of and can utilize the assistance optimally. Priority should be given to households with the highest vulnerability: those in rural areas, with larger household sizes, and whose heads have only primary education or less.

This study also acknowledges its limitations. The analysis focuses primarily on internal household factors, due to the constraints of the available dataset. Future research could incorporate external variables, such as regional food availability, price fluctuations, market access, and health service infrastructure, all of which play essential roles in shaping household food security. Additionally, applying multilevel logistic regression may provide deeper insights by accounting for household-level and contextual-level influences.

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