

Income-Mediated Diversity of Animal-Based Food Consumption among Rice-Farming Households in Palangai, Pesisir Selatan

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ABSTRACT

This study aims to examine the diversity of animal-based food consumption among rice farming households in Nagari Palangai and analyze the impact of factors such as animal food prices, family size, education level, and income on consumption diversity. Additionally, the study investigates the role of income as a mediator between these factors and consumption diversity. Conducted in June-July 2025 with 116 respondents, using primary data and analyzed through multiple linear regression and Sobel test. The results show that the diversity of animal-based food consumption is moderate. Animal food prices and family size significantly affect consumption, while education and income do not. Income mediates the relationship between food prices, family size, and consumption diversity.

INTRODUCTION

Food is one of the primary needs for every human being, it is the basic necessity that provides the essential strength needed for survival (Silva et al., 2023). Food consumption is a key factor in fulfilling nutritional needs, providing energy for the body, supporting metabolism, repairing body tissues, and promoting growth (Amawi et al., 2023). Sufficient and balanced food consumption is a prerequisite for achieving household food security, which in turn ensures proper nutrition (Kh'ng et al., 2022). Therefore, a diverse and nutritious food consumption pattern is essential. Food consumption diversity refers to the number of different food groups consumed over a certain period (Shrestha et al., 2021). Food consumption diversity as the variety of food types consumed by individuals or households during a specific period, serving as an important indicator of nutritional status and food security (Kundu et al., 2021). Food diversity is crucial because no single food type provides a complete set of nutrients, so a diverse diet will supply complementary nutrients (Dave et al., 2023).

Consumption expenditure is influenced by income, as people tend to consume a portion of their income and save the rest (Meshulam et al., 2023). Consumption expenditure is determined by permanent income, which refers to the long-term income an individual is expected to receive (Shaalán et al., 2023). Thus, income is important in determining consumption patterns. Data shows that food consumption expenditures have increased annually. In 2019, it was Rp 572,551 per capita per month, and in 2023 it increased to Rp 711,282 per capita per month. Similarly, in West Sumatra, food expenditure trends follow the national pattern. In 2019, food expenditure in West Sumatra was Rp 609,258, and in 2023 it rose to Rp 747,469, higher than the national average. In Pesisir Selatan Regency, a district in West Sumatra, food expenditure in 2019 was Rp 562,643 and in 2023 it increased to Rp 680,482, which is lower than both the national and provincial food expenditures.

Food can be classified into two types based on its source: animal-based food and plant-based food. Animal-based food is derived from animals and can be consumed by humans (Detzel et al., 2022). These foods are sources of protein and fats, such as meat, chicken, fish, eggs, and milk. In contrast, plant-based foods come from plants and include vegetables, fruits, legumes, etc (McClements & Grossmann, 2021). In Nagari Palangai, an agricultural area where rice farming is predominant, households face challenges in accessing animal-based protein due to low income levels. Rice farming families typically have small plots of land, and most of their produce is consumed as staple food, leaving little for other food purchases. As a result, there is limited diversity in their consumption of animal-based foods. This research aims to analyze the diversity of animal-based food consumption in rice farming households in Nagari Palangai. It will explore the influence of factors such as food prices, family size, education level, and income on consumption patterns. Specifically, the study will examine the role of income as a mediator in the relationship between these factors and the diversity of animal-based food consumption.

By addressing this gap, the research will provide valuable insights into how income and other factors shape dietary diversity in this rural area, particularly concerning animal-based foods.

LITERATURE REVIEW

Food consumption diversity is an essential aspect of nutritional adequacy and food security. It reflects the variety of food groups consumed by individuals or households over a given period and serves as an important indicator of diet quality and nutrient intake (Miller et al., 2022). A diverse diet ensures that the human body receives the full range of nutrients needed for growth, repair, and metabolic function since no single food type can provide all essential nutrients (Ofoedu et al., 2021). Therefore, achieving a balanced and varied consumption pattern is crucial for maintaining good health and preventing nutritional deficiencies.

Animal-based foods play a particularly important role in ensuring dietary diversity. They are rich sources of high-quality protein, fats, vitamins such as B12, and essential minerals including iron and zinc (Beal & Ortenzi, 2022). According to Sheffield et al (2024), these nutrients are more bioavailable in animal-source foods than in plant-based foods, making them vital for preventing malnutrition and micronutrient deficiencies. However, in many rural and agricultural communities, the consumption of animal-based foods is often limited due to economic constraints and reliance on staple crops such as rice. As a result, many rice-farming households exhibit low dietary diversity, particularly in their intake of animal-based foods.

Socioeconomic factors play a major role in shaping food consumption patterns. Variables such as income, food prices, family size, and education level have all been found to influence household dietary decisions. Income is particularly crucial because it directly determines purchasing power and access to diverse foods. Studies have consistently shown that as household income increases, families tend to allocate more of their expenditure to higher-quality, protein-rich foods such as meat, fish, eggs, and milk (Betancourt-Núñez et al., 2023; Blum et al., 2023). Conversely, households with limited income often spend most of their budget on staple foods like rice, leaving little room for purchasing animal-based products, which results in less diverse diets.

Income also acts as a mediating factor that links other socioeconomic variables to food consumption diversity. Bennett et al (2022) explain that income can strengthen or weaken the effects of other factors, such as education or family size, on dietary patterns. For example, higher education levels may increase awareness of nutritional needs, but without sufficient income, households remain unable to purchase the variety of foods they know are beneficial. Similarly, larger families may face greater pressure on household budgets, leading to less spending on non-staple foods unless their income is sufficient to support greater consumption diversity. Therefore, understanding the mediating role of income is essential to explain variations in animal-based food consumption across different socioeconomic contexts.

Agricultural households, particularly those relying on rice farming, often face unique challenges that limit their dietary diversity. Many of these households have small plots of land, and most of their harvest is consumed as staple food, leaving little surplus for sale or for purchasing other food types (Grewal et al., 2024). This dependence on self-produced rice means that their diet is heavily dominated by carbohydrates, with limited inclusion of animal-based foods. Empirical studies conducted in similar agricultural contexts have shown that low-income, subsistence-oriented farmers tend to have monotonous diets, lacking the protein and micronutrients that animal-based foods provide. Consequently, income diversification and improved access to food markets have been identified as critical strategies to enhance dietary diversity among rural households.

Previous studies in Indonesia and other developing countries have examined the relationship between income and dietary diversity, but most have focused on national or regional levels. There remains a limited understanding of how income mediates the relationship between other socioeconomic factors—such as food prices, education, and family size—and the diversity of animal-based food consumption at the household level. This research seeks to fill that gap by focusing specifically on rice-farming households in Nagari Palangai, Pesisir Selatan, where income constraints and subsistence farming practices may significantly affect dietary patterns. Understanding these dynamics will provide valuable insights for designing interventions aimed at improving dietary diversity and nutritional well-being in rural agricultural communities.

METHODOLOGY

The research method used is descriptive and associative. This study was conducted in Nagari Palangai, Ranah Pesisir District, Pesisir Selatan Regency, in June-July 2025, with a sample size of 116 households. The data collected includes both primary and secondary data. Data collection methods used were interviews, observations, and documentation. The variables observed in this study include animal food prices, family size, education level, household income, and animal food consumption. The data analysis method used in this research includes descriptive analysis and multiple linear regression analysis, with a Sobel test to determine the role of income as a mediator between animal food prices, family size, education level, and animal food consumption diversity in rice farming households. The general form of the multiple linear regression model can be expressed statistically as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where:

- Y = Animal food consumption (%)
- X1 = Animal food price (Rp/kg)
- X2 = Family size (people)
- X3 = Education level (years)
- e = Natural logarithm error term

Before conducting the multiple linear regression test, preliminary classical tests were performed, including multicollinearity, heteroscedasticity, and

normality tests. To test the influence of the mediator variable (Z), a Sobel test was used. To simplify the calculation of the mediator variable (Z), the researcher used an online calculator available at www.danielsoper.com.

RESULTS

Respondent Profile

The respondents in this study are rice farmers from Nagari Palangai. The majority of respondents fall within the age group of 36-46 years, comprising 35 respondents (30.17%). The next largest age group is between 68-78 years, with 25 respondents (21.55%), and the smallest group is 58-68 years, with 17 respondents (14.66%). Regarding household size, the most common household size is 4 members, with 39 respondents (34.00%). The smallest group consists of households with 2 members, totaling 14 respondents (12.00%). In terms of education level, the majority of respondents have completed high school (SMA) with 58 respondents (51.00%). There are 15 respondents (13.00%) who never attended school, 14 respondents (12.00%) who completed primary school (SD), and 14 respondents (9.00%) who completed higher education. As for household income, the respondents' monthly income ranges from Rp 1,500,000 to Rp 3,000,000, with the highest group earning between Rp 1,500,000 and Rp 2,000,000 per month, comprising 83 respondents (72.00%).

Diversity of Animal Food Consumption

The diversity of animal food consumption refers to the range of animal-based foods consumed by households, measured both qualitatively and quantitatively, and compared with the Expected Food Pattern (Pola Pangan Harapan/PPH). The results of the diversity of animal food consumption are shown in Table 1.

Table 1. Level of Animal Food Consumption Diversity among Respondents.

No	Level of Diversity	Number of Respondents	Percentage(%)
1	Low	0	0,0
2	Moderate	85	73,3
3	High	31	26,7
Total		116	100,0

Based on Table 1, it can be seen that the diversity of animal food consumption in rice farming households in Nagari Palangai is moderate to high. Of the respondents, 85 (73.3%) exhibited a moderate level of diversity, and 31 (26.7%) showed high diversity. Greater food diversity is associated with improved nutritional quality.

Factors Influencing the Diversity of Animal Food Consumption

The factors influencing the diversity of animal food consumption in rice farming households in Nagari Palangai were analyzed using multiple linear regression. The regression analysis was performed using IBM SPSS Statistics 23,

with classical assumption tests to evaluate the regression model's validity. The regression equation for factors affecting the diversity of animal food consumption in Nagari Palangai is:

$$Y = 30,725 + 8,010X_1 - 4,036X_2 + 0,000X_3 - 1,719X_4$$

Interpretation:

1. The constant value of 30.725 suggests that if income, animal food prices, family size, and education level are all zero, the diversity of animal food consumption is 30.725%.
2. The coefficient for animal food price (X_1) is 8.010, indicating a positive relationship between animal food prices and food diversity. A 1% increase in animal food prices leads to an 8.010% increase in food diversity, assuming other variables are constant.
3. The coefficient for family size (X_2) is -4.036, showing a negative relationship. For every additional family member, the diversity of animal food consumption decreases by 4.036%, holding other factors constant.
4. The coefficient for education level (X_3) is 0.000, meaning education level does not significantly affect the diversity of animal food consumption.
5. The coefficient for income (X_4) is -1.719, indicating a negative relationship between income and food diversity. For every increase of Rp 1,000 in income, food diversity decreases by 1.719%, assuming other variables are constant.

Hypothesis Testing

The F-test is used to test if the independent variables (animal food price, family size, education level, and income) collectively affect the dependent variable (diversity of animal food consumption). The result from the F-test shows a significance value of 0.000 (<0.05), meaning the hypothesis is accepted. Therefore, the independent variables significantly influence food diversity in Nagari Palangai.

T-Test (Partial Test)

The T-test is used to assess the individual contribution of each independent variable to the dependent variable. The results of the t-test can be seen in Table 2.

Table 2. T-test (*partial*)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	30,725	2,652		11,588	0,000
	Animal Food Price	8,010	0,000	0,578	8,352	0,000
	Family Size	-4,036	0,429	-0,665	-9,400	0,000
	Education Level	,000	0,108	0,000	0,002	0,998
	Income	-1,719	0,000	-0,079	-1,148	0,253

Coefficient of Determination (R^2)

The coefficient of determination (R^2) measures the extent to which the independent variables explain the variability in the dependent variable. In this study, the R^2 value is 0.546, meaning the independent variables (animal food price, family size, education level, and income) together explain 54.6% of the variation in food diversity, while the remaining 43.4% is explained by other factors not captured in this study.

Income as a Mediator Between Animal Food Price, Family Size, and Education Level

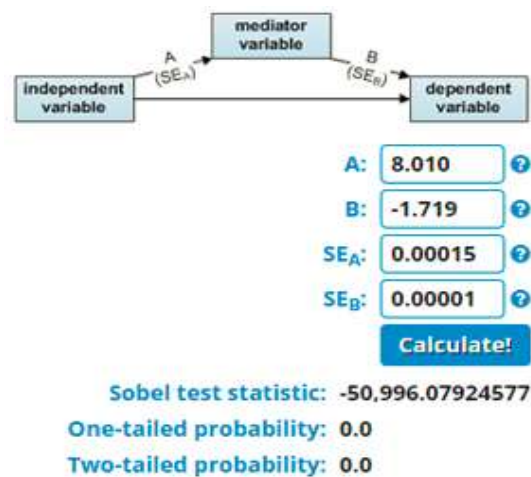


Figure 1. Sobel Test Results for Income Mediating the Relationship Between Animal Food Price and Food Diversity

The Sobel test result for income as a mediator between animal food price and food diversity shows a p-value of 0.0, which is less than 0.05. This indicates that income significantly mediates the relationship between animal food price and food diversity.

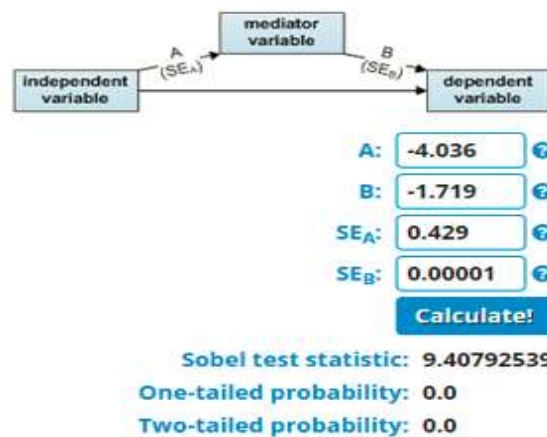


Figure 2. Sobel Test Results for Income Mediating the Relationship Between Family Size and Food Diversity

The Sobel test result for income as a mediator between family size and food diversity shows a p-value of 0.0, which is less than 0.05, meaning income significantly mediates the relationship between family size and food diversity.

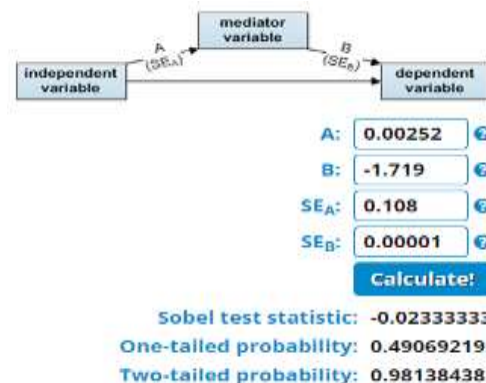


Figure 3. Sobel Test Results for Income Mediating the Relationship Between Education Level and Food Diversity

The Sobel test result for income as a mediator between education level and food diversity shows a p-value of 0.981, which is greater than 0.05. This suggests that income does not mediate the relationship between education level and food diversity.

DISCUSSION

This study is important because it examines the diversity of animal-based food consumption among rice farming households in Nagari Palangai, Pesisir Selatan Regency, an agricultural area primarily focused on rice farming. The research provides valuable insights into the factors that influence the consumption patterns of animal-based foods, which are essential for nutritional balance and food security. In rural areas where rice farming is predominant, households often face challenges in accessing animal-based foods due to low incomes and limited market availability. Understanding these patterns is crucial for addressing issues related to malnutrition, food security, and sustainable agricultural development. The role of income as a mediator between various socio-economic factors (such as animal food prices, family size, and education level) and the diversity of animal-based food consumption highlights the interconnectedness of economic and social variables in shaping dietary behaviors. In regions like Nagari Palangai, where income is generally low and agricultural practices are constrained, food diversity can often be limited. Investigating the factors that affect food consumption, particularly in terms of animal-based products, can help policymakers design interventions to improve nutrition and food security in rural communities. Ochieng et al (2017) emphasize the relationship between food consumption and nutritional security, arguing that diverse food consumption is a key factor in ensuring adequate nutrition. Similar to this study, they found that household income plays a significant role in determining food diversity. This comparison reinforces the importance of economic factors, such as income, in shaping dietary patterns in rural populations. Paro et al (2025) examine the links between household income, food expenditure, and dietary diversity in rural areas. Their

study found that increased household income enables access to a wider variety of foods, including animal-based products. The findings of this research align with the study in Nagari Palangai, where income influences the diversity of animal-based food consumption, suggesting that economic constraints limit access to essential protein sources. Klink et al (2022) explore food diversity as an indicator of nutritional status, showing that households with higher incomes and larger food expenditures tend to have more diverse diets, including greater consumption of animal-based foods. This study supports the idea that household income and food expenditure are critical to achieving food security and nutritional adequacy, as seen in the context of Nagari Palangai. These studies all underline the importance of economic and social factors in influencing food consumption patterns, particularly regarding animal-based foods, which are often more expensive and less accessible in rural areas.

The findings of this study have several important implications for both policy and practice. First, the study suggests that enhancing household incomes, especially in rural agricultural communities like Nagari Palangai, could significantly improve food diversity. Policymakers should consider developing programs that provide financial support or improve income-generating opportunities for rice farmers. This could include introducing agricultural diversification strategies, supporting small-scale livestock farming, or facilitating better access to markets for animal-based foods. Additionally, the study highlights the role of food prices in influencing consumption patterns. As animal food prices rise, households may reduce their intake of essential protein sources, leading to nutritional deficiencies. Efforts to stabilize food prices, improve the supply chain, or subsidize the cost of animal-based foods could help mitigate this issue. Furthermore, the negative relationship between family size and food diversity suggests that larger households may struggle to access a balanced diet, which could inform the design of targeted nutrition interventions for families with more members. This study has several limitations. First, the sample size of 116 households, while sufficient for the research, may not fully capture the diversity of experiences and conditions across all rice farming households in Nagari Palangai. The study also focuses only on animal-based food consumption, neglecting other food groups that contribute to overall dietary diversity. Additionally, the cross-sectional design limits the ability to draw conclusions about long-term trends or causality. Another limitation is the reliance on self-reported data from interviews, which may introduce biases due to inaccurate reporting or social desirability. Although efforts were made to ensure accuracy, these potential biases should be considered when interpreting the results. Furthermore, the study does not account for cultural factors that may influence dietary preferences and food choices in the region, which could add another layer of complexity to the findings.

Future research should explore the long-term impacts of income improvements on food diversity and nutritional outcomes in rural areas. Longitudinal studies that track household income and food consumption over time could provide deeper insights into how changes in income affect dietary behaviors and nutritional security. It would also be beneficial to expand the scope

of future studies to include a broader range of food groups, beyond just animal-based foods, to get a more comprehensive understanding of overall dietary diversity. This would allow for a more holistic view of food security and nutrition in rural areas.

Finally, research could also investigate the role of social and cultural factors in shaping food consumption patterns. Understanding the cultural context of food choices could lead to more effective interventions tailored to local preferences and practices. In conclusion, this study provides important insights into the factors affecting animal food consumption diversity in rural rice farming households. It underscores the need for integrated approaches that address economic, social, and educational barriers to improving dietary diversity and food security in agricultural communities.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that income, animal food prices, family size, and education level significantly influence the diversity of animal-based food consumption in rice farming households in Nagari Palangai. Among these factors, income plays a crucial role as a mediator, linking other variables to food diversity. The research shows that while most households have moderate animal food consumption diversity, low income and large family sizes limit access to animal-based proteins, impacting overall nutrition. Based on these findings, it is recommended that policymakers focus on increasing household incomes by supporting agricultural productivity and promoting livestock farming. Additionally, efforts should be made to stabilize food prices, particularly for animal-based foods, to improve accessibility for low-income households. Targeted support programs for larger households could also help enhance food diversity.

Further studies are needed to explore the long-term effects of income, family size, and food prices on dietary diversity. Future research could also investigate the role of cultural or regional factors in shaping food preferences, as well as the impact of different agricultural interventions on food security in rural communities. Additionally, examining the broader socio-economic dynamics, such as labor migration or access to markets, could provide a more comprehensive understanding of food consumption patterns in these areas. By implementing these recommendations, food security and dietary diversity in Nagari Palangai and similar regions could be significantly improved.

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