Factors influencing food security among fishermen households in West Java

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Abstract. Background: Food security is a critical component of sustainable development, particularly concerning health and nutrition. Fisherman households often face food insecurity, which is strongly associated with poverty. Objective: This research aims to analyze factors related to household food security among fishermen in Cikahuripan village, Cisolok District, Sukabumi Regency, West Java. Methods: This study employs a cross-sectional study consisting of 100 fisherman households selected using random sampling techniques. Food security is measured using the Household Food Insecurity Access Scale (HFIAS). The independent variables in this study included the education levels of both the wife and husband, household income, nutrition knowledge, and their ages at the time of marriage. Results indicated that 80% of fisherman households were facing food insecurity. Household income ($p = 0.046$) and the age of the wife at the time of marriage ($p = 0.047$) were significantly related to food security. Conclusion: Enhancing skills training to improve economic capabilities and encouraging marriage at an ideal age are recommended to prevent food insecurity among fishermen households.

1 Introduction

Household food security is a condition where household food needs are economically, physically and socially met, enabling a healthy and productive life [1]. Achieving household food security is influenced by several factors such as demographics, socio-economics, and the environment. Socioeconomic factors include household income, education level, and employment [2–4]. Household income and education levels demonstrate a positive correlation with household food security. In general, households with higher income and educational attainment are better equipped to achieve and maintain food security compared to those with limited income and lower educational backgrounds [3,5]. The prevalence of food insecurity among households in coastal areas (7.2%) is higher compared to agricultural (3.8%) and urban regions (4.3%) [6]. According to the US-HFSSM method, approximately 75% of fishing households or households within fishing groups are classified as food insecure with severe hunger levels [7].

Fisherman households are known to be associated with poverty and food insecurity. According to the data provided by the Central Statistics Data 2024, the farmer's term of trade

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(FTT) for fishermen is observed to be the lowest among all agricultural sectors, with a recorded value of 101.43. Farmer's term of trade is one of the useful indicators to measure the level of farmers' welfare, as it measures the ability of products (commodities) produced/sold by farmers compared to the products required by farmers both for the production process (business) and for consumption of farm households. This indicates a significant disparity in economic conditions compared to other agricultural stakeholders. FTT above 100 indicates that farmers can cover their production and living costs, while an FTT below 100 suggests financial strain. FTT for fishermen is 101.43, while the general exchange rate for farmers is reported at 119.85. This figure suggests that, on average, fishermen experience circumstances in which their expenditures surpass their incomes, highlighting ongoing challenges in achieving economic sustainability within the agricultural sector. Research conducted in Africa found that the majority of fisherman households are below the poverty line and this is a risk factor for food insecurity [8].

A study in Mali, Africa, demonstrated that fishermen's income plays a significant role in determining food security, as measured by the Food Security Index (FSI) [4]. This impact arises from the inherently variable nature of fishermen's income, which is largely influenced by seasonal shifts and the unpredictable availability of fish stocks. During peak seasons, higher catch volumes may temporarily increase income and improve food security within fishing households. However, during off-seasons or within periods of poor catch, income levels can drop sharply, placing households at a higher risk of food insecurity. The reliance on fishing as a primary income source makes these households vulnerable to natural environmental changes, such as storms or changes in water temperature, as well as economic factors like fluctuating fish market prices. This seasonal income instability limits their ability to consistently access and afford diverse, nutritious foods, contributing to food security challenges throughout the year [4,8].

Social factors influencing food security include gender equality. Another study conducted in Jember highlighted the importance of gender equality within farming households as a significant determinant of food security, assessable through indicators such as food availability, access, and utilization [9]. In this study, gender equality was analyzed through the lens of marriage age, as early marriage is recognized as a key indicator of gender equality [10]. Early marriage refers to marriage occurring under the age of 19, where individuals are generally unprepared to establish a family in terms of physical, economic, and emotional readiness. They often fail to consider the impacts on family resilience, including household food security [11]. Food insecurity can both drive and result from child marriage. Households facing food insecurity may resort to early marriage as a coping strategy to reduce financial strain. Conversely, child marriage limits education and economic opportunities for women, which can lead to lower household income and perpetuate food insecurity, creating a reinforcing cycle [12–14]. Despite the significance of this issue, there is a paucity of research specifically addressing early marriage as a social factor affecting food security within fisherman households. This gap in the literature contrasts with previous studies, which have typically focused on other aspects of food security. Moreover, this study adopts the Household Food Insecurity Access Scale (HFIAS) to measure perceptions of economic stability within households, providing a comprehensive understanding of food security dynamics. This research aims to determine factors influencing the food security of fishermen households in Cikahuripan village, Cisolok District, Sukabumi Regency, West Java.

2 Materials and methods

The research was conducted in Cikahuripan Village, Cisolok District, Sukabumi Regency, West Java in January 2024 using a cross-sectional study design. The research location was determined through a literature review to identify coastal areas where the majority of the

population consists of fishermen. Cikahuripan Village is located in Sukabumi Regency, in the southern part of West Java, bordering the Indian Ocean, making it a coastal area. In 2021, it was recorded that the number of people working as fishermen in Sukabumi Regency reached 8,437, the second-highest in West Java. The subjects of this study were 100 fisherman households selected through simple random sampling. The inclusion criteria were mothers with healthy children aged 6-59 months, without disability or fever during the study and were willing to participate in the study. Data collection was conducted by enumerators, using primary data obtained through questionnaires and direct interviews. The data covered household characteristics (husband's education, wife's education, income, nutritional knowledge, husband's and wife's age at marriage) and household food security.

Food security in households is evaluated using the Household Food Insecurity Access Scale (HFIAS) with scores categorized as food secure (score 0–1) and food insecure (score 2–27). The HFIAS refers to the experiences of households over the past 30 days. This measurement tool is considered relatively straightforward and more cost-effective compared to other methods of assessing food security. Furthermore, the HFIAS is particularly sensitive to changes in household conditions over time, making it a valuable instrument for monitoring food insecurity dynamics. HFIAS can capture the fluctuations in food access and availability within households, allowing for a nuanced understanding of food security [15]. The validation of the HFIAS in Indonesia has demonstrated that this tool is highly sensitive, making it effective for measuring household food security [16]. Data analysis was performed using multivariate linear regression tests with p value < 0.05. This research has received ethical approval from the Airlangga University Ethics Commission with Number: 1145/HRECC.FODM/X/2023.

3 Results and discussion

The majority of fisherman households were food insecure (80%), with only 20% were food secure. The percentage of husbands and wives with higher education (≥ high school) was higher in food-secure households (45% and 35%, respectively) than in food insecure households (18.8% for both). Household heads with higher education levels are more likely to achieve food security compared to those with lower education levels [17]. Higher levels of education among fathers can enhance awareness of the benefits of available resources and foster income diversification, ultimately improving household food supply [18]. Mothers with higher education levels are expected to possess knowledge related to nutrition and household financial management, enabling them to select nutritious food items while effectively managing their finances [19].

Nutrition knowledge in food-secure households was classified as moderate (50%), and in food-insecure households classified as poor (42.5%). This situation arises partly because mothers with lower education levels may lack the necessary knowledge regarding nutrition and household financial management. Most incomes in food-secure households were above the minimum wage (55%), while in food-insecure households were below the minimum wage (58.8%). Most husbands in both food-secure and food-insecure households married at the ideal age (≥ 19 years old). However, the majority of wives in food-insecure households (68.8%) married before the age of 19 years (Table 1).

Table 1. Household characteristics

Characteristics	Food secure (n=20)		Food insecure (n=80)	
	n	%	n	%
Husband's education				
High (≥ High school)	9	45.0	15	18.8
Low (< High school)	11	55.0	65	81.3
Wife's education				
High (≥ High school)	7	35.0	15	18.8
Low (< High school)	13	65.0	65	81.3
Household income				
High (≥ the minimum. wage)	11	55.0	33	41.3
Low (< the minimum. wage)	9	45.0	47	58.8
Wife's Nutrition knowledge				
Good	8	40.0	22	27.5
Moderate	10	50.0	24	30
Poor	2	10.0	34	42.5
Husband's age at marriage				
Ideal (≥19 years old)	10	50.0	40	50.0
Under-age (<19 years old)	10	50.0	40	50.0
Wife's age at marriage				
Ideal (≥19 years old)	10	50.0	25	31.3
Under-age (<19 years old)	10	50.0	55	68.8

The results of the regression analysis (Table 2) found the wife's income and age at marriage were associated with household food security (p value < 0.05). Increasing household income and marrying at an older age, particularly for women, can increase the household food security. Families with higher incomes are better positioned to access the food they need, as increased financial resources allow them to purchase a wider variety of nutritious foods. This financial stability enables them to afford not only basic necessities but also healthier options, which are often more expensive. Higher income levels provide flexibility to shop at various markets, access quality produce, and choose organic or specialty items that contribute to improved overall nutrition. Moreover, families with greater financial means can plan and budget their food needs, reducing the likelihood of food insecurity [3, 4, 8, 20].

Table 2. Factors associated with food security

Variable	β	t	p value
Husband's education	0.144	1.206	0.231
Wife's education	-0.095	-0.823	0.413
Household income	-0.197	-2.022	0.046*
Wife's Nutritional knowledge	-0.112	-1.090	0.278
Husband's age at marriage	0.040	0.375	0.708
Wife's age at marriage	-0.225	-2.011	0.047*
Sig.			0.022
R square			0.144
Adjusted r square			0.089

*Multivariate Linear Regression, p<0.05

Older women tend to be more productive and responsible than women who marry early, leading to increased household food security [21]. Women who married at a young age may also have limited influence over key household decisions, such as whether harvested crops

are consumed or sold, which family members are allowed to eat certain foods, and the order in which family members are served meals. These limitations can affect both food distribution within household and nutritional equity, restricting women's roles in managing food security and ensuring that all members have access to adequate nutrition [22]. Early marriage reduces women's educational attainment, increases fertility rates, and limits their involvement in essential childcare, while also weakening their social networks and support systems. This productivity disparity between men and women in agriculture ultimately impacts food availability at both the household and community levels [23]. With limited education and fewer social and economic opportunities, women who marry young are often unable to adopt innovations, access agricultural training, or obtain financing that could enhance their productivity [24]. The cumulative effect of these factors contributes to lower agricultural output, making food security harder to achieve in communities with prevalent early marriage. Addressing these barriers through education and social support initiatives is critical for reducing the productivity gap and promoting more sustainable food systems. The adjusted R-squared value of 0.089 indicates that only 8.9% of the variation in household food security is explained by the variables in this study (education, income, nutritional knowledge, and age at marriage). This suggests that 91.1% of the variation is influenced by other factors not covered in this research, such as environmental conditions, market access, or health issues. The The low R-squared value suggests food security is a complex issue, emphasizing the need for further studies to explore additional factors affecting it.

4 Conclusion

Food security among fishing households is primarily at a food-insecure level, with significant links to household income and the wife's age at marriage. Limited income restricts access to adequate and nutritious food, while early marriage often curtails women's educational and economic opportunities, exacerbating household vulnerabilities. Addressing these challenges requires targeted interventions, including the provision of non-formal education and skills training programs designed to enhance economic capabilities, such as entrepreneurship, sustainable fishing practices, and value-added product development. Additionally, encouraging marriage at an appropriate age allows women to complete their education and access employment opportunities, thereby improving household food security. A strategic focus on education, skills development, and delaying marriage to an ideal age is essential for fostering sustainable improvements in food security among fishing households.

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References

1. I. Tanziha. Ketahanan Pangan. Konsep. Determinan. dan Ketimpangan (IPB Press, Indonesia, 2023)
2. N. Sulaiman, H. Yeatman, J Russell, L.S. Law, A Food Insecurity Systematic Review: Experience from Malaysia. *Nutrients*. **13**, 945 (2021) https://doi.org/10.3390/nu13030945

3. S.N. Himi, S. Majumder, M.A. Islam, Determinants of Food Insecurity Status of Fisheries Community in Coastal Regions of Bangladesh. The Bangladesh J. Agri. Eco. **41**, 17 (2020)
4. B. Zongo, O.S. Combary, A. Zare, A. Samake, A. D. Gado, K. Keïta, P. Toé, T. Dogot, Food security status and coping strategies of households in inland fisheries: evidence from fishermen from Niger River Basin. J. Agric. Ext. Econ. Soc**. 41**, 44 (2023) doi:10.9734/ajaees/2023/v41i112260.
5. V.N Satyanarayana, M.R Babu, Food security and its determinants: A case study of South Coastal region, Andhra Pradesh. Int. J. Health Sci. **6**, 2486 (2022) doi.org/10.53730/ijhs.v6nS3.6071
6. S. Sumarmi, T. Mahmudiono, S. Melaniani, Household food insecurity and undernutrition in children below 5 years living in different geographical areas in East Java, Indonesia. Malays J Nutr. **24**, 529-538 (2018)
7. F.M Anggrayni, D. R Andrias, M. Adriani, Ketahanan pangan dan coping strategy rumah tangga urban farming pertanian dan perikanan Kota Surabaya. Media Gizi Indonesia. **10**, 173–178 (2015)
8. F. A. Simmance, G. Nico, S. Funge-Smith. S*,et al,*Proximity to small-scale inland and coastal fisheries is associated with improved income and food security. Commun. Earth Environ. **3**, 174 (2022) doi.org/10.1038/s43247-022-00496-5
9. F. Deviantony, T. Susanto, Gender role analysis in achieving farmer household food security in Jember District. Aceh Nut. J. **9**, 120 (2024)
10. UNICEF. Gender Equality Global Annual Result Report 2022. (2023)
11. V. Zulfa, U. Hasanah, F. Kusaini, The Phenomenon of Early Marriage and its Impact on Family Resilience. J. Family Sci. **1**, 48 (2024)
12. Plan International. Child, Early and Forced Marriage and Unions: Policy Brief October 2020 (2020) https:// plan-international.org/uploads/2022/02/glo-cefmu_ policy_brief-final-io-eng-jan21-1.pdf
13. I. C. Castañeda, L. Sabater, C. Owren, et al. GenderBased Violence and Environment Linkages: The Violence of Inequality (2020) https://portals.iucn.org/ library/sites/library/files/documents/2020-002-En.pdf
14. A.M Glinski, M. Sexton, L. Meyers. Child, Early and Forced Marriage Resource Guide (2015) https://www. usaid.gov/sites/default/files/documents/1865/USAID_ CEFM_Resource-Guide.PDF
15. N.S Kabunga, T. Dubois, M. Qaim, Impact of tissue culture banana technology on farm household income and food security in Kenya. Food Policy. **45**, 25–34 (2014)
16. C.R Ashari, A. Khomsan, Y.F. Baliwati YF, Validasi hfias (household food insecurity access scale) dalam mengukur ketahanan pangan: kasus pada rumah tangga perkotaan dan perdesaan di Sulawesi Selatan. J. Nutr. Food Res. **42**, 11 – 20 (2019)
17. A. Manzilati, Y.Sari, S. Suprayogi, A. Efani, The effect of credit access on food security of small fishermen in East Java. Habitat. **34**, 132–140 (2023) doi:10.21776/ub.habitat.2023.034.2.12.
18. K.E. Giller, T. Delaune, J.V. Silva, The future of farming: Who will produce our food?. Food Security. **13**, 1073 (2021) doi.org/10.1007/s12571-021-01184-6
19. A.V. R. Mauludtani, A. Khomsan., Maternal Nutritional Knowledge as a Determinant of Stunting in West Java: Rural-Urban Disparities. Amerta Nutrition. **6**, 8 (2022)

20. T. Mahmudiono, Trias, S.N. Triska, D.R Andrias, M. Hario, R. Richard, Household food insecurity as a predictor of stunted children and overweight/obese mothers (SCOWT) in Urban Indonesia. Nutrients. **10** (2018). doi: 10.3390/nu10050535.
21. K. Gambir. A. B. Matsika, A. Panagiotou. *et al.* Associations between child marriage and food insecurity in Zimbabwe: a participatory mixed methods study. BMC Pub. Health. **24**, 13 (2024) https://doi.org/10.1186/s12889-023-17408-7
22. M. Steinhaus, A. Kes, A, Child Marriage and Food Security in Niger. Washington, DC: International Center for Research on Women, 2018
23. M. O'Sulliva, A. Rao, R. Banerjee, K Gulati, M. Vinez, Levelling the field: improving opportunities for women farmers in Africa Washington, DC: World Bank & ONE Campaign, 2014
24. Plan. Understanding child marriage in food-insecure communities in Chiredzi District, Zimbabwe. UK, Plan International, 2022