INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print); 2222-5234 (Online)
Website: https://www.innspub.net
Email contact: info@innspub.net
Vol. 28, Issue: 3, p. 155-163, 2026

RESEARCH PAPER OPEN ACCESS

Socio-economic characteristics and production cost structure of rice farmers with and without financial intervention in Remedios T. Romualdez, Agusan del Norte

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Key words: Socio-economic profile, Rice farming, Financial intervention, Cost–return analysis, Land tenure, Agricultural sustainability

Received: February 27, 2026 **Accepted:** March 11, 2026 **Published:** March 16, 2026

DOI: https://dx.doi.org/10.12692/ijb/28.3.155-163

ABSTRACT

Rice farming plays a vital role in ensuring food security and sustaining rural livelihoods in the Philippines. However, many smallholder farmers continue to face challenges associated with limited financial resources, tenant-based farming systems, and increasing production costs. Understanding the socio-economic characteristics and production cost structure of rice farmers is essential for developing effective financial support programs and improving the sustainability of rice production. This study examined the socio-economic characteristics and production cost structure of rice farmers with and without financial intervention in Remedios T. Romualdez (RTR), Agusan del Norte. A descriptive–comparative research design was employed involving 70 rice farmers, comprising 35 beneficiaries and 35 non-beneficiaries of financial intervention programs. Data were collected through structured face-to-face interviews using a validated questionnaire and analyzed using descriptive statistics, including frequencies, percentages, and means, to compare socio-economic characteristics, agricultural input prices, and production costs. The findings revealed that 54.29% of the respondents were male, 58.57% were over 50 years of age, 71.43% were tenant farmers, 58.57% cultivated 1.01–1.50 ha, and 67.14% had annual household incomes below ₱40,000. Market prices of major agricultural inputs were generally similar between the two groups; however, farmers receiving financial intervention had access to crop loans and exhibited different production cost allocation patterns. Compared with non-beneficiaries, intervention farmers invested more in seeds (₱1,900.29 vs. ₱1,258.71), land rent (₱13,068.47 vs. ₱5,501.20), and family labor (₱9,066.67 vs. ₱8,286.67), while spending less on fertilizers (₱3,774.29 vs. ₱5,606.43), pesticides (₱2,127.50 vs. ₱2,535.96), and irrigation (₱278.72 vs. ₱431.43). These findings suggest that financial intervention is associated with differences in production cost allocation and resource utilization rather than changes in market input prices. Strengthening agricultural credit, input assistance, and extension services may therefore enhance resource-use efficiency and support the long-term sustainability of smallholder rice farming in Agusan del Norte.

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INTRODUCTION

Rice (*Oryza sativa* L.) is one of the world's most important staple food crops and serves as the primary source of calories for more than half of the global population. In the Philippines, rice production is not only essential for national food security but also provides livelihood opportunities for millions of rural households. Despite its economic and social importance, the rice sector continues to face numerous challenges, including rising production costs, limited access to agricultural credit, fragmented landholdings, fluctuating input prices, and increasing vulnerability to climate variability. These constraints are particularly evident among smallholder farmers, whose productivity and livelihood largely depend on their capacity to access production resources and adopt efficient farm management practices (Makate *et al.*, 2019; Food and Agriculture Organization of the United Nations, 2023).

Smallholder rice farming in the Philippines is characterized by relatively small farm sizes, tenancy arrangements, and limited household income, factors that collectively influence production decisions and resource allocation. Farmers with restricted financial capacity often encounter difficulties in purchasing quality inputs, accessing formal credit, and investing in technologies that enhance production efficiency. Consequently, financial support programs implemented by government institutions have become an important policy instrument for improving farmers' access to production resources and strengthening agricultural sustainability. Such interventions may include agricultural credit, subsidized farm inputs, extension services, and other forms of institutional assistance designed to reduce production constraints and improve farm management (Food and Agriculture Organization of the United Nations, 2022; Kassem *et al.*, 2021).

Previous studies have demonstrated that socio-economic characteristics, including age, education, land tenure, and household income, significantly influence farmers' production practices, technology adoption, and overall farm performance. Educational attainment enhances farmers' capacity to understand and implement improved agricultural practices, while secure access to land and financial resources encourages investment in productivity-enhancing technologies (Kassem *et al.*, 2021; Makate *et al.*, 2019). Likewise, access to institutional finance has been associated with improved production planning and more efficient utilization of farm inputs among smallholder rice farmers (Zakaria *et al.*, 2021; Mauki *et al.*, 2023). These findings highlight the importance of understanding how financial intervention influences farm management beyond simply increasing agricultural production.

Although numerous studies have examined rice production economics and agricultural support programs in different countries, relatively few have focused on how financial intervention influences production cost allocation among rice farmers at the local level in the Philippines. Existing research has largely emphasized profitability, productivity, or technology adoption, whereas less attention has been given to comparing the socio-economic characteristics, prevailing input prices, and production cost structures of farmers with and without financial intervention under similar production environments. Furthermore, empirical evidence from Remedios T. Romualdez (RTR), Agusan Del Norte remains limited despite the municipality's dependence on rice farming as a major livelihood. Addressing this gap is important for understanding how financial intervention may influence farmers' production decisions and resource allocation under local farming conditions.

This study was therefore conducted to examine the socio-economic characteristics and production cost structure of rice farmers with and without financial intervention in Remedios T. Romualdez (RTR), Agusan Del Norte. Specifically, the study aimed to: (1) determine the socio-economic characteristics of rice farmers in terms of gender, age, educational attainment, civil status, primary source of income, land tenure, farm size, and household income; (2) compare the average market prices of major agricultural inputs used by farmers with and without

financial intervention; (3) examine the production cost structure, including cash and non-cash costs, between the two farmer groups; and (4) assess the implications of financial intervention on production cost allocation and farm resource utilization. The findings are expected to provide evidence that can support local government agencies, agricultural planners, and other stakeholders in designing programs that strengthen the sustainability and resilience of smallholder rice farming in Agusan del Norte.

MATERIALS AND METHODS

Research design

This study employed a descriptive–comparative research design to examine the socio-economic characteristics and production cost dynamics of rice farmers in Remedios T. Romualdez (RTR), Agusan Del Norte. The descriptive component was used to characterize the respondents according to their demographic, socio-economic, and farm-related attributes, while the comparative component examined differences in agricultural input prices and production cost structures between farmers who received financial intervention and those who did not. This research design is widely applied in agricultural socio-economic studies because it enables systematic description of farming households while facilitating meaningful comparisons between farmer groups exposed to different production support conditions (Zakaria *et al.*, 2021; Mauki *et al.*, 2023).

Study area

The research was conducted in Remedios T. Romualdez (RTR), Agusan del Norte, Philippines, a municipality where rice farming is one of the major agricultural livelihood activities. The municipality was purposively selected because it has an established population of rice farmers, including beneficiaries and non-beneficiaries of financial intervention programs implemented by the Provincial Local Government Unit (PLGU). The presence of these two farmer groups provided an appropriate setting for comparing production practices and cost structures under similar agroecological and market conditions.

Respondents and sampling procedure

The study involved 70 rice farmers, consisting of 35 farmers who received financial intervention and 35 farmers who did not receive financial intervention. Respondents were selected using a stratified random sampling technique. Farmers were first classified into two strata based on their participation in the financial intervention program. Subsequently, respondents from each group were selected through simple random sampling using the list of eligible rice farmers obtained from the Municipal Agriculture Office. This sampling procedure ensured proportional representation of both groups and facilitated direct comparison between intervention and non-intervention farmers.

Research instrument and data collection

Primary data were collected through a structured questionnaire administered through face-to-face interviews during the 2024 cropping season. The questionnaire consisted of three major sections. The first gathered information on respondents' socio-economic characteristics, including gender, age, educational attainment, civil status, household income, land tenure, farm size, and primary source of livelihood. The second collected information on the prevailing prices of major agricultural production inputs, including seeds, fertilizers, pesticides, labor, fuel, irrigation, and crop loan interest. The third documented production costs incurred by farmers, distinguishing between cash and non-cash expenditures required for rice production.

Prior to data collection, the questionnaire was reviewed for clarity and relevance by faculty members with expertise in agricultural economics and extension. Interviews were conducted personally by the researchers after obtaining informed consent from each respondent. Responses were verified whenever possible through farm records and follow-up clarification to improve data accuracy and consistency.

Data analysis

The collected data were encoded, organized, and analyzed using descriptive statistical techniques.

Frequencies and percentages were used to summarize the socio-economic characteristics of the respondents, while arithmetic means were computed to determine the average prices of production inputs and the average cash and non-cash production costs incurred by farmers with and without financial intervention.

Production costs were classified into cash costs, including expenditures for seeds, fertilizers, pesticides, labor, fuel, irrigation, crop loan interest, land rent, and harvester's share, and non-cash costs, consisting of family labor, seed value, and the rental value of owned land. Comparative analysis was subsequently performed to identify differences in production cost allocation between farmers with financial intervention and those without. The results were presented using tables and interpreted descriptively to highlight variations in resource allocation and their implications for rice farming operations.

Ethical considerations

Participation in the study was voluntary. Before each interview, the objectives of the research were explained to all respondents, and informed consent was obtained. Participants were assured that the information collected would be treated confidentially, used exclusively for academic purposes, and reported only in aggregated form to protect their identity and privacy.

RESULTS AND DISCUSSION

Socio-economic characteristics of rice farmers

The socio-economic characteristics of the 70 rice farmers surveyed in Remedios T. Romualdez (RTR), Agusan Del Norte are presented in Table 1. Male farmers accounted for 54.29% (38 respondents) of the sample, while 45.71% (32 respondents) were female, indicating that rice farming in the municipality remains predominantly managed by men, although women also play a substantial role in agricultural production. This finding reflects the continuing importance of women's participation in farm management and household agricultural activities, a trend increasingly recognized in smallholder farming systems (Shisler, 2016; FAO, 2023).

The respondents were generally older farmers. Individuals aged 51–60 years constituted the largest proportion (30.00%), followed by those aged 60 years and above (28.57%), whereas only 4.29% were aged 30 years or younger. This age distribution indicates an aging farming population and limited participation of younger generations in rice production. Similar demographic patterns have been widely reported across developing countries, where youth migration and declining interest in agriculture threaten the long-term sustainability of farming communities (Makate *et al.*, 2019).

Educational attainment was relatively modest. High school graduates represented the largest educational group (28.57%), while only 8.57% had completed college and 2.87% possessed postgraduate education. Limited formal education may restrict farmers' access to technical knowledge, agricultural innovations, and extension services. Previous studies have demonstrated that higher educational attainment enhances farmers' decision-making ability, technology adoption, and farm productivity (Kassem *et al.*, 2021).

Most respondents (81.43%) were married, and farming served as the primary source of income for 90.00% of households. These findings indicate that rice farming remains the principal livelihood activity in the municipality and that household welfare is closely linked to agricultural performance.

Land tenure patterns showed that 71.43% of respondents cultivated land as tenants, while only 24.29% were landowners. Furthermore, 58.57% operated farms ranging from 1.01 to 1.50 ha, confirming the predominance of smallholder farming systems. Small farm sizes and tenant farming often limit long-term investment in land improvement and reduce opportunities for economies of scale, thereby constraining agricultural productivity (Makate *et al.*, 2019).

Table 1. So cio-economic characteristics of rice farmers in Remedios T. Romualdez (RTR), Agusan del Norte (n = 70), 2024

Socio-economic profile of rice farmer	Frequency	Percent (%)
Gender		
Male	38	54.29
Female	32	45.71
Age		
30 and below	3	4.29
31-40	10	14.29
41-50	16	22.86
51-60	21	30.00
60 and above average	20	28.57
Educational attainment		
Elementary level	13	18.57
Elementary graduate	7	10.00
High school level	11	15.71
High school graduate	20	28.57
Vocational graduate	5	7.14
College level	6	8.57
College graduate	6	8.57
Post graduate	2	2.87
Civil status		
Single	5	7.14
Married	54	81.43
Others	11	15.71
Main source of income		
Farming	63	90.00
Others	7	10.00
Land tenure		
Owner	17	24.29
Tenant	50	71.43
Rent	3	4.29
Farm size in (ha)		
1.0 ha and below	9	12.86
1.01- 1.5 ha	41	58.57
1.6- 2.0 ha	18	25.71
2.0 ha and above average	2	2.86
Farm household income		
Below 40,000	47	67.14
41,000 - 70,000	14	20.00
71,000-100,000	6	8.57
101,000 above	3	4.29

Household income further illustrates the financial vulnerability of rice-farming households. Approximately 67.14% earned less than ₱40,000 annually, whereas only 4.29% reported annual incomes exceeding ₱101,000. These findings suggest that most households have limited financial resources for investing in improved technologies and agricultural inputs. Similar socio-economic constraints have been reported among smallholder farmers in developing countries, where limited capital reduces production capacity and resilience to economic shocks (Akter and Chindarkar, 2019).

Average market prices of agricultural inputs

The average prices of major agricultural inputs are presented in Table 2. The prices of inbred seeds (₱1,600), urea (₱1,620), complete fertilizer (₱1,567), ammonium sulfate (₱814), pesticides (₱1,187.50), planting (₱6,500), leveling (₱1,000), pulling (₱3,000), fuel (₱1,100), and irrigation (₱300) were identical for farmers with and without financial intervention. This indicates that both groups operated under the same prevailing market conditions and faced comparable production input prices.

Table 2. Average market prices of major agricultural inputs used by rice farmers with and without financial intervention in Remedios T. Romualdez (RTR), Agusan del Norte, 2024

Variables	With intervention	Without intervention
Price (Php)		
Seed		
Inbred seeds	1,600	1,600
Fertilizers		
Urea	1620	1620
Complete	1567	1567
Ammonium sulfate	814	814
Pesticides	1,187.5	1,187.5
Labor cost		
Planting cost	6500	6500
Leveling cost	1000	1000
Pulling cost	3,000	3,000
FUEL	1,100	1,100
Irrigation cost	300	300
Interest payment of crop loan	1500	0

The only difference observed involved crop loan interest. Farmers receiving financial intervention incurred an average crop loan interest payment of ₱1,500, whereas no interest payment was reported among farmers without intervention. This suggests that intervention beneficiaries had greater access to institutional agricultural credit. Access to formal financing is widely recognized as an important factor supporting timely purchase of farm inputs and improving production efficiency among smallholder farmers (Zakaria *et al.*, 2021; Mauki *et al.*, 2023).

Overall, the findings indicate that financial intervention did not alter market prices of agricultural inputs but improved farmers' access to production financing. This distinction is important because differences in farm performance are therefore more likely attributable to production decisions and resource allocation than to differences in input prices.

Comparative production cost structure

The average production costs per hectare incurred by rice farmers with and without financial intervention are presented in Table 3. Noticeable differences were observed in the allocation of production expenditures. Farmers receiving financial intervention invested more in seeds (₱1,900.29) than farmers without intervention (₱1,258.71), suggesting greater investment in planting materials. In contrast, expenditures on fertilizers (₱3,774.29 versus ₱5,606.43) and pesticides (₱2,127.50 versus ₱2,535.96) were lower among intervention farmers. These patterns may reflect more efficient input management or improved access to quality inputs through financial support programs.

Labor-related expenditures exhibited only modest variation. Planting costs were ₱4,937.14 for intervention farmers compared with ₱4,758.57 for non-intervention farmers, while pulling costs were ₱3,161.43 and ₱2,892.86, respectively. Fuel expenditure was likewise slightly higher among intervention beneficiaries (₱825.71) than among non-beneficiaries (₱649.14), whereas irrigation costs were lower (₱278.72 versus ₱431.43). These findings suggest differences in production management rather than differences in market prices. Additional production expenses also differed between the two groups. Intervention farmers incurred crop loan interest of ₱1,500, reflecting access to institutional credit, and paid substantially higher land rent (₱13,068.47) than non-intervention farmers (₱5,501.20). Harvester's share and family labor costs were also slightly higher among intervention farmers. Meanwhile, the rental value of owned land remained constant (₱19,008) for both groups.

Collectively, these findings suggest that financial intervention influenced how production resources were allocated rather than reducing overall production expenditure. Farmers with financial

support appeared to prioritize investment in planting materials and productive farm operations while reducing expenditures on fertilizers, pesticides, and irrigation. Similar patterns have been reported in previous studies, where institutional support enabled farmers to allocate resources more efficiently and improve farm management practices (Zakaria *et al.*, 2021; Mauki *et al.*, 2023).

Table 3. Average production costs (cash and non-cash) per hectare of rice farming with and without financial intervention in Remedios T. Romualdez (RTR), Agusan Del Norte, 2024

Variables	With intervention	Without intervention
Cash costs (Php)		
Seeds	1,900.29	1,258.71
Fertilizers	3,774.29	5,606.43
Pesticides	2,127.50	2,535.96
Planting cost	4,937.14	4,758.57
Levelling cost	1000	1000
Pulling cost	3,161.43	2,892.86
Fuel	825.71	649.14
Irrigation cost	278.72	431.43
Interest payment on crop loan	1500	0
Land rent	13,068.47	5501.2
Harvester's shares	6961.68	6391.44
Non cash cost		
Family labor	9,066.67	8286.67
Seeds	2100	1540
Rental value of owned land	19,008	19,008

Table 4. Comparative implications of financial intervention on production cost allocation and farm resource use among rice farmers in Remedios T. Romualdez (RTR), Agusan del Norte, 2024

Production component	With financial intervention	Without financial intervention	Interpretation
Market input prices	Comparable	Comparable	Financial intervention did not affect prevailing market prices.
Agricultural credit	Crop loan available	No crop loan recorded	Intervention improved access to institutional financing.
Seed investment	Higher	Lower	Greater investment in planting materials.
Fertilizer expenditure	Lower	Higher	Indicates more efficient fertilizer use or subsidized access.
Pesticide expenditure	Lower	Higher	Suggests improved pest management efficiency.
Irrigation expenditure	Lower	Higher	Indicates relatively efficient water utilization.
Land rent	Higher	Lower	Greater investment in cultivated land.
Family labor	Higher	Lower	Increased household labor contribution to production.
Overall resource allocation	Greater investment in productive inputs with lower expenditure on fertilizers, pesticides, and irrigation	Greater expenditure on fertilizers and pesticides	Financial intervention influenced production decisions and resource allocation rather than market prices.

Overall implications of financial intervention on farm resource allocation

The comparative summary presented in Table 4 synthesizes the differences observed in production cost allocation between farmers with and without financial intervention. Although both groups purchased agricultural inputs at comparable market prices, the intervention influenced farmers' production decisions by improving access to agricultural credit and encouraging different patterns of resource allocation.

Farmers receiving financial intervention allocated relatively greater resources to quality seeds, land

access, and family labor while reducing expenditures on fertilizers, pesticides, and irrigation. These adjustments suggest that financial assistance supported more strategic investment decisions rather than simply increasing production expenditure. Lower spending on fertilizers and pesticides may indicate more efficient input use, whereas reduced irrigation costs could reflect improved water management practices.

When considered alongside the socio-economic characteristics presented in Table 1, these findings highlight the importance of financial intervention for predominantly smallholder and tenant farmers with limited household income. Access to production credit and financial assistance can reduce capital constraints, enabling farmers to invest in productivity-enhancing inputs and improve farm management. Although the present study did not directly evaluate profitability indicators such as gross income, net income, return on investment, or benefit-cost ratio, the observed differences in resource allocation indicate that financial intervention has the potential to strengthen production efficiency and enhance the economic resilience of rice-farming households.

Overall, the results suggest that financial intervention serves as an important mechanism for improving farmers' production capacity by facilitating access to financial resources and encouraging more efficient allocation of production inputs. Continued support through agricultural credit, extension services, and input assistance programs may therefore contribute to more sustainable rice production and improved livelihoods among smallholder farmers in Remedios T. Romualdez, Agusan Del Norte.

CONCLUSION

This study examined the socio-economic characteristics and production cost structure of rice farmers with and without financial intervention in Remedios T. Romualdez (RTR), Agusan Del Norte. The findings indicate that rice farming in the municipality is predominantly undertaken by middle-aged and older farmers, with most respondents relying on farming as their primary source of livelihood. The majority of farmers cultivates relatively small landholdings under tenant arrangements and belongs to low-income households, reflecting the typical characteristics and economic constraints of smallholder rice farming in the area.

The comparison of agricultural input prices showed that farmers with and without financial intervention operated under similar market conditions, as the prevailing prices of seeds, fertilizers, pesticides, labor, fuel, and irrigation were generally comparable. However, farmers who received financial intervention had access to formal crop loans, indicating improved access to agricultural credit and financial resources.

Differences were observed in the allocation of production costs between the two groups. Farmers with financial intervention invested more in seeds, land rent, and family labor while spending less on fertilizers, pesticides, and irrigation than farmers without financial intervention. These findings suggest that financial intervention was associated with differences in production cost allocation and farm resource use rather than changes in market input prices. Such differences may support more strategic management of production resources among intervention beneficiaries.

Overall, the study highlights the importance of financial intervention as a mechanism for improving access to production resources among smallholder rice farmers. Strengthening agricultural credit programs, input assistance, and extension services may further enhance farmers' capacity to allocate resources efficiently and sustain rice production. Future studies should incorporate comprehensive farm performance indicators, including yield, gross income, net income, benefit-cost ratio, and return on investment, to provide a more complete assessment of the economic outcomes of financial intervention programs.

ACKNOWLEDGEMENTS

The authors sincerely thank the rice farmers of Remedios T. Romualdez, Agusan del Norte, for their

voluntary participation and valuable cooperation during the conduct of this study. The authors also express their gratitude to the Municipal Agriculture Office of Remedios T. Romualdez and the Provincial Local Government Unit of Agusan del Norte for their assistance in facilitating data collection and providing access to relevant agricultural information. Appreciation is likewise extended to the faculty and staff of the College of Agriculture and Agri-Industries, Caraga State University, for their guidance and support throughout the research process.

The authors acknowledge all individuals who contributed to this study through technical assistance, logistical support, or constructive suggestions. Any remaining errors or interpretations are the sole responsibility of the authors.

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