

Food Security Based on Livelihood Assets: The Dominant Role of Financial Capital in Rural Areas for Sustainable Development

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Abstract

Keywords:

food security, livelihood assets, financial capital, SEM-PLS, SDGs

Food security issues have become a top priority in the Sustainable Development Goals (SDGs), particularly in efforts to meet basic human needs. The concept of food security is no longer limited to availability, but also encompasses access, which is influenced by livelihood assets. This study aims to analyze household food security in supporting SDG 2 based on the Sustainable Livelihood Approach in rural areas. A mixed-methods approach was employed, with a quantitative dominance through surveys of 100 households, analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings reveal that financial capital has a significant effect on food security and serves as a full mediator in the relationship between livelihood assets and food security. Human, social, physical, and natural capital do not have a direct significant effect, but exert indirect influence through financial capital. These results support the entitlement theory, which states that economic capacity determines access to food. Therefore, household food security in rural areas is more strongly determined by economic capacity than by resource availability, making access the dominant factor in achieving food security.

INTRODUCTION

Food is one of the basic human needs that determines quality of life and the sustainability of a nation. The issue of food security is no longer viewed solely from the perspective of availability, but also includes accessibility, nutritional quality, environmental sustainability, and community involvement in production systems (Dompheh et al., 2025; Mahmud et al., 2025; olena, Kotykova. Mykola, Babych. Anna, Lagodzinska. Anna, 2022). The United Nations, through the Sustainable Development Goals (SDGs), places food issues under Goal 2, namely Zero Hunger (Contreras et al., 2025; Hendrawati et al., 2026; Kadigi, 2026), with the main targets of ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture by 2030 (Fernandez-Zarate et al., 2026; Gundwal & Sharma, 2026; Herrera et al., 2025; Velázquez-Torres et al., 2025).

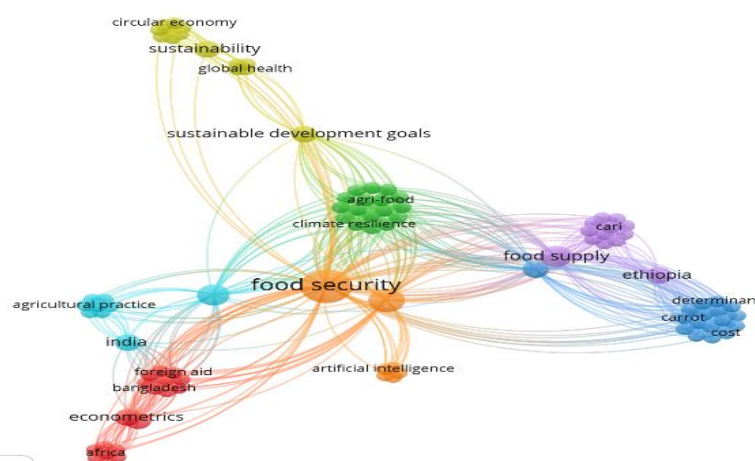


Figure 1. Bibliometric Analysis of Food Security

In its development, food security is no longer understood merely as a matter of production, but as a multidimensional phenomenon influenced by social, economic, and environmental conditions (Figure 1) (M. A. Ali & Eunice, 2025; Barrientos & Pilar, 2026; Chaminuka & Boogaard, 2023; Huluka, 2025; Tonk & Kaur, 2026). This approach aligns with the concept of the Sustainable Livelihood Approach (SLA), which emphasizes that a household's ability to achieve food security is highly determined by access to and management of various livelihood assets, including human, social, financial, physical, and natural capital. Thus, food security depends not only on the availability of resources but also on the capacity of households to optimize these assets to improve their welfare (Marson, 2025; Thapa et al., 2026).

In the local context, Mekar Tanjung Village has considerable agricultural resource potential, with a land area of approximately 407.11 hectares and rice productivity reaching around ± 3 tons per hectare per planting season. However, this potential has not fully translated into significant improvements in community welfare. There remains a gap between the availability of natural resources and household economic conditions, indicating issues in the utilization of livelihood assets. This phenomenon suggests that food security in rural areas is not determined solely by production factors, but also by the ability to access and manage resources effectively.

Although numerous studies have examined food security, most remain partial, focusing separately on production or economic aspects. In addition, many studies are conducted at the macro level and thus have not been able to comprehensively explain the dynamics of food security at the household level, particularly in rural contexts. Furthermore, the integration between the Sustainable Livelihood Approach (SLA) and food security analysis within the framework of achieving the SDGs remains relatively limited (F. Ali & Afzal, 2026; Basyuni et al., 2025; Maity et al., 2025; Nugraha et al., 2026; Sun et al., 2026), especially in identifying the empirical role of each livelihood asset.

Based on these conditions, this study seeks to fill the gap by analyzing household food security using a comprehensive SLA approach at the micro level. This research not only examines the relationships among livelihood assets but also identifies the mechanisms of their influence on food security, particularly in supporting the achievement of SDG 2 (Zero Hunger) (Contreras et al., 2025; Muazzam et al., 2025; Ndirangu & Zoltan, 2025). Therefore, the objective of this study is to analyze household food security based on livelihood assets and to describe the condition of these assets within the Sustainable Livelihood Approach framework in Mekar Tanjung Village.

METHODS

Type, Approach, and Research Location

This study employs a mixed methods approach that integrates quantitative and qualitative methods in a complementary manner. The quantitative approach is used to measure relationships between variables through statistical analysis, while the qualitative approach is used to deepen contextual understanding of household food security conditions and livelihood assets. The research was conducted in Mekar Tanjung Village, Sukabumi Regency, with farmer households as the unit of analysis. The research location was selected purposively by considering its agricultural potential and relevance to food security issues based on livelihood assets.

Population, Sample, and Data Sources

The population in this study consists of all households in Mekar Tanjung Village, totaling 3,353 households. The sample size was determined using the Slovin formula with a margin of error of 5%, resulting in approximately 100 households. The sampling technique used was random sampling to ensure the representativeness of respondents. This study utilizes primary data, obtained through questionnaires, in-depth interviews, and field observations, as well as secondary data, obtained from relevant institutions, literature, and supporting documents.

Data Analysis Techniques

Structural Equation Modeling (SEM-PLS) (Luc et al., 2026; Mananda et al., 2025) is used to test structural relationships between variables simultaneously, including both direct and indirect (mediating) effects. The structural model in this study is formulated as follows:

Financial Capital Equation

$$Z = \gamma_1 X_1 + \gamma_2 X_3 + \gamma_3 X_4 + \gamma_4 X_5 + \varepsilon_1$$

Food Security Equation

$$Y = \beta_1 Z + \beta_2 X_1 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_2$$

Notes:

Z : Financial capital

Y : Food security

X : Livelihood assets

ε : Error term

The mixed methods approach in this study enables a comprehensive analysis of household food security, both from a quantitative perspective through regression models and SEM-PLS, and from a qualitative perspective to gain an in-depth understanding of the local context.

RESULTS AND DISCUSSION

Mekar Tanjung Village is one of the villages in Sukabumi Regency that has considerable natural resource potential, particularly in the agricultural sector. Land use structure in this village is dominated by rice fields covering approximately ± 474 hectares, indicating a relatively high food production capacity. However, the limited land allocated for settlements, plantations, and public facilities indicates low economic diversification and limited supporting infrastructure.

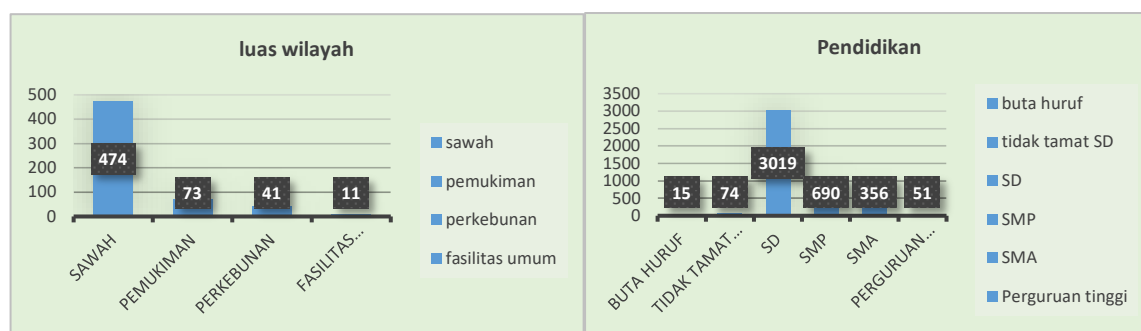


Figure 2. General Overview of the Village (observation results)

In terms of human resources, the level of education among the community is relatively low. The majority of the population (72%) has only completed primary school, while around 16% are classified as illiterate. This condition indicates that the quality of human capital remains a major challenge in economic development and food security in the area. Overall, this reflects a gap between the large potential of natural resources and the community's ability to manage and utilize them optimally.

Although Mekar Tanjung Village has significant natural resource potential, this does not necessarily lead to improved food security due to limitations in households' ability to manage and access these resources effectively. In this study, an evaluation of the measurement model was conducted to ensure that the indicators used are valid and reliable in measuring latent constructs. The analysis results show that all indicators have outer loading values above 0.70, indicating that they meet convergent validity criteria. Additionally, Composite Reliability (CR) values are greater than 0.70 and Average Variance Extracted (AVE) values exceed 0.50, meaning that all constructs are reliable. Therefore, the measurement model is suitable for further analysis in the structural model.

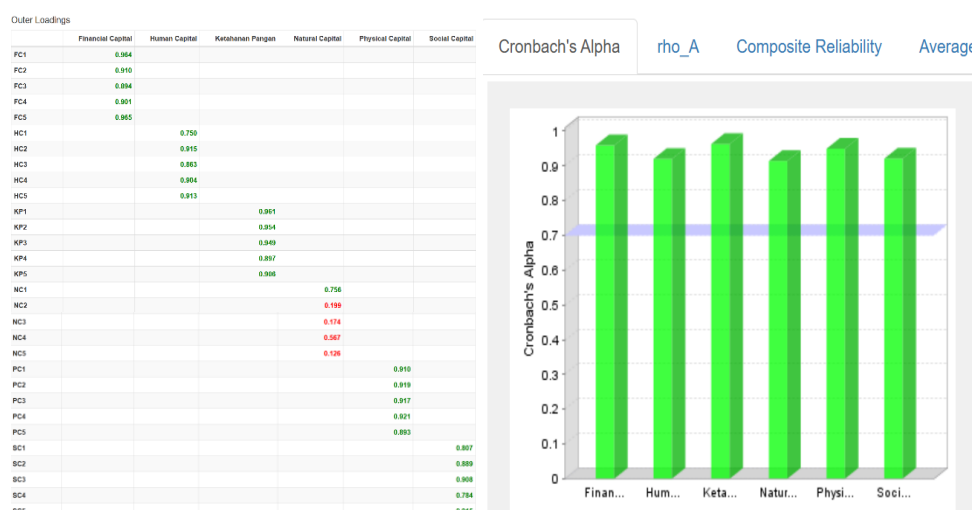


Figure 3. Outer Loading and Construct Reliability and Validity Charts (processed, 2026)

The analysis results show that the R² value for the food security variable is 0.943, while the R² value for the financial capital variable is 0.860. This indicates that the model has a very strong ability to explain the variance of endogenous variables and can therefore be categorized as a substantial (strong) model.

Table 1. R-Square Analysis Results

	R Square	R Square Adjusted
Financial Capital	0.860	0.854
Ketahanan Pangan	0.943	0.940

The estimation results of the path coefficients (Komalasari, Handoyono, 2025; Liu et al., 2025) show that financial capital has the most dominant influence on food security, with a coefficient value of 0.849. This confirms that access to and availability of financial resources are the main factors in strengthening the capacity of households or communities to achieve food security.

Table 2. Path Coefficients Analysis

	Financial Capital	Human Capital	Ketahanan Pangan	Natural Capital	Physical Capital	Social Capital
Financial Capital			0.849			
Human Capital	0.456		-0.002			
Ketahanan Pangan						
Natural Capital	-0.079		-0.066			
Physical Capital	0.395		0.111			
Social Capital	0.093		-0.028			

Human capital shows a very small and even negative effect (-0.002) on food security. Physical capital has a positive effect of 0.111, indicating that infrastructure and production facilities still play a role in supporting food security, although their contribution is relatively small compared to financial capital. Meanwhile, natural capital (-0.066) and social capital (-0.028) show negative effects, which may indicate that the utilization of natural resources and social networks has not been optimal in supporting food security.

In addition, relationships among different forms of capital are also evident. Human capital contributes to an increase in financial capital (0.456), as do physical capital (0.395) and social capital (0.093). However, natural capital has a negative effect on financial capital (-0.079). This suggests that financial capital often acts as an important intermediary linking various forms of capital to food security.

Table 3. Indirect Effects Analysis

	Financial Capital	Human Capital	Ketahanan Pangan	Natural Capital	Physical Capital	Social Capital
Financial Capital						
Human Capital			0.388			
Ketahanan Pangan						
Natural Capital			-0.067			
Physical Capital			0.335			
Social Capital			0.079			

The results of the indirect effects analysis (Lei et al., 2026; Nkiko, 2026) show how different forms of capital contribute to food security through other variables. This table illustrates the relationships among financial, human, natural, physical, and social capital that are not direct but occur through certain mediating pathways. In general, human capital, physical capital, and social capital have positive indirect effects on food security, with values of 0.388, 0.335, and 0.079, respectively. This indicates that improvements in human resource quality, availability of physical infrastructure, and social networks can strengthen food security through increased financial capital or other mediating factors.

Natural capital shows a negative indirect effect of -0.067, indicating that the condition or utilization of natural resources has not fully supported improvements in food security indirectly. This may be due to limited access, environmental degradation, or low efficiency in the use of

natural resources within food production systems.

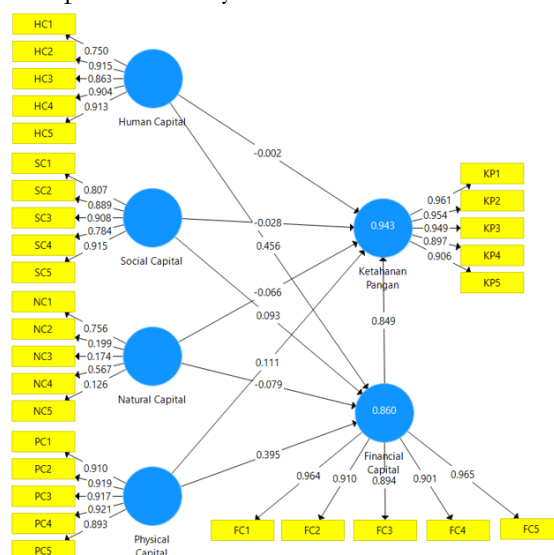


Figure 4. SEM-PLS Analysis Results

Based on the analysis results, financial capital has the most significant influence on food security, with a coefficient of 0.849. This indicates that household economic capacity, such as income and access to financial resources, is the main determinant of food security. These findings suggest that food security is more access-based, where the ability to purchase or obtain food is more important than mere food availability.

The results also indicate full mediation, where all livelihood assets influence food security through financial capital. This implies that livelihood assets cannot directly improve food security without being transformed into economic capacity. Thus, the relationships among variables in the model are indirect and operate through economic transformation mechanisms.

The results of this study are consistent with the Entitlement Theory proposed by Amartya Sen (Huluka, 2025), which states that food security is determined by economic access rather than merely food availability. The Food and Agriculture Organization Food Security Framework (Singh et al., 2026)(KC et al., 2025; Odekunle et al., 2025) also emphasizes the importance of the access dimension in addition to availability. The Sustainable Livelihood Approach (SLA) further indicates that livelihood assets must be transformed into economic well-being. The SEM-PLS results are consistent with the empirical conditions in Mekar Tanjung Village, namely: extensive agricultural land that has not yet optimally improved welfare, low levels of education that limit productivity and innovation, and economic access as the main constraining factor. This explains why food security is more strongly determined by financial capital compared to other assets. Policy implications include improving access to financial resources and increasing household income, strengthening human resource capacity, promoting household economic diversification, and developing economic infrastructure.

CONCLUSION

This study demonstrates that household food security in Mekar Tanjung Village is not primarily determined by the availability of natural resources, but rather by the capacity of households to access and manage those resources through financial capital. Using a mixed methods approach and SEM-PLS analysis, the findings reveal that financial capital plays a dominant and mediating role, fully linking all livelihood assets human, natural, physical, and social capital to food security outcomes. Despite the village's substantial agricultural potential, limitations in education, economic access, and resource management hinder the optimal utilization of these assets. The results confirm that food security is more access-based than availability-based, aligning with livelihood and entitlement perspectives. Therefore, strengthening financial access, improving human capital, promoting economic diversification, and enhancing supporting infrastructure are critical strategies to achieve sustainable food security in rural areas.

REFERENCE

- Ali, F., & Afzal, I. (2026). Sustainable weed control in the rice–wheat cropping system: challenges and ecological insights. *Weed Science*, 74(1). <https://doi.org/10.1017/wsc.2025.10076>
- Ali, M. A., & Eunice, B. L. G. (2025). Analyzing the prospects and hurdles of urban agriculture an examination of economic landscapes and versatile approaches in Ethiopia. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-02416-x>
- Barrientos, R. L. C., & Pilar, J. G. A. (2026). After mining catastrophe: the language of economic survival of the Sipalay mine people at Sipalay, Negros Occidental, Philippines. *Journal of Degraded and Mining Lands Management*, 13(1), 9239–9257. <https://doi.org/10.15243/jdmlm.2026.131.9239>
- Basyuni, M., Mubaraq, A., Aznawi, A. A., Sari, S. P. M., Ayu, S. M., Wahyuni, T., Siregar, E. S., Slamet, B., Sumarga, E., Larekeng, S. H., Agustina, N. A., Gonzales, R. C., Leopardas, V. E., Ali, H. M., & Amir, A. A. (2025). Edible and medicinal uses of mangroves in Indonesia with a systematic review on blue food potential and health benefits. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-01967-3>
- Chaminuka, & Boogaard. (2023). *Indigenous Cattle Keeping Through Ubuntu Philosophy: A Case Study with Tsonga People in Limpopo Province, South Africa*. 143–168.
- Contreras, R., Puertas, R., & Martinez-Gomez, V. (2025). Bibliometric analysis of emerging trends and future prospects in sustainable agriculture. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-01901-7>
- Dompheh, E. B., Wang, Q., Su, J., Dam Lam, R., Barman, B. K., Rossignoli, C. M., & Gasparatos, A. (2025). Differentiated characteristics, sustainability performance and preferences among small-scale aquaculture producers: implications for sustainable intensification. *Sustainability Science*, 21(1), 325–346. <https://doi.org/10.1007/s11625-025-01703-w>
- Fernandez-Zarate, F. H., Goñas, M., Oblitas, J., Fernandez, J., Gomez-Fernandez, D., García-Chimbo, N., Montalvan, M., Quiñones-Huatangari, L., Acosta-Jacinto, R. E., Ríos-Julcapoma, M., Guardia, G., Sanz-Cobeña, A., Huaccha-Castillo, A. E., & Milla-Pino, M. E. (2026). Sustainability of coffee farms: Case study of the cooperativa agraria Cafetalera La Prosperidad de Chirinos. *Clean Energy Science and Technology*, 4(2), 1–14. <https://doi.org/10.18686/cest555>
- Gundwal, M., & Sharma, N. K. (2026). Optimizing sustainability in allium crop supply chains: a

- framework for enhancing efficiency and circular economy practices in India. *Journal of International Logistics and Trade*, 1–41. <https://doi.org/10.1108/JILT-07-2025-0055>
- Hendrawati, T., Marthendra, K., Jayama Simanjuntak, B. R., & Pravitasari, A. A. (2026). Lstm and Gru in Rice Prediction for Food Security in Indonesia. *Barekeng*, 20(1), 55–68. <https://doi.org/10.30598/barekengvol20iss1pp0055-0068>
- Herrera, J. P., Nasir, D., Meral, R. J., Rauchilla, R. J., Christine, R., Esperio, J., Florence, R. A., Joël, P., Eliancine, M., Correlien, E., Valérie, A., Geraldo, N., Roméo, R. J., Judolin, R. N., Joelda, Olivetan, Z. R., & Wyman Roth, N. (2025). Evaluating the Efficacy of Agricultural Interventions in Northeast Madagascar. *Sustainability (Switzerland)*, 17(24), 1–25. <https://doi.org/10.3390/su172411134>
- Huluka, A. T. (2025). Conflict as a driver of multidimensional poverty in rural and urban areas of the East Wollega Zone of Ethiopia. *Discover Global Society*, 3(1). <https://doi.org/10.1007/s44282-025-00311-4>
- Kadigi, I. L. (2026). The role of fertilizers in Tanzania’s rice production: policy insights from the National Sample Census of Agriculture. *Frontiers in Sustainable Food Systems*, 10(January), 1–18. <https://doi.org/10.3389/fsufs.2026.1683883>
- KC, U., Lim-Camacho, L., Friedman, R., & Crimp, S. (2025). A Bayesian insight into improving national food security. *Food Security*, 17(5), 1191–1206. <https://doi.org/10.1007/s12571-025-01566-0>
- Komalasari, Handoyono, H. (2025). The Journal of Behavioral Science (IJBS). *The Journal of Behavioral Science*, 16(1), 85–100.
- Lei, D., Jin, J., Qiu, X., Liu, D., & Zhang, C. (2026). How Do Livelihood Assets Affect Subjective Well-Being Under Different Livelihood Strategies? Evidence from Tibetan Rural Households in China. *Agriculture (Switzerland)*, 16(1), 1–19. <https://doi.org/10.3390/agriculture16010055>
- Liu, L., Liu, X., & Zhang, Y. (2025). Tourism-Driven Land Use Transitions and Rural Livelihood Resilience: A Spatial Production Approach to Sustainable Development in China’s Heritage Areas. *Sustainability (Switzerland)*, 17(23), 1–26. <https://doi.org/10.3390/su172310839>
- Luc, M. H., Nguyen, Q. V., Pham, T. Van, Le, T. H. H., Tran, T. G., & Nguyen, T. H. L. (2026). How Community-Based Tourism Supports Sustainable Livelihoods: The Mediating Roles of Community Participation and Tourism-Related Employment. *Tourism and Hospitality*, 7(2), 1–24. <https://doi.org/10.3390/tourhosp7020037>
- Mahmud, Endayani, S., Stefano, A., Lakehu, A., Mutakim, & Wahyudi. (2025). Shifting cultivation and soil conservation strategies among Papuan communities, Indonesia. *Asian Journal of Agriculture*, 9(2), 671–682. <https://doi.org/10.13057/asianjagric/g090235>
- Maity, S., Sahoo, S., & Govind, A. (2025). A field-based data-driven modeling approach for livelihood vulnerability examination of rice farmers’ considering climate risk in parts of West Bengal, Eastern India. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-01711-x>
- Mananda, I. G. P. B. S., Negara, I. M. K., Kristianto, Y., Angligan, I. G. K. H., & Deuchar, C. (2025). From Overtourism to Regeneration: A Penta-Helix Governance Model for Sustainable Tourism in Bali. *Tourism and Hospitality*, 6(5), 1–34. <https://doi.org/10.3390/tourhosp6050240>
- Marson, M. (2025). Effects of public expenditure for agriculture on food security in Africa.

Empirical Economics, 68(6), 2673–2704. <https://doi.org/10.1007/s00181-025-02713-4>

- Muazzam, A., Samad, A., Alam, A. N., Hwang, Y. H., & Joo, S. T. (2025). Microbial Proteins: A Green Approach Towards Zero Hunger. *Foods*, 14(15), 1–19. <https://doi.org/10.3390/foods14152636>
- Ndirangu, Z., & Zoltan, E. (2025). Agricultural ergonomics and safety in the Zero Hunger era: a bibliometric analysis of global trends and research gaps. *Discover Sustainability*, 6(1), 1–29. <https://doi.org/10.1007/s43621-025-02080-1>
- Nkiko, C. M. (2026). Systematic review of business strategies for climate-induced migration adaptation through ESG in Sub-Saharan Africa. *Discover Sustainability*, 7(1). <https://doi.org/10.1007/s43621-025-02382-4>
- Nugraha, H., Purwanto, E., Christian, M., & Rembulan, G. D. (2026). The Evolution of Research in Agricultural Technology and Rural Development: A Bibliometric Analysis. *Journal of Global Innovations in Agricultural Sciences*, 14(1), 175–192. <https://doi.org/10.22194/JGIAS/26.1697>
- Odekunle, F. J., Fadeyi, A. A., Fadairo, O. A., Agbebiyi, M. J., Igwilo, M. C., Akindele-Sotunbo, D. B., Alabi, A. S., Adebayo, O. A., Oyewole, K. A., Akande, I., Kilasho, O. M., Jinadu, I. O., Iseoluwa, A., Adebakin, T. E., Anifowose, T. E., Akinde, O. P., Onifade, O. F., & Oke, T. I. (2025). Resilient Food Systems in Water-Stressed Regions: A Comparative Analysis of Water Scarcity and Food Security in Botswana and South Africa. *International Research Journal of Multidisciplinary Scope*, 6(4), 561–579. <https://doi.org/10.47857/irjms.2025.v06i04.06883>
- olena, Kotykova. Mykola, Babych. Anna, Lagodzinska. Anna, T. (2022). Agricultural and Resource Economics : International Scientific E-Journal Agricultural and Resource Economics : International Scientific E-Journal. *Agricultural and Resource Economics: International Scientific E - Journal*, 8(2), 30–49.
- Singh, B. R., Banda, L. J., Safalaoh, A., Mwangwela, A., Haug, R., Eik, L. O., West, J. J., & Lal, R. (2026). Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods— Volume 1. In *Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods— Volume 1*. Springer Nature Switzerland. <https://doi.org/10.1007/978-3-032-11288-0>
- Sun, X., Fan, X., Liu, Q., & Lyu, J. (2026). Balancing Livelihoods and Sustainable Development: How Does Off-Farm Employment Affect Agricultural Green Total Factor Productivity in China? *Sustainability (Switzerland)*, 18(1). <https://doi.org/10.3390/su18010155>
- Thapa, B., Ochuodho, T. O., Lhotka, J. M., Thomas, W., Muller, J., Brandeis, T. J., Olale, E., Zhou, M., & Liang, J. (2026). Potential Economic Impacts of Maple Syrup Production in Kentucky, United States: A CGE Analysis for Sustainable Rural Development. *Sustainability*, 18(2), 812. <https://doi.org/10.3390/su18020812>
- Tonk, A., & Kaur, M. (2026). Transhumance in transition: socio-economic shifts among semi-nomadic Gaddi tribe of Dhauladhar Himalayas. *Pastoralism*, 15(January), 1–21. <https://doi.org/10.3389/past.2025.15370>
- Velázquez-Torres, A. L., Martínez-Castañeda, F. E., Callejas-Juárez, N., Rogers-Montoya, N. A., Herrera-Tapia, F., Hernandez, E., & Thomé-Ortiz, H. (2025). Sustainability and Competitiveness of Mexican Rose Production for Export: A Policy Analysis Matrix Approach Assessing Economic and Social Dimensions. *Sustainability (Switzerland)*, 17(24), 1–17. <https://doi.org/10.3390/su172411289>

