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BINARY LOGISTIC MODEL FOR THE LEVEL OF RICE PRODUCTION AND ITS SIGNIFICANT PREDICTORS

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Abstract

This research article aims to give a description of the level of rice production in Albuera, Leyte, Philippines, and determine the statistically significant predictors affecting it. The study used primary and cross-sectional data from small-scale farmers (with 2-hectare rice farms or less) through a face-to-face interview with the aid of a constructed questionnaire. The gathered information was summarized with the assistance of descriptive metrics and presented in a tabular form. In addition, binary logistic modeling was constructed to extract influencing predictors of the level of rice production and tested its significance. Results portrayed that more farmers in Albuera, Leyte are experiencing a low level of rice production. The findings of the study depicted that small-scale farmers do not have enough capital to buy the necessary agricultural inputs due to their high prices in the market. Plus, farmers do not have sufficient credit facilities that they may use for their farming process and it is also shown that farmers are adversely affected by pests and diseases that destroy their rice cultivation. The binary logistic model shows that a married farmer, with a lower monthly income and with a smaller paddy farm tends to have a higher production level. Moreover, another regression model revealed that the presence of pests and diseases, and being provided with solutions by extension agents are significant predictors of high production levels in rice farming. The study suggests that small-scale farmers in rural areas must be supported regarding their capital and farming facilities, and must be guided and facilitated by expert extension agents in solving different problems.

Key words**:** *rice production, small-scale farmers, predictors of production, binary logistic model*

INTRODUCTION

Over the years, the most vital crop for food is rice in many countries where its demand for consumption has drastically increased [12]. The economics of rice has influenced many people in terms of culture, staple food, and even income. In [13], it is depicted that rice production has been a source of income for of millions farmers and considered as most productive and sustainable farming system in the world. In the case of the Philippines, millions of hectares (approximately 5) are devoted to rice farming with millions of metric tons (approximately 19) recorded for the production and the total value is about 404 billion (Philippine peso) [24]. The rice industry has been a great help in contributing to the gross domestic product (GDP) of the Philippines through exports and other economic activities such as the main source of income for many Filipino rice farmers [11]. In [8], it is deemed that rice cultivation and production is one of the main concentrations and paradigms of the Philippine government for betterment and enhancement by focusing on agricultural knowledge and financial support as well as a plan of action through policies.

With that, the government has implemented various laws and programs for the improvement of rice production including agricultural extension agents. Moreover, rice production has faced several problems that include flooding [20], pests and diseases [5], [7], lack of agricultural support [11], and high prices of inputs [8], among other constraints. In that case, farmers need support in regard to their economic inputs and knowledge that lead them to innovative ideas on how to improve their production and economic income as well as their well-being [11], [25]. It is worth noting that extension agents in rice production are the ones who provide valuable information

and knowledge that improves the production process from planting to harvesting [9].

On the face of it, the investigation of the effectiveness of extension agents in agricultural information will give valuable insights on how to improve the production and farming system as well as give solutions to constraints. According to the findings in [3], it is portrayed that farmers who adopted new technology and agricultural innovative ideas have enhanced and improved their farming techniques which leads to higher economic yield. In fact, it is necessary that rice farmers in the Philippines must be supported by agricultural extension agents since the country lacks lack of competitive advantage as opposed to other countries due to geography location, and climate [18]. Hence, to amend rice cultivation in the country Philippines and improve the economic profitability of small-scale or poor rice farmers, it is necessary that they are guided and educated by some agricultural extension experts to solve existing farming problems and provide remedy to the farm constraints.

At present, it is depicted in [6] that the rice industry in the Philippines is getting weaker and its economic value is diminishing,hence, rice shortages exist in many poor and remote areas of the country. The causes of this low production level include a decreasing number of farmers, climate change, and a significant number of problems and constraints in the farming system. Whence, this research article is motivated to elucidate the production level of rice farming in poor and remote areas in the country Philippines to give economic solutions and promote better policies on how to mitigate and eliminate agricultural constraints. Currently, the inquiry into the rice production level of small-scale rice farmers in remote areas in the Philippines using binary logistic regression modeling is insufficient, hence, this study is pursued without hesitance. The specific goals of this research article are as follows:

(i) to give a statistical description of the socio-demographic profile of small-scale rice farmers;

(ii) to measure and categorize the rice production level of poor rice farmers;

(iii) to construct a binary logistic model that determines the statistically significant predictors of rice production level.

The importance of this research inquiry is to supply an informative overview of the rice production level and formulate a policy that enhances the rice farmers' competitive advantage and well-being. The results of this study may give multipurpose information to enhance government programs in agriculture, provide useful insights to alleviate poverty and maintain sustainable growth in the near future. Moreover, this study might be helpful as baseline information for other agricultural economists focusing on rice production in the local and global aspects.

MATERIALS AND METHODS

Research Design

This article dealt with quantitative data gathered through a cross-sectional survey. In particular, the study employed a complex correlational research design that involves descriptive statistics metrics and regression modeling to elucidate and give a complete description of the data and explain the influence of independent variables on a single dependent variable. Additionally, the research design was used to draw conclusions and extract predictive information about the level of rice production as it is influenced by some factors.

Research Locale and Respondents

In [10], it is depicted that Barangay Poblacion is one of the significant contributors to rice supply in the Municipality of Albuera, Leyte. In addition, the Barangay has reached out to several agricultural extension agents helping the rice farmers to improve their productivity and lives. In that case, the researchers were motivated to investigate the farmers in the Barangay who were assisted by the extension agents and who are members of the farmers' association in the Municipality of Albuera. Hence, the site of the research locale is shown in Map 1 below. Being a member of the farmers' association assures that the respondents are legit rice farmers in the

Barangay. In that case, researchers have asked for the list of registered farmers in the Municipal Agriculture Office (MAO) of Albuera, Leyte.

Moreover, the study focused on small-scale farmers, thus, it only considered farmers who managed a farm area of 2 hectares or less.

Among the 79 registered farmers with a farm area of 2 hectares or less, 66 farmers were randomly selected with the aid of Slovin's formula with a 5% margin of error.

Map 1. Location of Barangay Poblacion, Albuera, Leyte, Philippines
Source: [15].

In case the chosen farmer was not available during the survey or refused to be interviewed, an alternative farmer was also chosen randomly.

Research Instrument and Data Collection

Since the study involved human beings, hence ethical procedures were properly observed. First, a consent letter was constructed and sent to the Municipal Agriculture Office (MAO) of Albuera, Leyte. After its approval, another consent letter was also constructed and sent to the Barangay Captain of Poblacion. Fortunately, the research survey was permitted and allowed the researchers to interview the farmers who were being chosen as respondents of the study. Before the interview took place, each farmer was informed that the data gathered from them did not contain sensitive information that destroyed their reputation. Moreover, the farmer was also oriented that the information gathered from them would be solely used for this research study only and would be kept private.

A structured questionnaire was constructed as the research instrument for this study. The questionnaire was used as a research survey guide for the personal interview with the rice farmers. The survey questionnaire contains four sections. For the first section, the selected farmers were interviewed about their profile including their age in terms of years, sex (male or female), educational attainment (college graduate or not), marital status (married or not), religion, household size (count), other sources of family income aside from rice farming, monthly income in rice farming (in Philippine peso (₱)), ownership of paddy farm (yes or no), and number of years as experience in rice farmers. For the second section, the rice farmers were interviewed in regard to their perception of some constraints in rice farming including high prices of inputs, lack of farm facilities, lack of credit facilities, inadequate capital for rice farming, inaccessibility to high ways, and pests and diseases. In that case, a 4-point rating scale was used with the following descriptions: 1-Not affecting, 2-Moderately affecting, 3-affecting, and 4-Severely affecting. Thirdly, rice farmers were asked about their perception of the extension agents' roles such as educator (knowledge provider), facilitator (guidance), and solution giver. For the perception of rice farmers to the extension agent's role, a 5-point rating scale was used with the following equivalents: 1-Very unsatisfied, 2-Unsatisfied, 3-Undecided, 4-Satisfied, and 5-Very satisfied. Lastly, the rice farmers were asked about the level of their production in one cropping season. The production level is just equal to the number of sacks per farm size (in hectares). If the production level is 72 or above, then it is categorized as high production, otherwise, it is low production [10].

Data Management and Regression Model

After collecting the desired data, it was encoded into Microsoft Excel and formatted to fit in the STATA program for statistical calculation. In addition, proper coding of

values and their descriptions were made to give appropriate interpretation for the desired results. To summarize the data gathered, descriptive statistical metrics such as mean average (M), standard deviation (SD), maximum (max) and minimum (min) values, percentages (%), and frequency counts were computed and presented in statistical tables. Since the level of rice production as a dependent variable is a binary, then binary logistic regression model was used to predict its determinants. As a diagnostic test for the model, a variance inflation factor (VIF) was employed to determine if the model possesses a multicollinearity problem which is a possible assumption violator for the binary logistic regression model. In the paper of Allison [2], it is portrayed that a regression model does not have a multicollinearity problem if the mean VIF is less than 10. The empirical regression models are as follows:

$$\begin{aligned} Production_i = {} & \alpha_0 + \alpha_1 Age_i + \alpha_2 Male_i \\ & + \alpha_3 Cgraduate_i \\ & + \alpha_4 Married_i \\ & + \alpha_5 RoCatholic_i \\ & + \alpha_6 HHSize_i \\ & + \alpha_7 Otherincome_i \\ & + \alpha_8 \log(income)_i \\ & + \alpha_9 Owner_i \\ & + \alpha_{10} Yexperience_i \\ & + \alpha_{11} Farmsize_i + \varepsilon_i \end{aligned} \quad (1)$$

and

$$\begin{aligned} Production_i = {} & \beta_0 + \beta_1 Hinputs_i \\ & + \beta_2 Ffacilities_i \\ & + \beta_3 Cfacilities_i \\ & + \beta_4 ICapital_i \\ & + \beta_5 Inaccessibility_i \\ & + \beta_6 PDiseases_i \\ & + \beta_7 Educator_i \\ & + \beta_8 Facilatator_i \\ & + \beta_9 Sgiver_i + e_i \end{aligned} \quad (2)$$

where: $Production_i$ represents a binary dependent variable (0-low, 1-high), i=1, 2,...,66 (rice farmers), Age_i represents the age of rice farmers measured in years, $Male_i$ is anindicator (dummy) variable that indicates a male farmer (0-female, 1-male), $Cgraduate_i$ is anindicator (dummy) variable that indicates a farmer who graduated college degree (0-non college graduate, 1-college graduate), $Married_i$ is anindicator (dummy) variable that indicates a farmer who are married (0-non married, 1-married), $RoCatholic_i$ is anindicator (dummy) variable that indicates a farmer that is a Roman Catholic as a religion (0-non Roman Catholic, 1-Roman Catholic), $HHSize_i$ refers to the farmers' household size (number of family members), $Otherincome_i$ is anindicator (dummy) variable that indicates a farmer with other source of income (0-no other source of income, 1-with other source of income), $\log(income)_i$ represents to the logarithm (base 10)of monthly income in rice farming, $Owner_i$ is anindicator (dummy) variable that indicates a farmer who owns their rice field (0-non owner, 1-owner), $Yexperience_i$ refers to the farmer's number years in rice farming, and ε_i refers to the remaining random error in model (1). In addition, $Hinputs_i$ refers to the perception of farmers on the high inputs as a constraint, $Ffacilities_i$ refers to the perception of farmers on the lack of farm facilities as a constraint, $Cfacilities_i$ refers to the perception of farmers on the lack of credit facilities as a constraint, $ICapital_i$ refers to the perception of farmers on the inadequate capital as constraint, $Inaccessibility_i$ refers to the perception of farmers on the inaccessibility to high ways as constraint, $PDiseases_i$ refers to the perception of farmers on the pests and diseases as constraint, $Educator_i$ refers to the perception of farmers on the extension agents' role as educator, $Facilatator_i$ refers to the perception of farmers on the extension agents' role as facilitator, $Sgiver_i$ refers to the perception of farmers on the extension agents' role as solution giver, and e_i represents to the random error in model (2). All statistical inference results were tested at the standard level of significance.

RESULTS AND DISCUSSIONS

Profile of Small-scale rice farmers

The summarized socio-demographic profile of small-scale rice farmers in Brgy. Poblacion,

Albuera, Leyte, Philippines were shown in Table 1. The mean average age (in years) of small-scale farmers in Brgy. Poblacion, Albuera, Leyte is approximately equal to 57.48 (SD=9.41) and it ranges from 36 (youngest) to 79 (oldest) years old. There are 65% male and 35% female small-scale rice farmers in the barangay. This result is parallel to [9] that there are more male rice farmers in the barangay indicating that farming is a masculine job. Only 11% of these farmers have finished a college degree and 89% of them do not have a bachelor's degree. In [11], it is deemed that most of the rice farmers do not have good educational attainment and mostly do not finish a college degree. Most of the rice farmers are married (89%) and only 11% of them are non-married. In addition, the mean average household size of the farmers in the barangay is close to 5 (SD=1.58) where the smallest is 2 and the highest is 11. Most (85%) of these farmers are Roman Catholic believers and only 15% of them are with other religions. On average, the monthly income in rice farming of small-scale farmers in the barangay Poblacion is close to ₱4,946.97 (SD=₱ 2,148.58) and it ranges from ₱ 3,000 to ₱ 15,000. About 39% of these rice farmers own their paddy farm and most (61%) of them are tenants and rental payers.

Table 1. Small-scale rice farmers' profile

Variables	Mean	Std. Dev.	min	Max
Age	57.48	9.41	36	79
Male farmers[a]	0.65	0.48	0	1
College degree[a]	0.11	0.31	0	1
Married farmers[a]	0.89	0.31	0	1
Number of family members[b]	5.42	1.58	2	11
Roman Catholic[a]	0.85	0.36	0	1
Other income[a]	0.94	0.24	0	1
Monthly income[c]	4,946.97	2,148.58	3,000	15,000
Farm owner[a]	0.39	0.49	0	1
Years of experience	23.73	9.55	6	50
Farm size[d]	0.65	0.37	0.1	2

Note: a-indicator (dummy) variable; b-counts; c-in Philippine Peso (₱) (0.018 USD); d-measured in hectares.
Source: Authors' calculation (2024).

Approximately, the mean average number of years in rice farming of the farmers is close to 23.73 (SD=9.55) and it ranges from 6 to 50 years). Moreover, the mean average farm size that was cultivated by small-scale rice farmers is close to 0.65 hectares (SD=0.37 hectares) and it ranges from 0.1 to 2 hectares.

Farmers' Perception of Farm Constraints and Agriculture Extension Agents' Support

Table 2 depicts the subjective perception of rice farmers to their farm constraints (Scale of 1 to 4) in rice cultivation and production, and farmers' perception of agricultural extension agents' support (Scale of 1 to 5). It is revealed that small-scale farmers are moderately affected (M=2.50, SD=0.61) by high prices of agricultural inputs needed in the rice production process. This means that farmers are facing difficulties in acquiring the inputs which affects their economic profitability in rice farming. This result is consistent with the findings in [11] which portrayed that farmers' low income in rice farming is due to the high input prices from planting to growing. Fortunately, on average, farmers do not lack of farm facilities (M=1.68, SD=0.83) needed in the rice production process. This implies that they have the available materials and facilities that enable them to grow rice from land cultivation to harvesting. However, the lack of credit facilities is moderately affecting (M=2.36, SD=0.83) the rice farmers' production process. It is worth noting that farmers need financial assistance like access to credit to meet the economic requirements during the rice cultivation process which is utilized in purchasing seeds, pesticides, fertilizers, labor costs, and other agricultural inputs [1], [11]. As can be gleaned in Table 2, farmers are experiencing inadequate capital (M=3.17, SD=0.83) during the cultivation process which results in difficulty in acquiring the needed farm inputs. In [21], it is depicted that nowadays, rice farmers in the rural areas in the Philippines are suffering from the high expense of critical inputs in rice cultivation. Moreover, rice farmers are also affected by pests and diseases (M=2.58, SD=0.82) which lower down their production. In [19], it is deemed that one of the problems in rice cultivation is pests and diseases where farmers need a financial system to provide proper management. In that case, these rice farmers are affected by pests and diseases since they lack of budget to buy the necessary pesticides,

herbicides, and insecticides, among others, that are needed to have a healthy paddy farm.

It is revealed in Table 2 that rice farmers are satisfied (M=3.65, SD=0.73) with the support of extension agents as educators of agricultural techniques. This implies that extension agents are doing their responsibilities as transferring necessary information for the improvement of farmers' production process. This result is parallel to the findings in [3] and [14] that agricultural extension agents are educating local farmers for sustainable development. However, farmers are undecided (M=3.41, SD=0.88) regarding their satisfaction perception with extension agents' support as farm facilitators. This indicates that extension agents do not fully facilitate the farmers in the actual farming process but only share ideas and information that may influence the farmer's decision-making skills. In [9], it is depicted that extension agents in the barangay are just focusing on transferring innovative technology in farming through training and seminars but less on the hand-in-hand farming or actual processes. Moreover, farmers are also undecided (M=3.39, SD=0.84) in regard to their satisfaction perception with extension agents' support as solution givers.

Table 2. Farmers' Perception of Constraints and Extension Agents' Support

Variables	M±SD	min	max	Description
Rice farming constraints				
High inputs	2.50±0.61	2	4	Moderately affecting
Lack of farm facilities	1.68±0.83	1	4	Not affecting
Lack of credit facilities	2.36±0.83	1	4	Moderately affecting
Inadequate capital	3.17±0.83	1	4	Affecting
Inaccessibility to highways	1.44±0.68	1	3	Not affecting
Pest and diseases	2.58±0.82	1	4	Affecting
Extension agents' support				
Educator	3.65±0.73	2	5	Satisfied
Farm facilitator	3.41±0.88	2	5	Undecided
Solution giver	3.39±0.84	2	5	Undecided

Source: Authors' calculation (2024).

This goes to infer that farmers' problems are not always given a solution by an extension agent regarding their production needs. Especially, in the capital for buying agricultural inputs and labor costs. It is worth noting that in [22], rural farmers' frequent problem is the access to credit or loans for input supplies in the production activities and other agricultural expenses.

Level of Rice Production

About 53% of the rice farmers have a low level of production and about 47% of them have high production. This means that several of the farmers in Brgy. Poblacion is experiencing problems and challenges in the production process, especially in dealing with climate change, water supply systems, pests and diseases, and management, among others [6], [8], [18]. In the study of Casinillo and Seriño [11], small-scale farmers in rural areas are suffering from the rise of agricultural inputs, hence, some farmers cannot acquire a necessary solution to the production problems which results in low productivity. In addition, it is portrayed in [17] that farmers' low productivity in rice farming is due to the high costs of fertilizers, land rent, land area, and low innovative techniques in cultivating rice plants. Moreover, most of the farmers in rural areas are traditional farmers whose farming skills are not suitable for the current climate or season and existing problems nowadays [11], [25].

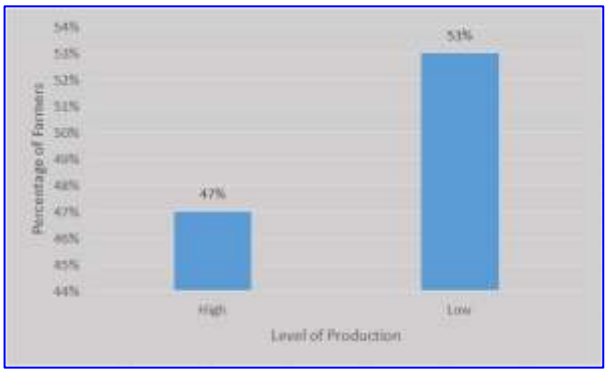

Fig. 1. Rice farmers' level of production.
Source: Authors' construction (2024).

Binary Logistic Models

Table 3 shows the first binary logistic regression model where the dependent variable is the level of rice production (high or low) and the independent variables are the socio-demographic profile of rice farmers. Based on variance inflation factor (VIF) computation, it is depicted that model (1) does not suffer from multicollinearity problems between independent variables (VIF<10). It is revealed in the table that model (1) is significant at a 5% level (X^2=23.17, p-

value=0.017) and possesses a pseudo-R^2 of 0.253. This indicates that model (1) has significant factors influencing the level of production among farmers. It is revealed in the model (1) that being a married (α_4=2.094, p-value=0.078) farmer tends to have a high level of rice production and it is significant at a 1% level. Based on the marginal effect computation, the probability of being married with a high level of rice production is higher by 37.8% as opposed to the farmers who are not married. This implies that being a married farmer is more productive and eager to earn more because of the responsibilities and duties of a provider in the household [16]. In [8], it is portrayed that a married farmer is more motivated to earn money for the basic needs of their family.

Table 3. Binary logistic model (1) for the level of rice production and its predictors (socio-demographic)

Variables	Coeff.	Std. Error	p-value	Marginal effects
Age	-0.029^{ns}	0.045	0.515	-0.007
Male[a]	-0.619^{ns}	0.695	0.373	-0.151
College graduate[a]	-2.093^{ns}	1.664	0.209	-0.378
Married[a]	2.094*	1.190	0.078	0.378
Household size[b]	-0.168^{ns}	0.208	0.416	-0.041
Roman Catholic[a]	-0.600^{ns}	0.964	0.534	-0.148
Other income[a]	0.217^{ns}	1.473	0.883	0.052
log (income[c])	-6.854**	3.469	0.048	-1.676
Farm owner[a]	0.883^{ns}	0.821	0.282	0.215
Years of experience	0.006^{ns}	0.049	0.899	0.001
Farm size[d]	-2.169**	1.077	0.044	-0.530
Constant	27.399**	13.123	0.037	-
No. of respondents	66			
X^2	23.17**			
p-value	0.017			
Log-likelihood	-34.04			
Pseudo R^2	0.253			

Note: a-dummy variable; b-counts; c-in Philippine Peso (₱); d-hectares; ns-not significant; *p<0.10; **p<0.05.
Source: Authors' calculation (2024).

It is shown in the binary logit model (1) that farmers with lower monthly income (α_8 =-6.854, p-value=0.048) tend to have higher production levels and it is significant at the 5% level. In addition, the likelihood of farmers with lower income having a higher level of rice production is higher by 167.6% compared to farmers with higher monthly income. This means that farmers with lower monthly incomes are eager to exert effort in improving the production level. In [26], it is deemed that poor farmers are more likely to adopt new innovative technology to somehow improve their production level and economic profit. Moreover, model (1) depicted that farmers with smaller farm sizes (α_{11}=-2.169, p-value=0.044) tend to have a higher level of rice production and it is significant at the 5% level. The likelihood of the farmers with smaller farm sizes having a higher level of rice production is higher by 53% as opposed to farmers with larger farm sizes. This implies that farmers with smaller paddy farms can easily focus on taking care the rice cultivation and are more attentive to applying technologies in agriculture [4]. Plus, the local government is supporting small-scale rice farmers in regard to their inputs to increase production [23].

Table 4 presents the second binary logistic regression model (2) where the regress and is the level of rice production (high or low) and the regressors are some possible factors in farming activity. By multicollinearity test, it is revealed that the VIF is less than 10 which indicates that no significant correlation exists in the pairwise regressors. In Table 4, it is shown that model (2) is not significant even at a 10% level (X^2=14.31, p-value=0.117) and possesses a pseudo R^2 of 0.157. This implies that model (2) has a few significant factors influencing the level of production based on the individual test for each regressor as can be gleaned in Table 4. First, model (2) revealed that if the rice planting process encounters pests and diseases (β_6=0.821, p-value=0.055), farmers are more likely to have a high level of production and it is significant at a 10% level. This indicates that if pests and diseases are present in farming activities, farmers tend to apply technologies to get rid of pests and diseases which results in increased production. Using the marginal effect calculation, it is shown that the probability of the presence of pests and diseases with higher levels of production is higher by 20.3% compared to no pests and diseases. This inverse result shows that farmers are motivated to take care of their farms if pest and diseases constraint exists by applying new innovative technology and management to enhance the yield of rice [5], [8], [28]. Moreover, model (2) revealed that if extension agents can give a solution (β_9 =1.071, p-value=0.014) to the farmers'

existing problems in the farming process, they tend to have a high level of rice production and it is significant at a 5% level. The likelihood of farmers being provided a solution to the problem to have a higher production is higher by 26.6% compared to farmers not being provided with a solution. This implies that extension agents' support to farmers is a great help in improving their decision-making skills and enhancing their productivity in farming. The result is consistent with the findings in [9] and [27] that extension agents provide the necessary knowledge to solve the farmers' production problems and educate them to make good decisions and management.

Table 4. Binary logistic model (2) for the level of rice production and its predictors (rice farm factors)

Variables	Coeff.	Std. Error	p-value	Marginal effects
High inputs[a]	0.027[ns]	0.508	0.957	0.006
Lack of farm facilities[a]	-0.439[ns]	0.462	0.342	-0.109
Lack of credit facilities[a]	0.208[ns]	0.404	0.607	0.051
Inadequate capital[a]	0.566[ns]	0.426	0.185	0.140
Inaccessibility to high ways[a]	0.348[ns]	0.473	0.461	0.086
Pest and diseases[a]	0.821*	0.428	0.055	0.203
Educator[b]	-0.248[ns]	0.477	0.603	-0.061
Farm facilitator[b]	0.078[ns]	0.390	0.842	0.019
Solution giver[b]	1.071**	0.437	0.014	0.266
Constant	-7.393**	3.068	0.016	-
No. of respondents	66			
X^2	14.31			
p-value	0.112			
Log-likelihood	-38.47			
Pseudo R^2	0.157			

Note: a-Scale of 1 to 4; b-Scale of 1 to 5; ns-not significant; *p<0.10; **p<0.05.
Source: Authors' calculation (2024).

CONCLUSIONS

Results indicated that there are more small-scale rice farmers in Brgy. Poblacion Albuera Leyte who are experiencing a low level of production. This means that the rice farming in the Brgy. Poblacion does not optimally maximize production due to some existing factors and constraints influencing it. It is concluded that farmers are affected by high prices of inputs needed in the farming process and they have no enough capital and sufficient access to credit to buy those agricultural inputs. It is revealed that during rice cultivation, pests and diseases exist which negatively affect the yield and economic income in rice farming. The binary logistic regression depicted that a married farmer tends to have a higher production level since they are motivated to work hard and eager to earn more income for their families' needs. In addition, the model shows that farmers with lower monthly incomes and smaller paddy farms tend to have a higher production level. These inverse results indicated that farmers with those characteristics are more focused and stimulated in farming where they can easily take care and apply suitable techniques to increase their productivity. Furthermore, the second regression model revealed that the presence of pests and diseases, and being provided with solutions by extension agents are significant factors of higher levels of rice production. This implies that farmers were provided necessary information by agricultural extension agents on how to solve problems in farming by applying new innovative technologies including to remedy pests and diseases in the cultivation process. Hence, the study recommended that small-scale rice farmers in rural areas must be supported by the local government in terms of farm capital and agricultural facilities. Furthermore, farmers must be guided and facilitated by expert extension agents in combating different problems in farming activities to improve their production levels. As for future studies, farmers' well-being must be investigated like satisfaction and resilience to support the current findings.

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