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Research Article

Food Availability of Wetland Farmers: A Socioeconomic Analysis in Hulu Sungai Utara, South Kalimantan

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Abstract
Household food availability is one of the main pillars of food security, which is greatly influenced by socioeconomic conditions, especially in wetland agricultural areas with ecological and infrastructure limitations. This study examines household food availability levels and identifies key socioeconomic determinants among farming households in Karias Dalam Village, Banjang Subdistrict, Hulu Sungai Utara Regency, an area characterized by wetland agroecosystems with significant ecological and infrastructural limitations. Employing a cross-sectional analytical survey design, data were collected from 42 farming households selected through simple random sampling from a population of 280 households. Quantitative descriptive analysis and multiple linear regression ($\alpha = 5\%$) were applied to assess food availability measured in kcal/capita/day and its relationship with household income, mothers' nutritional knowledge, and family size. The findings reveal that farming households operate at moderate food availability levels, averaging 1,462 kcal/capita/day which is a substantial deficit of 39% below the national recommended dietary allowance of 2,400 kcal. Multiple linear regression analysis demonstrates that household income, mothers' nutritional knowledge, and family size simultaneously exert significant effects on food availability ($F = 10.847$, $p < 0.001$), with these factors collectively explaining 46.1% of the variance ($R^2 = 0.461$). Specifically, income and nutritional knowledge demonstrate positive associations, while larger family size negatively impacts per capita food availability. These results underscore the urgent need for integrated policy interventions combining income diversification, maternal nutrition education, and family planning support to enhance food security in wetland agricultural communities. The study contributes empirical evidence for context-specific food security strategies in Indonesia's marginalized wetland ecosystems.

Keywords: Farming Households, Food Availability, Socioeconomic Factors, Wetland Forest.

1. Introduction

Food availability is a fundamental aspect of national development and a key indicator of the success of food security in a region. As an agrarian country with a large population, Indonesia faces serious challenges in ensuring sufficient, equitable, and sustainable food availability, especially in regions with specific agroecosystem characteristics such as lowland wetland areas (Tono et al., 2023). Peat wetland areas have great potential as food barns, but at the same time face various limitations in the form of water fluctuation, low land productivity, and limited economic access for farmers. These conditions have a direct impact on the ability of farming households to provide food sustainably throughout the year (Verhoeven & Setter, 2010).

Household food availability is not only determined by agricultural production levels, but is also greatly influenced by socioeconomic factors such as income, education level, nutritional knowledge, and number of family members. Households with low incomes and limited nutritional knowledge tend to experience food insecurity even though they are located in food-producing areas (Ramadhan et al., 2023; Sardeshpande et al., 2025). Hulu Sungai Utara Regency is one of the wetlandy agricultural centers in South Kalimantan Province. Karias Dalam Village in Banjang Subdistrict has a large number of farming households and plays a role in supporting regional food security. However, fluctuations in food

crop production and the socio-economic limitations of farmers have the potential to affect household food availability.

Previous studies have established that socioeconomic factors significantly affect food availability for farming households. Gantini et al. (2024) demonstrated income and education effects in South Sulawesi, while Pellokila et al. (2020) identified family size as critical in Papua. However, these studies exhibit three key limitations: (1) they focused predominantly on mineral soil or highland systems, leaving wetland agroecosystems particularly Lebak typology empirically underexamined; (2) they treated nutritional knowledge as subsumed under general education rather than as a distinct measurable variable with direct behavioral pathways; and (3) they did not simultaneously test income, knowledge, and family size within unified regression frameworks for wetland contexts. Consequently, the precise magnitude and relative contribution of these factors to food availability in Lebak environments remain undocumented.

Household food security is an important indicator in sustainable agricultural development, especially in rural areas that depend on the agricultural sector as their main source of livelihood. Food availability is defined as the availability of sufficient, safe, and nutritious food that can be obtained from own production or household economic access. In the context of farming households, food availability is not only influenced by agricultural production, but also by the household's ability to manage resources and income to meet daily food consumption needs (Ramadhan et al., 2021; Arrigoni et al., 2022). Recent studies show that the dimension of food availability is one of the main pillars of food security, in addition to food access and utilization (Tono et al., 2023). Socioeconomic factors are the main determinants in determining the level of food availability in farming households. Household income plays a direct role in food purchasing power, while education and nutritional knowledge influence consumption patterns and the quality of food chosen (McKinnon, 1988). In addition, the number of family members determines food distribution within the household, so that the larger the family size, the less food is available per individual (Pellokila et al., 2020; Gantini et al., 2024).

Empirical research shows that income, education, and number of dependents have a significant effect on household food security in rural areas (Apid et al., 2022; Gantini, 2024; Kero & Bogale, 2023). Agricultural production conditions also affect food availability, particularly in lowland wetland areas, which are characterized by seasonal flooding and specific cropping patterns. Farmers in lowland wetland areas rely on rice production as their annual food reserve and sell part of their harvest to meet their household economic needs (Herwenita & Hutapea, 2018). Adaptation to these agroecosystem conditions shows that household food security is not only determined by economic factors, but also by production strategies and family food stock management (Mekonnen et al., 2021). Therefore, food availability analysis needs to consider the interaction between socioeconomic characteristics and local agroecological conditions.

This study addresses these gaps through three objectives which are assess current household food availability levels in kcal/capita/day, examine simultaneous and partial effects of income, mothers' nutritional knowledge, and family size on food availability, and determine relative factor contributions to inform prioritized interventions. The implications span three domains. Theoretically, the study tests whether conventional socioeconomic determinants apply to wetland agroecosystems or require ecosystem-specific modification. Practically, quantified coefficients enable precision interventions including calculating, for instance, whether knowledge or income investments yield greater returns per unit cost. For policy, findings justify integrating maternal nutrition education and family planning into agricultural extension services, and provide empirical thresholds for calibrating social protection programs to wetland communities' specific economic realities.

2. Methods

This study uses a quantitative descriptive approach with a cross-sectional analytical survey design. This approach was chosen because it is able to describe the food availability conditions of farmer households and explain the causal relationship between socioeconomic factors and food availability in a certain period of time (Sugiyono, 2013). The research location was purposively determined in Karias Dalam Village, Banjang District, Hulu Sungai Utara Regency, considering that the village has the largest number of farming households and is a potential wetland area that supports regional food security. This study was conducted from February 2025 to June 2025.

The research population consisted of all 280 farming households in Karias Dalam Village. The research sample consisted of 42 farming households using simple random sampling, in accordance with the sampling rules for large populations (Arikunto, 2010; Saihani & Fitriannoor, 2024). The research data consisted of primary and secondary data. Primary data was obtained through structured questionnaires and direct interviews with respondents, while secondary data was obtained from the Central Statistics Agency, the Food Security Agency, and the local Agricultural Extension Center.

Household food availability is measured based on the energy availability of staple foods (rice) in kcal/capita/day, with reference to the Food Composition Table. Food availability criteria are classified as low, medium, and high (Adi et al., 2024). The influence of socioeconomic factors on food availability was analyzed using multiple linear regression with independent variables including household income, mothers' nutritional knowledge, and number of family members. The analysis was performed using SPSS software with a significance level of 5% (Ghozali, 2018).

3. Results and Discussion

3.1. Research Results

3.1.1. Characteristics of Respondents and Food Availability

The results of descriptive analysis show that the average food availability of farming households in Karias Dalam Village is 1,462 kcal/capita/day. This value is in the moderate category and is still below the national ideal energy adequacy standard of 2,400 kcal/capita/day (BKP, 2022; Adi et al., 2019). The distribution of food availability shows that most farmer households are in the moderate category, while the rest are in the low category. This condition indicates significant food insecurity among wetland farmer households, especially during the lean season and when income declines (Ramadhan et al., 2023; Tono et al., 2023).

3.1.2. Multiple Linear Regression Analysis

The results of the multiple linear regression test show that socioeconomic factors simultaneously have a significant effect on the food availability of farming households with a significance value of 0.000 (<0.05). The coefficient of determination (R^2) value of 0.461 indicates that 46.1% of the variation in food availability can be explained by the variables of income, mothers' nutritional knowledge, and number of family members, while the remaining 53.9% is influenced by other variables not included in this model such as agricultural production levels, land ownership, access to markets, or seasonal factors (Ghozali, 2005; Suliyanto, 2011).

Partial regression analysis reveals that household income has a positive and significant effect on food availability. The higher the income, the greater the household's ability to provide food, both from their own production and purchases (Harper et al., 2020; Pellokila et al., 2020). This finding confirms

that even in food-producing areas, monetary access remains critical for achieving adequate food availability.

Maternal nutrition knowledge also has a positive and significant effect on food availability. Housewives with better nutrition knowledge tend to be able to manage family food more efficiently and diversely, even with limited income (den Hartog et al., 2006; Gantini et al., 2024). This suggests that non-economic interventions can partially compensate for income constraints. Conversely, the number of family members has a negative and significant effect on food availability. The larger the number of family members, the higher the food consumption burden that must be met, thereby reducing per capita food availability (Rahayu et al., 2020; Ramadhan et al., 2023). This indicates pressure from demographic factors on household food security.

3.2. Discussion

3.2.1. Food Availability in the Context of Wetland Agroecosystems

The findings of this study indicate that the food security of farming households in peatland areas remains vulnerable despite their role as regional food producers. This condition is consistent with the characteristics of peatland areas, which are highly influenced by seasonal factors and the limited economic access of farming households (Noor et al., 2014). The average food availability of 1,462 kcal/capita/day positions most households in a precarious state where minor disruptions to income or production can push them into food insecurity. The moderate category classification masks significant heterogeneity within the sample. Households at the lower boundary of this category face substantially greater risk than those approaching the threshold of high availability. The gap of 938 kcal/capita/day from the national standard represents not merely a quantitative deficit but qualitative nutritional inadequacy, as caloric concentration in staple foods (rice) often comes at the expense of dietary diversity.

3.2.2. The Role of Income and the Paradox of the "Hungry Farmer"

The significant influence of income on food availability confirms that household food security cannot be separated from purchasing power, even in agricultural communities. This finding reveals what scholars have termed the "hungry farmer" paradox: households engaged in food production may still experience food insecurity due to structural economic constraints (McKinnon, 1988; Tono et al., 2023). Low-income households tend to rely on a single staple food and have limited food consumption diversification, creating a cycle where poor nutritional outcomes perpetuate productivity deficits (Harper et al., 2020). The dominance of income as a determinant suggests that agricultural development strategies focused solely on production increases may fail to improve household-level food security if they do not translate into enhanced economic welfare. The 46.1% explanatory power of the model implies that factors beyond the household such as market structures, price policies, and post-harvest systems which warrant equal attention in policy design.

3.2.3. Nutritional Knowledge as a Moderating Factor

The role of mothers' nutritional knowledge in increasing food availability demonstrates that human capital investments can yield returns in food security even under resource constraints. Nutritional knowledge enables households to make more optimal use of local food sources, improve intra-household food distribution, and maximize the nutritional value of available resources (den Hartog et al., 2006; Gantini et al., 2024). This finding is particularly relevant for wetland areas where biodiversity offers alternative food sources such as fish, sago, and various tubers that may be underutilized due to knowledge gaps or cultural preferences concentrated on rice. The positive

coefficient for nutritional knowledge suggests that education interventions could serve as a cost-effective complement to income-generation programs, potentially achieving caloric improvements without proportional income increases.

3.2.4. Demographic Pressure and Household Dependency

The negative impact of family size on food availability indicates the need for a demographic approach and strengthening the productive economy of farming families. High consumption costs without a corresponding increase in income have the potential to increase household food insecurity (Pellokila et al., 2020; Rahayu et al., 2020). In the context of Karias Dalam Village, where agricultural labor requirements may incentivize larger family sizes, this creates structural tension between production needs and consumption burdens. The dependency ratio which is the proportion of non-productive to productive household members likely mediates the relationship between family size and food availability. Households with many children or elderly dependents face compressed per capita availability even when total household income is adequate. This suggests that food security interventions should incorporate lifecycle considerations and targeted support for households with high dependency burdens.

4. Conclusion

This study concludes that household food availability among farmers in Karias Dalam Village, Banjang Subdistrict, Hulu Sungai Utara Regency is moderate with an average of 1,462 kcal/capita/day, which remains 39% below the national ideal standard of 2,400 kcal/capita/day. Multiple linear regression analysis confirms that household income, mothers' nutritional knowledge, and family size simultaneously and significantly influence food availability, explaining 46.1% of the variation, while income and nutritional knowledge demonstrate positive effects and family size exerts a negative effect. These findings reveal a vulnerable food security condition among wetland farmers characterized by the "hungry farmer" paradox where food-producing households experience caloric deficits due to structural economic constraints, limited dietary diversification, and demographic pressures suggesting that agricultural productivity alone does not guarantee household-level food security without adequate purchasing power, nutritional literacy, and family planning considerations.

Given these findings and the study's limitations including its cross-sectional design which precludes seasonal analysis, the narrow measurement of food availability based solely on rice energy content potentially overlooking local food sources, and the unexplained 53.9% variance indicating other influential factors, integrated policy interventions are recommended. Local governments should strengthen income-generation programs combining agricultural intensification with non-farm employment opportunities, institutionalize family nutrition education through extension services and women's group networks to improve dietary diversification and resource management, and develop wetland-specific economic diversification leveraging local potential such as fisheries, sago processing, and ecotourism. These measures, aligned with the significant determinants identified, offer a pathway toward sustainable food availability that addresses both immediate caloric deficits and underlying socioeconomic vulnerabilities in peatland agricultural communities.

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