**Analysis Of Household Food Security Among Farmers In Food-Insecure Areas Of Lombok Island West Nusa Tenggara Province**

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ABSTRACT

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| This study aims to: (1) analyze the food security conditions of farming households in food-insecure areas of Lombok Island; (2) identify and analyze the factors influencing household food security in these areas; (3) evaluate existing food security policies and/or programs; and (4) formulate policy and/or program recommendations to strengthen food security among farming households. A descriptive research method was employed, involving 44 respondents selected through Slovin’s formula and proportional sampling across four sub-districts in four regencies categorized as “food-vulnerable” areas. Four analytical approaches were used: the Food Insecurity Experience Scale (FIES) for assessing household conditions; factor analysis to determine key influencing factors; the Discrepancy Evaluation Model (DEM) to evaluate policy impacts; and policy analysis to formulate recommendations.  The findings show that: (1) 51.35% of respondents fell into the "moderate" food insecurity category and 48.65% into the "severe" category based on FIES; (2) the main factors affecting household food security were geographic and physical access (27.16% of variance), food availability and social support (20.33%), and consumption patterns and purchasing power (18.64%); (3) the effectiveness of current food security policies and/or programs was partial, with an average effectiveness score of 43.46%, indicating the need for improvements in relevance, distribution, and long-term strategy; and (4) policy and program recommendations are grouped into two categories: those to be maintained and strengthened—namely, beneficiary data updating, seed and fertilizer subsidies, food price stabilization, targeted food aid distribution, nutrition education, and village-level food storage—and those to be revised and further developed, including food diversification, farmer participation in planning, infrastructure development, village food cooperatives, cash-for-work schemes, and food diversification campaigns.  The study underscores the need for integrated, community-based, and context-specific interventions to achieve sustainable food security in rural farming households of Lombok Island. |

*Keywords: food security, food-insecure areas, farming households, food security factors, food security policy recommendations, food security policy evaluation,*

1. INTRODUCTION

Food security is a global issue with direct implications for health, well-being, and socio-economic development, including in Indonesia, which continues to face challenges in food provision, particularly in rural areas and among farming households in food-insecure regions (FAO, 2019). Ironically, although farmers are the main food producers, they are often the most vulnerable group due to limited resources, price fluctuations, and the impacts of climate change (IFAD, 2021). Indonesia, as one of the world’s largest rice producers, still experiences disparities in food access across regions. The Global Food Security Index (GFSI) 2022 ranked Indonesia 63rd out of 113 countries, with low scores in food availability and quality despite relatively good affordability levels (EIU, 2022). Factors such as climate change, limited infrastructure, and dependency on certain commodities have exacerbated the national food security problem (Basuki, 2021).

The province of West Nusa Tenggara (NTB) has significant agricultural potential and a rice production surplus, yet still faces food insecurity, especially at the household level among farmers (BPS NTB Province, 2023). Droughts, natural disasters, and inadequate infrastructure are major contributing factors, worsened by reliance on traditional farming methods (Setiawan, 2022). Data from the 2021 Indonesian Nutrition Status Survey (SSGI) indicates that the prevalence of severe malnutrition among children under five in NTB reached 3.02%, placing the province 18th out of 34 provinces in Indonesia (Ministry of Health, 2022). Consumption patterns dominated by carbohydrates such as rice and corn have led to low intake of protein and micronutrients, particularly among vulnerable groups like children and pregnant women (Drammeh et al., 2019).

According to the 2023 Food Security and Vulnerability Atlas (FSVA), several sub-districts in Lombok—such as Sekotong, Praya Barat Daya, Bayan, and Sambelia—face complex food security issues due to prolonged droughts, food price volatility, and limited infrastructure that hampers food distribution to remote areas. Most farming households in Lombok rely on rain-fed agriculture, which is highly susceptible to climate change and heavily dependent on rice production (Ramdhani, 2022), while crop diversification and access to agricultural technology remain low (Sumardi, 2021). Various programs have been implemented to improve food security in Lombok, such as nutrition education, food diversification, and social assistance. However, their effectiveness remains limited and has not significantly enhanced household food security (Ministry of Agriculture, 2023).

Based on the above context, the objectives of this study are as follows:  
(1) To analyze the condition of household food security among farmers in food-insecure areas of Lombok Island; (2) To analyze the factors influencing household food security among farmers in food-insecure areas of Lombok Island; (3) To identify and evaluate the policies and/or programs that have been implemented in food-insecure areas of Lombok Island; (4) To formulate policy and/or program recommendations to enhance household food security among farmers in food-insecure areas of Lombok Island.

2. methodology

This study employs a descriptive research method, which is conducted to determine the value of independent variables—whether one or more—without making comparisons or establishing relationships with other variables (Sugiyono, 2013). The unit of analysis in this study is farming households located in food-insecure areas of Lombok Island, West Nusa Tenggara Province. The research location was selected using purposive sampling based on the 2023 Food Security and Vulnerability Atlas (FSVA), which indicates that only four sub-districts across four regencies on Lombok Island (Sekotong Sub-district in West Lombok Regency, Praya Barat Daya Sub-district in Central Lombok Regency, Sambelia Sub-district in East Lombok Regency, and Bayan Sub-district in North Lombok Regency) are classified as "food-insecure areas" based on the food security dimension of the Food Security and Vulnerability Atlas (FSVA). The determination of respondents was carried out using Slovin’s Formula with a precision level of 15%. Slovin’s Formula is used to calculate the sample size from a known population, which in this case is the number of Agricultural Household Enterprises (RTUP) engaged in food crop commodities in the four regencies, totaling 304,120 households in 2023. Based on this calculation, a sample size of 44 respondents was obtained. The distribution of respondents across the four regencies was then determined using Proportional Sampling.

The data sources include both primary and secondary data. Data collection techniques employed were interviews and questionnaires. Four types of data analysis methods were used, each aligned with specific research objectives: (1) the Food Insecurity Experience Scale (FIES) for analyzing the condition of food insecurity; (2) factor analysis to determine influencing factors; (3) the Discrepancy Evaluation Model (DEM) to evaluate the implementation of policies and programs; and (4) policy analysis for formulating policy recommendations.

**Data Analysis Methods**

1. Food Insecurity Experience Scale (FIES)

The FIES measures the level of household food insecurity based on four key dimensions: food availability, accessibility, utilization, and stability. The eight questions reflect three levels of food insecurity: mild (questions 1–3), moderate (questions 4–6), and severe (questions 7–8) (FAO, 2020).

|  |
| --- |
| In the past 12 months, was there a time when... |
| 1. You or any household member were worried about not having enough food to eat due to a lack of money or other resources? (Worry) |
| 1. You or any household member had to reduce the number of meals per day because of insufficient food availability? (Healthy) |
| 1. You or any household member consumed food of low quality or not in accordance with preferences due to food limitations? (Fewfood) |
| 1. You or any household member were forced to repeatedly consume the same type of food due to lack of options? (Skipped) |
| 1. There was a time when you or any household member had to skip a meal because there was not enough food? (Ateless) |
| 1. You or any household member felt hungry but did not eat because there was not enough food at home? (RunOut) |
| 1. You or any household member could not eat sufficient portions or felt undernourished due to food limitations? (Hungry) |
| 1. Any household member experienced unintended weight loss due to limited food access? (Whlday) |

Source: Primary Data, 2025

1. Factor Analysis

Factor analysis is a multivariate statistical technique used to identify and group related variables into several principal factors. It is useful for data reduction and for identifying dominant factors influencing food security (Hair et al., 2010). The stages of factor analysis are as follows:

1. Variable Selection: Based on theoretical frameworks, previous research, and relevance to the research objectives.
2. Feasibility Testing: Utilizing Bartlett’s Test of Sphericity (sig. < 0.05) and the Kaiser-Meyer-Olkin (KMO > 0.5) measure to assess data suitability.
3. Factor Extraction: Principal Component Analysis (PCA) is used to reduce the dataset to key factors.
4. Factor Rotation: Varimax rotation is applied to produce a clearer factor structure, ensuring each variable loads significantly onto a single factor.
5. Determination of Dominant Factors: Factors with eigenvalues >1 are selected to represent the original variables effectively.
6. Discrepancy Evaluation Model (DEM)

The Discrepancy Evaluation Model, developed by Malcolm M. Provus (1971), is used to identify discrepancies between expected standards and actual performance in program implementation. In this study, DEM is employed to evaluate policy impact through the following stages:

1. Design: Establishing the ideal policy standard.
2. Installation: Assessing whether implementation aligns with the intended design.
3. Process: Evaluating the execution process against intermediate objectives.
4. Product: Measuring the final outcomes of the policy relative to the established standards.
5. Cost (optional): Evaluating the cost-efficiency and cost-benefit aspects of the policy.
6. Policy Analysis

Policy analysis is a systematic process used to collect, synthesize, and evaluate relevant information for formulating effective policy recommendations. According to Dunn (2018), the stages in policy analysis include:

1. Problem Formulation: Identifying key issues faced by farming households.
2. Future Projection: Forecasting the potential impact of policy measures on food security.
3. Policy Options Evaluation: Comparing alternative policy solutions to identify the most effective.
4. Monitoring and Evaluation: Ensuring that policy implementation aligns with its intended goals.

3. results and discussion

3.1 Respondent Characteristics

* 1. Gender

Gender is a significant factor that can influence individual roles within a household. The distribution of respondents by gender provides insights into gender roles in both food production and household consumption. The detailed characteristics based on the gender of farmers in Lombok Island are presented in Table 1.

Table 1. Gender Distribution of Farmers in Lombok Island, 2024

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | | **Gender** | **Number of Respondents** | **Percentage (%)** |
| 1 | | Female (F) | 28 | 63.64 |
| 2 | | Male (M) | 16 | 36.36 |
|  | Total | | 44 | 100 |

Source: processed primary data, 2025

As shown in Table 1, the majority of respondents in this study are female, accounting for 63.64%. This female dominance indicates the central role women play in managing household food security. According to the Ministry of Agriculture (2024), women play a crucial role in ensuring the availability and distribution of food at the household level. Additionally, a study by Pujilestari and Haryanto (2020) highlights that women perform dual roles in ensuring food availability, accessibility, and safety within the household.

* 1. Age

The distribution of respondent age provides an overview of the age groups that dominate the study population. Age influences productivity levels, experience in food management, and the ability to adapt to environmental changes. Detailed characteristics based on the age of farmers in Lombok Island are presented in Table 2.

Table 2. Farmer Characteristics by Age in Lombok Island, 2024

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Age (Years)** | **Number of Respondents** | **Percentage (%)** |
| 1 | 19-44 (Adult) | 15 | 34.09 |
| 2 | 45-59 (Pre-Elderly) | 21 | 47.73 |
| 3 | >60 (Elderly) | 8 | 18.18 |
|  | Total | 44 | 100 |

Source: Processed Primary Data, 2025

Based on Table 2, the age classification refers to Regulation of the Minister of Health No. 25 of 2016. The majority of respondents belong to the pre-elderly (45–59 years) category, accounting for 47.73%. This age group is in the mature productive phase, possessing sufficient experience to manage resources effectively for household food security. According to Astuti (2021), individuals in the productive age group demonstrate greater adaptability to environmental changes and food market dynamics. Another study by Riajaya et al. (2020) supports this, stating that this age group tends to have stronger economic resilience, which supports household food consumption.

* 1. Education Level

Education is a critical factor influencing how respondents manage food resources and adopt food security strategies. Educational attainment determines an individual’s ability to comprehend information, utilize technology, and access government assistance programs. Detailed characteristics based on the highest level of education completed by farmers in Lombok Island are presented in Table 3.

Table 3. Farmer Characteristics by Education Level

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Education Level** | | **Number of Respondents** | **Percentage (%)** |
| 1 | Did Not Complete Primary School | | 6 | 13.64 |
| 2 | Completed Primary School | | 17 | 38.64 |
| 3 | Completed Junior High School | | 6 | 13.64 |
| 4 | Completed Senior High School | | 9 | 20.45 |
| 5 | Completed Higher Education | | 9 | 20.45 |
|  | | Total | 44 | 100 |

Source: Processed Primary Data, 2025

As shown in Table 3, most respondents completed primary school, accounting for 38.64%. A low level of education may limit the ability to access information, technologies, and government food security programs. According to Astuti (2021), higher education enables better understanding of food diversification and agricultural technology adoption. A study by Haryanto et al. (2020) confirms that low education levels are associated with a higher risk of food insecurity.

* 1. Household Size

Household size reflects the economic burden within a household. Larger households tend to experience higher pressure on food availability, whereas smaller households may possess stronger food security. Detailed characteristics based on household size among farmers in Lombok Island are presented in Table 4.

Table 4. Farmer Characteristics by Household Size

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Number of Members** | | **Number of Respondents** | **Percentage (%)** |
| 1 | 1–3 (Small family) | | 20 | 45.45 |
| 2 | 4-6 (Medium family) | | 23 | 52.27 |
| 3 | >6 (Large family) | | 1 | 2.27 |
|  | | Total | 44 | 100 |

Source: Processed Primary Data, 2025

Based on Table 4, the highest proportion falls within the medium-sized family category (4–6 members), accounting for 52.27%, followed by small families (1–3 members) at 45.45%, while large families (>6 members) make up only 2.27%. This indicates that most respondents have a moderate number of dependents, reflecting a more balanced economic burden compared to larger families. According to Kurniawan et al. (2023), households with 4–6 members tend to have better food security than larger families, as food consumption can be managed more effectively within available resources. However, another study by Haryanto (2022) shows that smaller households (1–3 members) generally have better access to nutritious food, as resource allocation per individual is proportionally higher. These findings indicate that household size is an important factor influencing household food security.

**3.2. Household Food Security Conditions of Farmers**

**3.2.1. Reliability Test**

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Based on the results of the Rasch Model analysis, the reliability value obtained was 0.7553. This indicates that the instrument used in the study has a relatively good level of internal consistency in measuring household food security among farmers. According to the Rasch Model interpretation, a reliability value between 0.7 and 0.8 is considered acceptable for further analysis, although improvements are still possible (Cafiero et al., 2018).

Furthermore, the theta standard deviation value of 1.77 reflects a substantial variation in food security conditions among respondents. A higher theta standard deviation indicates greater differences in food security levels across the surveyed households. Since the instrument demonstrates acceptable consistency, the Food Insecurity Experience Scale (FIES)-based analysis can be carried out. This analysis provides a more accurate overview of household food security conditions, categorizing households into food secure, moderately food insecure, and severely food insecure.

**3.2.2. Food Security Conditions**

The household food security conditions in this study were assessed using the Food Insecurity Experience Scale (FIES), an experience-based survey method developed by the FAO. FIES measures household food insecurity across four dimensions: availability, accessibility, utilization, and stability. The results are shown in Table 5.

Table 5 : Household food insecurity measurement

|  |  |  |  |
| --- | --- | --- | --- |
| No | Category | Number of Respondents | Percentage (%) |
| 1 | Moderate | 19 | 51.35 |
| 2 | Severe | 18 | 48.65 |
| Total | | 37 | 100.00 |

Source: Processed Primary Data, 2025

The results indicate that most respondents are in critical food security conditions. A total of 51.35% fall into the severe category, meaning they experience serious food insecurity, including insufficient access to food for daily needs. Meanwhile, 48.65% fall into the moderate category, still facing challenges in food access and quality, although to a lesser degree. This highlights the vulnerability of farming households in the study area.

**By dimension, the results are summarized as follows:**

* **Food Availability**

This was found to be relatively good. A total of 34 respondents (77.27%) reported that their rice harvests could meet household needs for 3–6 months. However, availability was limited to staple food (rice), while other food items (proteins and vegetables) still had to be purchased. This reliance on own production exposes households to climate and harvest failure risks. This aligns with FAO’s (1996) food availability concept, which emphasizes the importance of sufficient food quantity. Hermawan et al. (2020) confirmed that agrarian regions such as Lombok have good staple food availability but still rely on market access for other food types.

* **Food Accessibility**

Physically, 72.73% of respondents reported relatively easy access to markets or local vendors. However, 68.18% stated limited purchasing power, especially for nutritious food. This supports the FAO (1996) notion that food access includes both physical and economic access.

* **Food Utilization**

This was one of the most problematic dimensions. About 90.91% of households consumed mainly rice with minimal side dishes, indicating poor dietary diversity. This leads to nutrient deficiencies, especially among vulnerable groups. The prioritization of food quantity over quality was common. As Purwanti (2019) noted, poor dietary diversity is often due to limited nutritional knowledge and economic constraints.

* **Food Stability**

All respondents (100%) reported frequent food price fluctuations, especially during lean seasons. Additionally, 88.64% reported a lack of storage facilities, leading to rapid depletion of food stocks. These findings align with Suryani et al. (2021), who highlighted the impacts of price volatility and storage limitations. Building community food reserves could improve long-term stability.

**3.3. Factors Influencing Household Food Security**

The factors influencing household food security among farming households were examined using factor analysis**.** Factor analysis is a multivariate statistical technique used to identify and group interrelated variables into several principal factors. The following presents the results of the factor analysis conducted to investigate the determinants of household food security.

**3.3.1. Variable Identification**

The variables used in this analysis reflect the dimensions of food security, including food stock availability, purchasing power, geographic, social, and physical conditions, consumption patterns, and dependency on harvest yields.

The *Food Stock Availability* variable represents the food availability dimension, which serves as a fundamental basis for understanding food security. This dimension encompasses the extent to which households have access to food in adequate quantity and quality.

The variables of *Purchasing Power*, *Geographic*, *Social*, and *Physical* conditions represent the dimension of food accessibility, which focuses on the ability of households to obtain food through economic, physical, and social means. *Purchasing Power* reflects the economic capacity of households to purchase food.

The *Consumption Pattern* variable relates to the food utilization dimension, which includes how households make use of food to meet their nutritional needs. This dimension involves aspects such as consumption habits, nutritional knowledge, and the diversity of diets consumed. This variable is crucial, as inadequate consumption patterns may lead to nutritional problems that affect food security, even when food availability and accessibility are ensured.

The *Dependency on Harvest Yields* variable is closely related to the food stability dimension. This dimension reflects the extent to which household food security is influenced by reliance on agricultural yields, which are often vulnerable to external factors such as weather conditions, pests, or price fluctuations. Food stability is a critical component, as the absence of stability in food sources may lead to food insecurity, even when short-term access and availability are present.

**3.3.2. Feasibility Test**

To ensure the suitability of the data for analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett’s Test of Sphericity were conducted. The following are the results of the KMO and Bartlett’s Test.

| **KMO and Bartlett's Test** | | |
| --- | --- | --- |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .536 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 50.450 |
| Df | 21 |
| Sig. | .000 |

Source: Processed Primary Data, 2025

Based on the results above, the KMO test yielded a value of 0.536, indicating a moderate level of sampling adequacy, yet still acceptable for factor analysis (KMO > 0.5). Meanwhile, Bartlett’s Test yielded a χ² value of 50.450 with a significance level of 0.000, which implies that the correlation matrix significantly differs from an identity matrix. These results suggest that the data meet the necessary requirements for factor analysis, albeit with moderate sampling adequacy. This test provides a solid foundation to proceed with factor extraction.

**3.3.3. Factor Extraction**

Factor extraction was conducted using the Principal Component Analysis (PCA) method to reduce the dataset into key components that represent the original variables. Based on the extraction results, three principal factors were identified with eigenvalues > 1, cumulatively explaining 66.13% of the total variance.

Table 6. Principal Component Analysis Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Component** | **Eigenvalue** | **% Variance Explained** | **% Cumulative Variance** |
| 1 | Food Accessibility | 1,996 | 27,16% | 27,16% |
| 2 | Food Availability | 1,437 | 20,33% | 47,49% |
| 3 | Food Utilization and Stability | 1,195 | 18,64% | 66,13% |

Source: Processed Primary Data, 2025

Table 6 shows that three principal components sufficiently represent the data structure. The first component explains the highest variance, followed by the second and third. The Scree Plot supports this conclusion, indicating a clear “elbow” at the third component. The subsequent components contribute significantly less to the total variance.

3.3.4. Factor Rotation

To clarify the factor structure, a Varimax rotation was performed, aiming to maximize the squared loadings of variables on a single factor such that each variable exhibits a high loading on one factor only. The following is the result of the Rotated Component Matrix:

Table 7. Rotated Component Matrix Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Variable | Component 1 (Food Accessibility) | Component 2 (Food Availability) | Component 3 (Utilization and Stability) |
| 1 | Food Stock Availability | 0,047 | -0,869 | 0,023 |
| 2 | Purchasing Power | -0,084 | 0,190 | -0,779 |
| 3 | Geographic Condition | 0,849 | 0,053 | 0,197 |
| 4 | Social Condition | 0,483 | 0,620 | -0,161 |
| 5 | Physical Condition | 0,893 | -0,086 | 0,104 |
| 6 | Consumption Pattern | 0,095 | 0,175 | 0,764 |
| 7 | Dependency on Harvest Yields | -0,362 | 0,454 | 0,194 |

Source: Processed Primary Data, 2025

Based on the above results, after rotation:

* 1. Factor 1 is dominated by *Geographic Condition* (0.849) and *Physical Condition* (0.893), indicating the critical role of geographic location and infrastructure in determining food security.
  2. Factor 2 is dominated by *Food Stock Availability* (-0.869) and *Social Condition* (0.620), reflecting the influence of food availability and social networks.
  3. Factor 3 is dominated by *Consumption Pattern* (0.764) and *Purchasing Power* (-0.779), highlighting the role of consumption behavior and household purchasing capacity in shaping food security.

**3.3.5. Determination of Dominant Factors**

The retained factors were selected based on eigenvalues greater than 1 and their contribution to the total variance. The three dominant factors are as follows:

1. **Factor 1 (Geographic and Physical Conditions):**

This factor explains 27.16% of the total variance. The dominant variables are *Geographic* and *Physical Conditions*, indicating the importance of physical access and geographical location in food security. With high loadings for Geographic (0.849) and Physical (0.893) variables, this factor emphasizes the significance of physical access to food sources. According to Sen’s (1981) entitlement theory, food security depends not only on availability but also on accessibility, which includes geographic and infrastructural conditions. Inadequate physical access hinders households from acquiring food, even when national stock is sufficient.

Field cases revealed that 35 farming households (79.55%) reported having shops or kiosks nearby; however, high prices and limited food variety due to distance from main markets led to low purchasing quantities due to limited purchasing power and prioritization of other needs such as children’s education. Kumar et al. (2021) found that poor physical access, especially in remote areas, increases food transportation costs by up to 30%, making food less affordable for low-income households. Moreover, food aid distribution in Lombok often fails to account for geographic constraints, with 15 farming households (34.09%) reporting delayed or inaccessible aid, rendering it ineffective in addressing food insecurity.

1. **Factor 2 (Food Availability and Social Conditions)**

This factor explains 20.33% of the total variance. The dominant variables are *Food Stock Availability* and *Social Condition*, indicating that equitable food supply and strong social assistance enhance food security. With high loadings for stock availability (-0.869) and social support (0.620), this factor aligns with Maxwell and Smith’s (1992) food distribution theory, which emphasizes that even food distribution and efficient systems are foundational to food security. Although rice availability is relatively adequate, with 34 respondents (77.27%) stating that their harvests met needs for 3–6 months, this only applies to staple foods. Field observations showed that 15 farming households (34.09%) received food aid that did not match their needs—they were given rice even though their rice stock was sufficient, while their needs for protein or vitamins were unmet. This indicates a lack of needs-based targeting in food aid programs in Lombok.

1. **Factor 3 (Consumption Pattern and Purchasing Power):**

This factor accounts for 18.64% of the total variance. The dominant variables are *Consumption Pattern* and *Purchasing Power*, reflecting the significant role of household income and eating habits in determining food security. High loadings for consumption pattern (0.764) and purchasing power (-0.779) underscore this link. Households with lower incomes are more vulnerable to food insecurity.

Interviews with 35 farming households (79.55%) revealed that they prioritized children's education over nutritious food, resulting in minimal food consumption patterns—often just rice with simple side dishes like chili paste or vegetables. Moreover, 41 respondents (93.18%) indicated that household dietary practices in Lombok are influenced by cultural preferences that prioritize staple foods such as rice, while neglecting dietary diversity. Lopez et al. (2023) found that strong cultural preferences are often major barriers to changing consumption habits.

Furthermore, 15 farming households (34.09%) indicated that aid programs focusing solely on a single food type (e.g., rice) did not improve dietary practices. Lopez and Hernandez (2019) demonstrated that more diverse food aid—such as packages including protein and vegetables—is more effective in improving household nutrition. Therefore, food aid programs in Lombok should be redesigned to address a broader range of nutritional needs.

**3.4. Evaluation of Implemented Food Security Policies and/or Programs**

The evaluation of implemented food security policies and/or programs was conducted using the Discrepancy Evaluation Model (DEM). The DEM, developed by Malcolm M. Provus, is designed to assess gaps in program implementation. The following presents the evaluation results using the DEM framework.

**3.4.1. Design (Policy Formulation)**

The design of food security policies in Lombok Island was analyzed based on the four core dimensions identified by FAO (1996): availability, accessibility, utilization, and stability. The primary goal of these policies is to ensure that communities have access to sufficient, nutritious, and stable food in both the short and long term. However, several design weaknesses hinder implementation, such as a lack of locally tailored approaches and limited inclusivity.

In the food availability dimension, policies such as agricultural subsidies for fertilizers, seeds, and irrigation were designed to boost local food production. While aligned with the government's traditional production-focused approach, these policies often neglect food diversification. Drewnowski and Popkin (1997) observed that excessive emphasis on staple food production, such as rice, may hinder dietary diversity. Field data from 15 farming households (34.09%) indicated that subsidies were primarily allocated for rice, while other commodities such as vegetables and fruits received insufficient attention. Consequently, despite increased rice production, communities still struggled to meet balanced nutritional needs.

In terms of food accessibility, the Non-Cash Food Assistance Program (BPNT) aims to enhance the purchasing power of low-income households. However, 15 households (34.09%) reported that rice assistance was insufficient or misaligned with their specific nutritional needs, such as protein or vegetables. Additionally, 100% of respondents (44 households) noted that outdated beneficiary data hampered the program’s ability to reach newly vulnerable groups. Kumar et al. (2021) emphasized that regularly updated data-driven policies could enhance program relevance and impact by up to 30%.

Regarding food utilization, nutrition education policies aimed to raise awareness about balanced diets. These programs are vital to encourage consumption beyond staple foods such as rice, by including protein, vegetables, and fruits. However, interviews with 21 respondents (47.73%) revealed that nutrition counseling mainly targeted pregnant women, leaving out other key household members such as heads of households and adolescents. Chen et al. (2023) suggested that involving all household members in nutrition education can improve dietary diversity by up to 40%. This shortcoming highlights the need for redesigning food utilization policies in Lombok to reach a broader audience.

In the food stability dimension, government efforts include social assistance and village food reserves to mitigate the impact of price fluctuations. However, long-term food stability remains problematic due to the absence of effective price stabilization mechanisms. Rahman and Idris (2020) noted that without such mechanisms, low-income households remain vulnerable to global food price volatility. Interviews showed that 20 respondents (45.45%) relied heavily on harvest outcomes, and 15 respondents (34.09%) on social assistance, increasing their vulnerability to economic shocks or natural disasters.

Overall, the design of food security policies in Lombok reveals fundamental weaknesses in integrating local needs and long-term planning. The policy’s reactive focus on rice production and short-term aid demonstrates a lack of preventive strategies. The absence of integration between programs—such as agricultural subsidies and nutrition education—further limits their effectiveness. As emphasized by Lopez and Hernandez (2019), policies must be locally tailored, inclusive, and sustainable. Recommendations include budget diversification, strengthening beneficiary databases, and integrated approaches to address food security comprehensively in Lombok.

**3.4.2. Installation (Policy Implementation)**

Implementation of food security policies in Lombok has encountered several issues. Although the policies were designed to improve household food security, field findings indicate a disconnect between planning and execution, reducing the programs’ effectiveness.

In terms of food availability, agricultural subsidies such as fertilizers and seeds were often deemed inadequate by farmers. All 44 respondents (100%) stated that these subsidies failed to meet their actual needs. This indicates a misalignment between subsidy allocation and on-ground requirements. Smith et al. (2020) reported that improper subsidy targeting could reduce production potential by up to 20%.

For food accessibility, the BPNT program was intended to ease food access for poor households. Yet, only 15 respondents (34.09%) felt the program was truly beneficial. The main issue was the mismatch between assistance provided and household-specific needs. For instance, 15 households (34.09%) reported receiving unnecessary rice aid, while lacking essential items such as protein and vegetables. Lopez and Hernandez (2019) showed that non-needs-based aid distribution could reduce program effectiveness by 30%. Furthermore, all 44 respondents (100%) emphasized that outdated beneficiary data excluded newly vulnerable groups.

Concerning food utilization, the government conducted nutrition education programs to promote healthier diets. However, their reach was limited, primarily focused on infant nutrition or immunization. Only 4 households (9.09%) reported that nutrition education improved their dietary practices. Chen et al. (2023) found that comprehensive education could increase diet diversity by up to 30%, but this requires broader, inclusive engagement. In Lombok, 38 respondents (86.36%) still relied heavily on rice, with low consumption of protein and vegetables.

Regarding food stability, social aid and price stabilization policies aimed to protect households from price volatility. However, 15 respondents (34.09%) stated the aid was either inadequate or delayed, particularly in remote areas, making it ineffective in mitigating food price shocks. Rahman and Idris (2020) highlighted that relying on external aid without robust price stabilization increases food insecurity risk during crises.

Overall, although food security programs in Lombok were well-designed, their implementation often failed to align with community needs. Key barriers include poor distribution, irrelevant program content, and a shortage of human resources. Furthermore, inter-agency coordination and outdated data usage undermined overall policy efficiency. To enhance implementation success, updating beneficiary data, investing in distribution infrastructure, and adopting locally tailored approaches—as recommended by Kumar et al. (2021)—are essential.

**3.4.3. Process (Assessment of Policy Execution Processes)**

The implementation process of food security policies in Lombok reflects a complex set of challenges in ensuring that the programs align with intermediate goals. This stage evaluates how the policies perform in terms of aid distribution, program relevance, and community participation. While there have been some successes, analysis indicates that the overall implementation process remains suboptimal due to several constraints.

Regarding aid distribution, efficiency remains a major concern. Many remote areas in Lombok face significant challenges in transportation and access. Poor road conditions and limited logistics infrastructure have resulted in delayed or insufficient distribution. Only 15 respondents (34.09%) felt that the distribution process helped them access food. Smith et al. (2020) emphasized that investment in rural transport infrastructure could improve distribution efficiency by up to 50%.

Program relevance also emerged as a critical issue. According to interviews, 15 respondents (34.09%) reported that government programs did not align with their household needs. For example, households received rice aid despite having adequate rice stock, while other nutritional needs—such as protein and vegetables—remained unmet. This misalignment indicates that many programs were not designed based on local needs. Lopez and Hernandez (2019) noted that needs-insensitive aid could reduce program effectiveness by 30%. In addition, 100% of respondents (44 households) stated that the lack of regular updates to beneficiary data led to the exclusion of newly food-insecure groups, exacerbating inequities in program delivery.

In terms of community participation, 40 farming households (90.91%) reported feeling excluded from the planning and implementation of food security programs, which were typically designed and executed by officials with input only from their close contacts. This low level of community engagement suggests a lack of community-based approaches. Bourdieu (1986) argued that strong social capital enhances the success of community-based programs, especially in rural areas. In Lombok, however, community participation is often limited to passive receipt of aid, without involvement in decision-making or program management. This leads to a diminished sense of ownership, which in turn reduces policy sustainability.

These three aspects—aid distribution, program relevance, and community participation—are interrelated and collectively affect policy success. Inefficient distribution delays or limits access to timely aid, while irrelevant programs fail to meet real needs. Simultaneously, low community engagement reinforces dependence on government interventions that may not be adaptive or effective. Chen et al. (2023) highlighted that community involvement in program management can increase efficiency by up to 25%, especially in rural settings.

Overall, the policy execution process in Lombok faces major challenges in terms of efficiency, relevance, and participation. These problems call for a reformed implementation approach, focused on updated beneficiary data, improved infrastructure, and enhanced community engagement. Addressing these process-related weaknesses would enable food security policies to deliver more substantial and sustainable impacts, as recommended by previous studies.

**3.4.4. Product (Assessment of Policy Outcomes)**

The outcome assessment of food security policies in Lombok Island focuses on the extent to which the implemented programs have generated tangible impacts on the community. This evaluation is framed around the four key dimensions of food security: availability, accessibility, utilization, and stability. The findings reveal partial achievements, though significant challenges remain that continue to undermine policy effectiveness.

In the dimension of food availability, government subsidies for fertilizers and seeds have supported some households in improving their harvests. However, 15 respondents (30.39%) reported that the assistance was insufficient to meet their needs. A key issue lies in subsidy misallocation, as farmers in remote areas often receive less access than those near distribution centers. Smith et al. (2020) found that equitable and well-targeted subsidies could enhance yields by up to 30%. In Lombok, the reliance on rice subsidies highlights the lack of production diversification, reinforcing rice as the primary indicator of food security.

Regarding food accessibility, the outcomes were mixed. Programs like BPNT have helped some households access food at lower prices, but only 15 respondents (30.39%) believed that the program sufficiently met their food needs. The core problem is the misalignment of aid with household-specific requirements. Respondents noted that rice, often provided as aid, was not always necessary, whereas protein and vegetables were not included. Sen’s (1981) entitlement theory argues that food access depends not just on availability but also on financial capacity and distribution systems. The findings from Lombok suggest that aid programs must improve targeting and sustainability to reach the most vulnerable groups more effectively.

In the utilization dimension, government-run nutrition education programs have produced localized benefits, yet the overall coverage remains limited. Only 4 farming households (9.09%) stated that the counseling improved their healthy eating habits. Dietary patterns in Lombok are still dominated by rice, with minimal consumption of protein and vegetables. Chen et al. (2023) reported that comprehensive nutrition education can enhance dietary diversity by up to 40%, but this requires adequate funding and human resources—both of which are lacking in Lombok.

The food stability dimension presents the most significant concern, especially in ensuring sustainable food supply and protection from price volatility. Social aid and village food reserves aimed at addressing this issue often fail to meet community needs. 15 respondents (30.39%) reported that the aid was insufficient or arrived late, particularly in remote regions. Rahman and Idris (2020) stressed that dependency on external aid without local price stabilization mechanisms increases food insecurity during crises. In Lombok, inadequate investment in food storage and reserve management has exacerbated vulnerability to economic shocks and natural disasters.

In summary, the evaluation of policy outcomes in Lombok shows that although some achievements exist, major issues persist in ensuring relevance, sustainability, and long-term impact. With a more integrated, needs-based approach, food security policies could yield broader and more equitable benefits, especially for the most vulnerable communities. Policy reforms focused on diversification, efficiency, and inclusivity are essential to achieving sustainable food security.

**3.4.5. Cost (Cost-Efficiency Analysis of Policy vs. Benefits)**

The cost-efficiency analysis reveals that the food security policies implemented in Lombok, when evaluated across the four food security dimensions, still face major challenges in ensuring that public spending translates into optimal community benefits. A disproportionate focus on subsidies and direct aid—without adequate investment in infrastructure and long-term education—has created imbalances that undermine policy effectiveness. With a more integrated, needs-based strategy, these policies could deliver greater and more efficient impacts. Policy reform must include budget diversification, strengthened beneficiary data systems, and long-term program investment to ensure sustainability.

Evaluation across dimensions shows:

* Availability: Agricultural subsidies for fertilizers and seeds helped increase yields but were deemed sufficient by only 34.09% of respondents. Lack of commodity diversification, beyond rice, limits the supply of nutritious food.
* Accessibility: BPNT helped improve purchasing power but often lacked relevance and relied on outdated beneficiary data, causing inequities. Only 34.09% of respondents felt the program met their needs.
* Utilization: Nutrition education reached only 9.09% of the population and had minimal impact on household dietary patterns. A majority (86.36%) still relied on staple foods like rice with insufficient protein and vegetables. Effectiveness here is estimated at 43.18%.
* Stability: Food stabilization policies failed to address price fluctuations and overreliance on short-term aid. 45.45% of respondents depended on harvests, while 34.09% said social aid was inadequate or delayed. Effectiveness on this dimension is 62.50%.

On average, the food security policies and programs in Lombok have demonstrated partial success, with an overall effectiveness rate of 43.46%. This indicates considerable room for improvement in areas such as program relevance, aid distribution, and long-term planning to ensure sustainable food security. According to Hatry (2010), any policy or program with an effectiveness below 70% requires significant improvement.

**3.5. Policy and/or Program Recommendations for Food Security**

A key step in policy analysis involves identifying the main challenges faced by farming households in food-insecure areas of Lombok Island. The findings indicate that most households fall into the “severe” or “moderate” food insecurity categories. This reflects a heavy dependence on harvest yields as the primary food source, while food access remains limited. Rice, as the staple food, is the sole reliance for most farming households in Lombok. This dependency contributes to limited dietary diversity, which is a major factor in low nutritional intake. A monotonous diet centered on rice not only reduces health quality but also increases economic pressure on farming households. According to the study, all 44 households (100%) relying solely on rice incurred higher expenses compared to those practicing dietary diversification. This is because rice often has to be purchased when harvest stock runs out, particularly during the lean season.

Field results from 24 respondents (54.55%) indicate that inadequate distribution infrastructure is a major constraint in ensuring equitable food availability across Lombok. Poor road access in several rural areas delays the transport of harvests to markets. Furthermore, 39 respondents (88.64%) reported a lack of storage infrastructure, such as cold storage facilities or village granaries, which causes significant post-harvest losses before the food can be sold or consumed. All 44 farming households (100%) agreed that food price fluctuations exacerbate household food insecurity. Prices of essential food items like rice, cooking oil, and meat often rise significantly during lean seasons, directly affecting the purchasing power of low-income farming households. As a result, 35 respondents (79.55%) reported reducing their consumption of nutritious foods such as protein and vegetables.

Limited nutrition education among farmers worsens the food insecurity situation. A total of 36 households (81.82%) lacked adequate knowledge about the importance of dietary diversity for fulfilling nutritional needs. Existing educational efforts often fail to reach all community segments, especially heads of households who make budgetary decisions (Hermawan, 2023). The study also found that the absence of integrated agricultural extension programs hampers progress in food security. Most programs focus solely on increasing rice production without addressing the need for diversifying nutrient-rich crops. Moreover, existing programs are often not adapted to local needs, thereby limiting their impact on household food security.

The Non-Cash Food Assistance Program (BPNT) serves as a temporary solution for some households. However, this program often fails to address local needs adequately. The aid, primarily consisting of rice, is often insufficient, while essential items such as protein and vegetables are lacking. Uneven distribution is another key barrier to the program's effectiveness. Interviews with 44 respondents (100%) revealed that while local government efforts to enhance food self-sufficiency have yielded positive results, many challenges remain. Programs such as fertilizer and seed subsidies have helped increase production, but their distribution remains unequal. Farmers in remote areas struggle to access these subsidies, meaning not all communities benefit equally. Poor inter-agency coordination also impedes the effective implementation of food security policies. Policy analysis indicates that food security enhancement programs often deviate from plans due to a lack of synergy among national, regional, and village-level governments. This leads to overlapping programs and inefficient budget allocations. Interviews with 44 respondents (100%) showed that outdated beneficiary data often results in unqualified recipients receiving aid, while truly needy households are excluded. In some cases, households receive duplicate assistance, creating resource allocation disparities and reducing program effectiveness.

According to 40 respondents (90.91%), low community participation in policy planning reduces program relevance to local needs. Many policies are formulated without involving farmers as key stakeholders, resulting in misaligned programs. A community-based approach is essential to ensure policy relevance and effectiveness (Hermawan, 2023).

Based on these findings, the following policy and/or program recommendations are proposed to improve food security in Lombok Island:

**a. Food Security Policy Recommendations**

i. To Be Maintained and Enhanced

* Regular Updating of Beneficiary Data

Update beneficiary data every six months to ensure targeted aid. Current data is outdated (100%), leading to mistargeted assistance.

* Subsidies for Quality Seeds and Fertilizers

Increase the availability and distribution of high-quality seeds and fertilizers. Difficult access (86.36%) hinders farm productivity.

* Food Price Stabilization

Implement regulatory mechanisms to control price fluctuations during lean seasons. Food prices are highly volatile (100%) during such periods.

ii. To Be Revised and Expanded

* Food Diversification

Promote consumption of alternative local foods such as tubers, maize, and legumes. Households focus solely on rice without diversification (93.18%).

* Farmer Participation in Program Planning

Establish mechanisms for farmers to participate in village meetings and policy formulation. Farmers feel excluded from planning processes (90.91%).

* Improvement of Local Infrastructure

Enhance road access and food distribution facilities in remote areas. Infrastructure limitations affect 54.55% of respondents.

**b. Food Security Program Recommendations**

i. To Be Maintained and Enhanced

* Targeted Food Aid Distribution

Improve food aid targeting using digital application-based systems. Current aid distribution is uneven; many needy households are unserved (54.54%).

* Expanded Nutrition Education

Broaden the scope of nutrition counseling to reach all farming households, not just select groups. Only 44.73% have been reached, and only 9.09% reported impact.

* Village Food Storage Program

Establish food storage facilities at the village level to reduce post-harvest losses and extend rice shelf life. Storage facility shortages lead to spoilage (88.64%).

ii. To Be Revised and Expanded

* Village Food Cooperatives

Form village cooperatives to help farmers sell produce at stable prices and access essential goods. Low purchasing power (79.55%) makes it hard to meet food needs.

* Cash-for-Work Food Assistance

Implement work-based aid programs, such as infrastructure repairs in exchange for food or money. Supports farmers affected by low purchasing power (79.55%).

* Food Diversification Campaigns

Provide training on cultivating alternative crops and encourage home gardens. Rice dependency hinders dietary diversification (93.18%).

4. Conclusion

Based on the findings and discussion presented above, several conclusions can be drawn. First, the food security condition of farming households in food-insecure areas of Lombok Island reveals that the majority of respondents (51.35%) fall into the “moderate” category according to the Food Insecurity Experience Scale (FIES), while the remaining 48.65% are classified as experiencing “severe” food insecurity. This indicates a widespread vulnerability among agricultural households in the region.

Second, the main determinants of household food security identified in this study consist of three primary factors: geographic and physical conditions (explaining 27.16% of the variance), food availability and social factors (20.33%), and consumption patterns and purchasing power (18.64%). These findings emphasize the multidimensional nature of food security and the necessity of addressing both physical and socio-economic barriers.

Third, the evaluation of food security policies and/or programs that have been implemented shows partial achievement but remains far from optimal, with numerous persistent issues undermining their effectiveness. In the food availability dimension, agricultural subsidy policies for fertilizers and seeds have supported production but were deemed sufficient by only 34.09% of respondents. Moreover, limited diversification beyond rice continues to obstruct the provision of nutritious food. In the food accessibility dimension, programs such as the Non-Cash Food Assistance Program (BPNT) have improved purchasing power, but misaligned distribution and outdated beneficiary data have resulted in inequitable outcomes, with only 34.09% of respondents stating that the program met their needs. In the food utilization dimension, nutrition education has reached just 9.09% of respondents and has had limited impact on dietary behavior. A majority (86.36%) of households still rely on rice without adequate intake of proteins and vegetables, and overall program effectiveness in this dimension was only 43.18%. In the food stability dimension, policies intended to stabilize food prices were insufficient to counteract market fluctuations or reduce dependence on short-term aid. While 45.45% of respondents relied on harvests, 34.09% felt that social assistance was either inadequate or delayed, resulting in an effectiveness score of 62.50%.

Overall, food security policies and/or programs in Lombok Island have achieved partial success, with an average effectiveness score of 43.46%. This suggests a substantial need for improvement in terms of policy relevance, equitable distribution, and the adoption of long-term strategies to ensure sustainable food security. According to standard policy evaluation criteria, if effectiveness remains below 70%, substantial reforms are required.

Based on the analysis, recommendations are categorized into two strategic directions: those that should be maintained and enhanced, and those that should be revised and further developed. Policies that should be maintained and enhanced include: (1) regular updating of beneficiary data to improve targeting accuracy; (2) the provision of high-quality seed and fertilizer subsidies to boost productivity; and (3) the regulation of food prices to reduce volatility during lean seasons. Programs that should be maintained and enhanced are: (1) the improvement of food aid distribution through targeted, data-driven systems; (2) the expansion of nutrition education to reach all household members; and (3) the development of village-level food storage facilities to reduce post-harvest losses and extend shelf life.

Meanwhile, policies that should be revised and further developed include: (1) the promotion of food diversification through support for alternative local crops such as tubers and legumes; (2) the involvement of farmers in participatory policy planning; and (3) the improvement of local infrastructure to support food distribution and market access. Programs that require revision and further development are: (1) the formation of village food cooperatives to help stabilize prices and facilitate access to basic goods; (2) the implementation of cash-for-work schemes to support vulnerable farmers while improving rural infrastructure; and (3) the initiation of food diversification campaigns, including home gardening and training on alternative food sources.

These combined efforts are expected to improve the relevance, effectiveness, and sustainability of food security interventions in Lombok Island.

Consent (where ever applicable)

All respondents voluntarily participated in this study. Verbal informed consent was obtained from all participants prior to the interviews and observations.

Ethical approval (where ever applicable)

The study involved interviews and direct observations of farming households in four districts of Lombok Island. Although no formal ethical approval was obtained, all research activities were conducted with respect to participants' privacy, confidentiality, and voluntary participation, in accordance with ethical standards for social science research.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that generative AI technologies have been used during the editing of this manuscript. Details of the AI usage are given below:

* 1. Tool: ChatGPT (OpenAI), GPT-4
  2. Used to improve grammar, clarity, and structure of abstract and conclusion.
  3. Prompts: "Please improve the clarity and grammar of this paragraph”

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