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Rice-Based Household Food Security in Benteng Subdistrict, Selayar Islands Regency: Evidence from Availability, Access, and Utilization Dimensions

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Abstract

Rice is the main staple food for most households in Indonesia; therefore, its availability, access, and utilization are important dimensions of household food security. This study aimed to analyze rice-based household food security in Benteng Subdistrict, Selayar Islands Regency, based on the dimensions of rice availability, access, and utilization. A descriptive quantitative approach with a survey design was employed. The sample consisted of 199 households selected from 7,726 households using simple random sampling. Primary data were collected through a structured questionnaire, while secondary data were obtained from institutional documents and scientific literature. Data were analyzed using descriptive statistics, Spearman's rho correlation, and ordinal regression. The results show that rice availability, access, and utilization were generally in the very high category. Spearman's rho indicated positive and significant relationships between rice-based household food security and rice availability ($r = 0.761$; $p < 0.001$), rice access ($r = 0.703$; $p < 0.001$), and rice utilization ($r = 0.846$; $p < 0.001$). Ordinal regression further indicated that the three dimensions were positively associated with the likelihood of households being in a higher rice-based food security category. Rice utilization was the dominant dimension ($B = 4.920$; $p < 0.001$; $OR = 137.00$), followed by rice availability ($B = 1.835$; $p < 0.001$; $OR = 6.27$) and rice access ($B = 1.116$; $p = 0.016$; $OR = 3.05$). These findings suggest that strengthening rice-based household food security in an archipelagic area requires attention to supply continuity, price affordability, and household capacity to manage rice consumption efficiently.

Keywords: Food Security, Household, Rice Access, Rice Availability, Rice Utilization.



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1. INTRODUCTION (Arial 11)

Food security is a fundamental condition for household welfare because it is closely related to food availability, purchasing power, utilization, and the stability of consumption over time. In Indonesia, rice has a strategic role because it remains the main staple food for most households. Although household food security is broader than rice consumption alone, the condition of rice availability, access, and utilization remains an important entry point for understanding household vulnerability, especially in areas where rice supply depends on distribution from other regions. Previous studies show that food security indicators must be interpreted carefully because different indicators may capture different dimensions of household welfare, access, diet quality, or food insecurity experience (Barrett, 2010; Headey & Ecker, 2013; Jones et al., 2013).

In the Indonesian context, the three dimensions most frequently used to explain food security are availability, access, and utilization. Availability refers to the presence and continuity of food supply; access reflects the ability of households to obtain food physically and economically; and utilization concerns how households consume, process, store, and manage food resources to meet daily

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needs. Pujiati et al. (2020) also emphasize that availability, affordability, and utilization are interrelated in supporting community food security. Therefore, analyzing these dimensions at the household level is important for identifying which aspect requires stronger policy attention.

South Sulawesi has long been recognized as one of Indonesia's important rice-producing regions. However, rice production remains vulnerable to seasonal conditions, climate variability, and changes in harvested area. In 2023, the rice harvest area in South Sulawesi was estimated at 0.97 million ha, a decrease of 64.97 thousand ha or 6.26% compared with 2022. Total paddy production was estimated at 4.94 million tons of dry unhusked grain, decreasing by 417.07 thousand tons or 7.78% compared with 2022. Rice production for food consumption was estimated at 2.84 million tons, decreasing by 239.33 thousand tons compared with the previous year (Badan Pusat Statistik [BPS], 2023). This decline indicates that rice availability cannot be understood only from production potential but also from the stability of supply and distribution.

Selayar Islands Regency has specific geographical characteristics as an archipelagic area. The regency consists of 11 subdistricts, with five located on the main island and six located outside the main island. Its land area reaches 1,357.03 km² (BPS Kabupaten Kepulauan Selayar, 2024). For agricultural commodities, Selayar Islands Regency is not one of the main rice production centers in South Sulawesi. This condition may increase dependence on rice supplies from other regions and create vulnerability to distribution disruptions caused by weather, sea transportation, price fluctuation, and market accessibility.

Benteng Subdistrict is an important area in Selayar Islands Regency because it functions as the administrative and economic center. However, the concentration of population and economic activities also implies higher household demand for rice. Previous studies have examined rice availability, price dynamics, food access, infrastructure, and household rice waste (Mamilianti & Maslakha, 2024; Nur et al., 2024; Olabiyi & Adedokun, 2024; Rozi et al., 2023; Sintiya, 2023). Nevertheless, empirical evidence on rice-based household food security in the archipelagic context of Benteng Subdistrict remains limited. This study addresses this gap by focusing on the household level and by comparing the relative association of rice availability, access, and utilization with rice-based food security categories.

The novelty of this study lies in its micro-level examination of rice-based household food security in an archipelagic area that depends partly on external rice supply. The study does not claim to measure overall household food security in the nutritional sense; instead, it focuses specifically on rice as the dominant staple commodity. Therefore, this study aims to analyze the level of rice-based household food security in Benteng Subdistrict based on the dimensions of rice availability, access, and utilization, and to assess the statistical association between these dimensions and the ordinal category of rice-based household food security.

2. METHOD

2.1 Research Design and Location

This study used a descriptive quantitative approach with a cross-sectional survey design. The survey was conducted in Benteng Subdistrict, Selayar Islands Regency, South Sulawesi Province. Benteng Subdistrict was selected because it is the administrative and economic center of Selayar Islands Regency and represents an urbanizing household consumption area in an archipelagic region. Based on population administration data, Benteng Subdistrict had 24,412 residents and 7,726 households in 2025 (Disdukcapil Kabupaten Kepulauan Selayar, 2025).

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2.2 Population and Sample

The population of the study consisted of households in Benteng Subdistrict. The sample size was determined from 7,726 households using a descriptive survey formula with an error tolerance of approximately 7%. The sample size calculation was as follows: $n = N / (1 + N e^2)$, where n is the sample size, N is the number of households, and e is the tolerated sampling error. With $N = 7,726$ and e approximately 0.07, the minimum sample size was 199 households after rounding. Respondents were selected using simple random sampling so that each household in the sampling frame had the same opportunity to be included. The questionnaire was completed by the household head or housewife because they were considered to have the most knowledge about household rice consumption, stock, purchasing patterns, and food management practices.

2.3 Data Collection and Research Instrument

The study used primary and secondary data. Primary data were collected through structured interviews using a questionnaire. Secondary data were obtained from official documents, including population data from the Population and Civil Registration Office, regional statistics published by the Central Statistics Agency, and scientific literature related to rice availability, food access, food utilization, and household food security. The questionnaire was arranged according to four constructs: rice availability, rice access, rice utilization, and rice-based household food security. Each statement was measured using a Likert scale, where higher scores indicated more favorable household conditions.

Table 1. Operational definitions of research variables

Variable	Indicators	Operational meaning
Rice availability (X1)	Household rice stock, continuity of rice supply, perceived availability in markets, and frequency of shortage	Shows whether rice is sufficiently and continuously available at household and local market levels
Rice access (X2)	Purchasing power, rice affordability, distance to purchase location, transportation access, and ease of obtaining rice	Shows the physical and economic ability of households to obtain rice
Rice utilization (X3)	Rice storage, processing practices, consumption management, prevention of waste, and household efficiency in rice use	Shows how households manage rice to meet daily food needs
Rice-based household food security (Y)	Ordinal category of household rice security derived from the overall household response pattern	Shows the household level of rice-based food security, not total dietary or nutritional security

2.4 Data Analysis

The data were analyzed in three stages. First, descriptive quantitative analysis was used to summarize the level of rice availability, rice access, rice utilization, and rice-based household food security. The total score of each variable was classified into ordinal categories ranging from very low to very high. Second, Spearman's rho correlation was used because the questionnaire data and outcome categories were ordinal. This test measured the direction and strength of the relationship between each dimension and rice-based household food security. Third, ordinal logistic regression was used as an exploratory model to assess the relative association of rice availability, access, and utilization with the likelihood of households being in a higher rice-based food security category.

The ordinal regression model was interpreted as an associative model rather than a causal model because the data were collected using a cross-sectional survey. The model can be written as

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$\text{logit}[P(Y \leq j)] = \theta_j - (B_1X_1 + B_2X_2 + B_3X_3)$, where Y is the ordinal category of rice-based household food security, θ_j is the threshold parameter, B_1 - B_3 are regression coefficients, and X_1 , X_2 , and X_3 represent rice availability, access, and utilization. Statistical significance was assessed at $p < 0.05$. Odds ratios were reported as $\text{Exp}(B)$ to show the change in odds of being in a higher rice-based food security category for an increase in each explanatory dimension.

3. RESULT AND DISCUSSION

3.1 Descriptive condition of rice-based household food security

The descriptive analysis indicates that household rice availability, access, and utilization in Benteng Subdistrict were generally in the very high category. Rice utilization emerged as the strongest dimension, followed by rice availability, while rice access was the lowest among the three dimensions. This pattern suggests that most households were able to manage rice consumption and storage well, but access-related issues such as purchasing power, price affordability, transport cost, or market distance may still require attention in an archipelagic area.

Table 2. Descriptive summary of rice-based household food security dimensions

Dimension	Category	Main finding	Practical implication
Rice availability	Very high	Households generally perceived rice supply as sufficient and continuous.	Maintain supply continuity and local rice reserves, especially during bad weather and transport disruptions.
Rice access	Very high, but lowest among the three dimensions	Households generally had access to rice, but this dimension was relatively weaker than availability and utilization.	Improve affordability, price monitoring, and distribution efficiency.
Rice utilization	Very high and strongest dimension	Households were generally able to manage, store, and consume rice efficiently.	Strengthen household education on storage quality, waste reduction, and food diversification.

Although the overall category was very high, the lower relative position of rice access is important. In archipelagic regions, rice access is not determined only by income but also by market distance, transportation routes, shipping frequency, and price fluctuation. Olabiyi and Adedokun (2024) show that community-level infrastructure is closely related to household food insecurity, while Rozi et al. (2023) explain that rice demand in Indonesia remains strong because rice is still the dominant carbohydrate source. Therefore, policies aimed at strengthening rice-based food security in Benteng Subdistrict should not only focus on rice supply but also on household affordability and distribution reliability.

3.2 Spearman's rho correlation between rice dimensions and rice-based household food security

Spearman's rho correlation was used to test the relationship between each rice dimension and rice-based household food security. The results are presented in Table 3.

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Table 3. Spearman's rho correlation results

Relationship	Spearman's rho	p-value	N	Interpretation
Rice availability (X1) - rice-based household food security (Y)	0.761	< 0.001	199	Strong, positive, and significant
Rice access (X2) - rice-based household food security (Y)	0.703	< 0.001	199	Strong, positive, and significant
Rice utilization (X3) - rice-based household food security (Y)	0.846	< 0.001	199	Very strong, positive, and significant

The correlation between rice availability and rice-based household food security was strong and positive ($r = 0.761$; $p < 0.001$). This result indicates that households with better rice availability tended to have higher rice-based food security. Availability is important because households can only maintain stable consumption when rice is present in sufficient quantity and can be obtained continuously. This finding is consistent with Sintiya (2023), who emphasizes the importance of rice availability for food security policy, and with Nur et al. (2024), who show that population growth and rice price dynamics affect rice availability.

The correlation between rice access and rice-based household food security was also strong and positive ($r = 0.703$; $p < 0.001$). This means that households with better physical and economic access to rice tended to have higher rice-based food security. Access includes the ability to purchase rice, obtain it from nearby markets, and cope with price changes. Although the category of access was very high, it was the lowest of the three dimensions. This result suggests that access remains a strategic issue for Benteng Subdistrict because archipelagic geography can increase transportation costs and create vulnerability during distribution disruptions.

Rice utilization had the strongest correlation with rice-based household food security ($r = 0.846$; $p < 0.001$). This result suggests that household practices in storing, processing, and managing rice consumption are closely related to rice-based food security. Mamilianti and Maslakha (2024) note that household rice waste can generate economic losses, while rice consumption patterns in Indonesia remain strongly associated with household food habits. Therefore, utilization is not merely a consumption issue; it is also related to household efficiency, storage quality, and the ability to prevent waste.

3.3 Ordinal regression of rice-based household food security

Ordinal regression was used to identify the relative association of rice availability, rice access, and rice utilization with the ordinal category of rice-based household food security. Table 4 presents the available parameter estimates. The standard errors and confidence intervals in the table were calculated from the reported estimates and Wald statistics.

Table 4. Ordinal regression parameter estimates for rice-based household food security

Variable	Estimate (B)	SE	Wald	p-value	Exp(B)	95% CI for Exp(B)
Rice availability (X1)	1.835	0.431	18.116	< 0.001	6.27	2.69-14.59
Rice access (X2)	1.116	0.463	5.805	0.016	3.05	1.23-7.57
Rice utilization (X3)	4.920	0.618	63.442	< 0.001	137.00	40.83-459.75

The regression results show that rice availability was positively associated with a higher rice-based household food security category ($B = 1.835$; $p < 0.001$; $\text{Exp}(B) = 6.27$). This means that households with a higher rice availability score had higher odds of being in a better rice-based food

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security category. The result supports the view that continuous household rice stock and stable supply are essential for maintaining staple food security.

Rice access was also positively associated with rice-based household food security ($B = 1.116$; $p = 0.016$; $\text{Exp}(B) = 3.05$). Although its coefficient was the smallest among the three dimensions, the result remains statistically significant. This finding indicates that access continues to matter even when availability and utilization are high. For an archipelagic area, access may be affected by transportation, household income, rice price, market distance, and the continuity of supply from outside the region.

Rice utilization had the largest coefficient ($B = 4.920$; $p < 0.001$; $\text{Exp}(B) = 137.00$), indicating that it was the dominant dimension associated with rice-based household food security. Households that manage rice efficiently, store rice properly, and reduce waste are more likely to maintain a higher level of rice-based food security. However, the very large odds ratio should be interpreted cautiously because utilization indicators may overlap conceptually with the ordinal outcome of rice-based food security. The result should therefore be read as evidence of a strong predictive association rather than direct causality.

Overall, the correlation and ordinal regression results are consistent: rice availability, access, and utilization were positively and significantly associated with rice-based household food security. Nevertheless, the study's conceptual framing is important. These three variables are not external causes in the strict causal sense; they are dimensions that help explain the household condition of rice-based food security. Therefore, the results provide evidence about relative dimension strength, not experimental causal effects. This interpretation is consistent with the broader food security literature, which cautions that different food security indicators measure different constructs and should not be interpreted beyond their measurement scope (Barrett, 2010; Jones et al., 2013; Maxwell et al., 2013).

3.4 Policy implications

The findings have several practical implications for rice-based food security management in Benteng Subdistrict. First, local government needs to maintain supply continuity through market monitoring, coordination with traders, and emergency rice reserves, especially during periods of bad weather or sea transportation disruption. Second, because rice access was the lowest relative dimension, policies should focus on price affordability, distribution efficiency, and transportation cost reduction. Third, household education on rice storage, consumption management, and food waste reduction should be strengthened because utilization was the dimension most strongly associated with rice-based household food security. Fourth, long-term food security policy should not rely exclusively on rice, because overall household food security also requires dietary diversity and balanced nutrition.

3.5 Study limitations and future research

This study has several limitations. First, the analysis focuses on rice-based household food security and does not measure overall household food security, dietary diversity, energy adequacy, protein intake, or nutritional status. Future studies should consider household food insecurity experience, household dietary diversity, or food consumption scores to obtain a broader picture of food security. Second, the cross-sectional survey design limits the ability to infer causality. Third, the available statistical output did not include full model diagnostics such as model-fitting information, goodness-of-fit statistics, pseudo R-square, or test of parallel lines; these diagnostics should be reported in the final statistical output to strengthen the ordinal regression analysis.

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Fourth, validity and reliability testing of questionnaire items should be reported in the final manuscript, including item validity and internal consistency measures such as Cronbach's alpha.

4. CONCLUSION

This study analyzed rice-based household food security in Benteng Subdistrict, Selayar Islands Regency, using the dimensions of rice availability, access, and utilization. The results show that all three dimensions were generally in the very high category. Rice utilization was the strongest dimension, followed by rice availability, while rice access was the lowest relative dimension.

Spearman's rho correlation confirmed that rice availability, rice access, and rice utilization were positively and significantly related to rice-based household food security. The ordinal regression results also indicated that the three dimensions were positively associated with the likelihood of households being in a higher rice-based food security category. Rice utilization was the dominant dimension, followed by rice availability and rice access.

The findings suggest that strengthening rice-based household food security in Benteng Subdistrict requires not only maintaining rice supply but also improving household access and encouraging efficient rice utilization. Because this study focuses only on rice, future research should include broader food security indicators such as dietary diversity, food insecurity experience, nutritional adequacy, and household resilience to price and distribution shocks.

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