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ECONOMETRIC EVIDENCE ON HAPPINESS AND ITS DETERMINANTS AMONG RICE FARMERS IN LEYTE, PHILIPPINES

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ABSTRACT

The study investigated the influence of socio-economic factors on rice farmers' subjective well-being in barangay Tabunok, Hilongos, Leyte, Philippines. A face-to-face interview was conducted among 177 randomly selected rice farmers and 50 purposive samples of wage workers for comparison. Descriptive statistics and econometric modeling was used to examine the determinants of happiness in farming. Results show that the farmers' actual happiness is significantly lower than the expectations. Knowledge, skills, health, and farm owner make them more competent than the other farmers and increase their happiness level. An increase in income leads to an increase in household assets, giving benefits and comfort to the family and directly influencing their well-being. Furthermore, results reveal that farmers' level of happiness is significantly lower compared to wage workers. Also, farmers are negatively affected by the price increase of agricultural inputs and low harvested output prices in the country.

Keywords*:* *Expected and actual happiness, socio-economic factors, well-being*

1. INTRODUCTION

Rice is the most important staple food for the Philippines' entire population (Koirala et al., 2014; Yagos & Demayo, 2015). Rice is rich in nutrients, vitamins, minerals and is an important source of carbohydrates. For the Filipinos, especially in rural areas, rice is not merely food but a grain that shapes their way of living, that is, the source of income (Villano & Fleming, 2006). Further, rice production is sustenance with historical and cultural values deeply woven into the Filipino culture (Dullas & Acoba, 2013).

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The province of Leyte has a wide paddy farm, and the main crop grown is rice. Rice cultivation in this province is closely associated with the rural population. Traditional farmers who are aging farmers have low education and are living below the absolute poverty line. Barangay Tabunok in Hilongos is one of the rice-producing barangays in Leyte, Philippines.

It has a huge area devoted to rice farming and is the main income source. Before the National Irrigation Administration had put up an irrigation system in this place, the land was suitable for corn production. In 1987, the irrigation system was completed into its full operation, which brought blessing to all the farmers in the place. Corn lands were turned into rice fields. Barangay folks celebrated for the realization of Tabunok Communal Irrigation System.

This government project has improved the lives of the farmers in the barangay. Over the years, the rice farmers continually tilled rice farms for family consumption and income generation. According to the findings of Kamaruddin et al. (2013), happy and contented farmers are productive and efficient. In the study of Markussen et al. (2018), different factors influence a rice farmer's actual happiness. This includes the demographic profile, economic status, social relationships, rice production factors, environment, government projects in farming, and health issues.

The rice farmers' happiness in the paddy workplace is known to increase economic productivity (Proto, 2016). To date, little work is done about analyzing the relationship between happiness indicators and the rice farmers' socio-economic factors using the econometrics approach. The economics of happiness is known to be a novel approach that provides alternative measures of well-being, which focuses on the aspects of the process that also matter to one's welfare (Graham, 2004).

Understanding the economics of happiness among rice farmers will elucidate a deeper sense of satisfaction in the paddy workplace (Yagos & Demayo, 2015). The study focused on the effects on happiness from being self-employed in farming, and not working for a wage or being self-employed in non-farming. Other factors include socio-demographic profile, leisure time management, quality of the farm environment, rice field management effectiveness, and satisfaction with the development programs of local government, social relationships, and health issues of farmers were investigated.

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The hypothesis of this study about the benefits of rice farming was based on the economic concept of procedural utility (Frey et al., 2004), which was based on self-determination theory (SDT) (Deci & Ryan, 2000). SDT is a theory of motivation concerned with supporting natural or intrinsic tendencies to behave in productive and efficient ways.

This study aimed to investigate the different determinants affecting the economics of happiness among rice farmers in barangay Tabunok, Hilongos, Leyte, Philippines. The specific objectives were the following: (1) to describe the socio-demographic profile of the rice farmers; (2) to estimate and compare the level of expected and actual happiness of the rice farmers; (3) to identify determinants influencing happiness among rice farmers; and (4) to provide inputs to policymakers on improving the happiness and well-being of rice farmers.

2. METHODOLOGY

2.1. Research Design

This study is mixed-method research that is descriptive and inferential. It seeks to analyze factors affecting rice farmers' degree of happiness. The permission of the barangay captain was asked before the conduct of the study. The barangay's secretary provided useful lists of rice farmer in the barangay. Simple random sampling was employed for the farmers in choosing the possible respondent of this study. For comparison purposes, a survey was also conducted among selected wage workers.

Primary data through a direct face-to-face interview on the demographic profile, level of happiness, and determinants were gathered using structured questionnaires. Descriptive statistics were computed for both quantitative and qualitative data. Non-parametric method was employed for comparing the expected and actual happiness. Furthermore, the econometric analysis was undertaken to determine the significant determinants of the degree of happiness using Stata v.14. The econometric models used in this study were adopted from Guazzelli and Zilli (2016) and Markussen et al. (2018).

2.2. Sampling Procedure and the Respondents

All rice farmers who were currently active in farming and residing barangay Tabunok, Hilongos, Leyte, Philippines during the study comprised the population of interest. For determining the sample size, a probabilistic approach was considered in this study. In selecting the desired respondent, simple random sampling was used. The following formula was used to determine the sample size (Cochran, 1953):

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$$n_0 = \frac{Z_{\alpha/2}^2 \sigma^2}{e^2} \quad (1)$$

where n_0 is the sample size, $Z_{\alpha/2}$ is the confidence interval, σ^2 is the population variance and e refers to the margin of error. The study used 95% confidence interval, which suggests that the sample is a certain 95% of the study time. In statistics, the established Z-value for the 95% confidence interval is 1.96. Since there is no prior information for the population variance σ^2, then it was estimated using proportions.

It was assumed that the proportion would be 0.5 since there is limited information available for the rice farmers in the barangay. The said proportion is a worse-case assumption, while a close to 1 proportion suggests the best-case assumption. This worse-case assumption is a conservative approach in estimating the required sample size. Using all these assumptions, the sample size was determined as follows:

$$n_0 = \frac{Z_{\alpha/2}^2 (0.5)(1-0.5)}{e^2} \quad (2)$$

Now, suppose the population is known to be finite. In that case, it is necessary to adjust the computed sample size as follows:

$$n = \frac{n_0}{1+\frac{n_0}{N}} \quad (3)$$

where n is the adjusted sample size, n_0 is the initial sample size and N is the number of rice farmers in the barangay. In determining the rice farmers to be interviewed, a list of all farmers was obtained from concerned officials in the barangay. Then, a simple random sampling procedure was conducted using the random numbers to ensure that every farmer has an equal chance of being selected as a respondent in the study.

Also, alternative households were drawn if the selected farmer is not available or refuses to participate in the survey. Also, for the sake of comparison, a purposive sample of 50 non-farm wage workers was chosen in the same barangay. Table 1 shows the sample size and its percentage by setting the margin of error by 5%.

Table 1: Distribution of sample.

Number of Active Farmers	Sample size	Percentage
328	177	53.96%

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2.3. Research Instrument and Data Collection

The questionnaire for the level of happiness was adopted from the study of Lyubomirsky and Lepper (1999). The level of happiness of the farmers is considered as the dependent variable of this study. A 2-item scale was designed to measure the subjective level of expected happiness and the rice farmers' actual happiness.

Expected happiness refers to the projected well-being in the future. In contrast, actual happiness refers to the current or present well-being. Each of the items was completed by choosing one of 10 options that finish a given sentence fragment. Each item used a 10-point rating scale, where 1 is the very unhappy farmer and 10 is the very happy farmer.

The said questionnaire is valid and reliable, with Cronbach's alpha equal to 0.73. For the independent variables, a Likert scale questionnaire and open-ended type for cardinal questions were employed. This set of questionnaires were adopted from the current study of Adam and Pebrian (2017), Guazzelli and Zilli (2016), and Markussen et al. (2018).

2.4. Data Analysis and Econometric Models

In determining the happiness gap, the expected and actual happiness were compared and tested for the significant difference using Wilcoxon signed-rank test since the paired variables are ordinal (Conover, 1980). If there is a significant expectation gap, farmers are considered unhappy with their work as rice farmers.

In this study, measuring happiness was used to compare levels in an absolute sense. Thus, the equation's actual happiness was treated as a continuous variable and consider the Ordinary Least Square (OLS) as the first model. The OLS estimation procedure includes three important estimation procedures. A procedure to estimate the regression parameters' values, the variance of the error term's probability distribution, and the variance of the coefficient estimate's probability distribution (Stock & Watson, 2007). Thus, the OLS model takes the form (Gelman & Hill, 2007):

$$y_i = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip} + \varepsilon_i = x_{it}^T \beta + \varepsilon_i \qquad (4)$$

where $i = 1, \ldots, n$ and T denotes the transpose, so that $x_{it}^T \beta$ is the inner product between vectors x_{it} and β. In this study, y_i is the level of actual happiness of rice farmers and x_{it}, are the different factors affecting happiness, where $t = 1, 2, \ldots, p$ (p factors) and $i = 1, \ldots, n$ (n observations). In interpreting the OLS model, β_t is the approximate change in the level of

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happiness in every 1 unit change in the explanatory variable x_t while holding other variables constant.

Since our response variable is ordinal, then, this study considered other models. The second model is the binary logit model, and the actual happiness response was coded as follows: 0-unhappy farmer (1-5) and 1-happy farmer (6-10). The binary logit model assumed that the farmers' level of happiness is binary in nature. The logit model was based on the cumulative logistic probability function which may be expressed as:

$$P_i = P_r\left(Y = 1 \middle| x_1, x_2, \dots, x_p\right) = f(\beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p) \quad (5)$$

where P_i is the probability that a farmer is happy or unhappy given the explanatory variables or determinants x_i, $i \in \{1, 2, \dots, p\}$ and $\beta_j, j \in \{0, 1, 2, \dots, p\}$. Thus, the logistic distribution function can be written as:

$$P_i = P_r\left(Y = 1 \middle| x_1, x_2, \dots, x_p\right) = \frac{1}{1+e^{-(\beta_0+\beta_1 x_1+\cdots+\beta_p x_p)}} \quad (6)$$

The parameters $\beta_j, j \in \{0, 1, 2, \dots, p\}$ can be estimated using the Likelihood technique, and e is the base of natural logarithms. Then, log of odds that a farmer is happy or unhappy is given by:

$$\text{Log}\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p \quad (7)$$

The third econometric model used in this study is the ordered logit model. In the model, level of happiness was considered an ordinal variable which is coded as categorical and ordered as follows: 0-unhappy farmer (1-3), 1-moderately happy (4-6) and 2-very happy farmer (7-10). The ordinal response $(AH)_i$ for i^{th} farmer and with c categories $(c = 0, 1, 2)$ is defined by a set of two equations where the cumulative probabilities are given by

$$g_{ci} = \Pr\left((AH)_i \leq c \middle| x_1, x_2, \dots, x_p\right) \quad (8)$$

where p is the number of factors (explanatory variables).

Let $\boldsymbol{\beta}'\mathbf{X}_i = \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p + \varepsilon_i$ be a linear predictor. Then, the ordered logit function can be written as (Thissen & Steinberg, 1986):

$$\text{logit}(g_{ci}) = \log\left(\frac{g_{ci}}{1-g_{ci}}\right) = \alpha_c - \boldsymbol{\beta}'\mathbf{X}_i \quad (9)$$

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where α_c is a parameter called thresholds or cut points, and it is increasing order, that is, $\alpha_1 < \alpha_2 < \cdots < \alpha_{c-1}$. A vector $\boldsymbol{\beta}$ of parameters to be estimated and $\mathbf{X}_i$ is a vector of factors or predictors. From equation (8), the given cumulative probability for category c is given by

$$g_{ci} = \frac{e^{\alpha_c - \boldsymbol{\beta}'\mathbf{X}_i}}{1+e^{\alpha_c - \boldsymbol{\beta}'\mathbf{X}_i}} = \frac{1}{1+e^{-\alpha_c + \boldsymbol{\beta}'\mathbf{X}_i}} \quad (10)$$

The ordered logit model is also known as the proportional odds model because the parallel regression assumption implies the proportionality of the odds of not exceeding the c^{th} category, that is, $\text{odds}_{ci} = \frac{g_{ci}}{1-g_{ci}}$. The ratio of these odds for two units, say i and j, is given by

$$\frac{\text{odds}_{ci}}{\text{odds}_{cj}} = e^{[\boldsymbol{\beta}'(\mathbf{X}_j - \mathbf{X}_i]} \quad (11)$$

Furthermore, this is constant across response categories (Wooldridge, 2002). The probabilities of the categories c are obtained by difference (Fagerland, 2014):

$$P_{ci} = \frac{1}{1+e^{-\alpha_c + \boldsymbol{\beta}'\mathbf{X}_i}} - \frac{1}{1+e^{-\alpha_{c-1} + \boldsymbol{\beta}'\mathbf{X}_i}} \quad (12)$$

For the acceptability of the logit models, the log-likelihood ratio test was employed. Chi-square test was used to test the parameters of the models (Greene, 2008). To ensure that the econometric model results are valid for interpretation, a diagnostic test was performed, including multicollinearity test, homoscedasticity test, and normality of residuals test.

3. RESULTS AND DISCUSSION

The subjective well-being and its determinants of a random sample of farmers and selected wage workers were gathered through a constructed questionnaire. This section discusses the expectation gap of happiness and different determinants that may influence rice farmers' well-being. Descriptive statistics were employed, and econometric models were used to analyze the determinants of farmers' well-being.

3.1. Descriptive Statistics and Correlation Analysis for Rice Farmers

On average, farmers' actual happiness is closed to 4.85, which could be described as moderately unhappy. In contrast, the expected happiness is closed to 6.42, which could be described as moderately happy (Table 2). It also reveals that expected happiness is significantly correlated to actual happiness, which implies that higher expectations on predetermined goals result in an immediate increase in actual happiness.

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Nowadays, rapid economic progress is taking place in the said barangay; thus, the level of subjective well-being as a farmer is getting lower since other options are existing. The average age of farmers is close to 54 and ranges from 22 to 89. The average years of residence is 48 years, which suggests that some farmers migrated from other places.

These farmers are relatively old since most of the young residents in the barangay were sent to school and later found a decent job in other places. Table 2 shows that about 80% of the farmers are males. Almost all male farmers are heads of their respective families, with about four members per family with 1 dependent. Most of the farmers are high school level with approximately 7.6 years of schooling and directly associated with happiness (Table 2).

Knowledge learned from school is helpful in actual working activities. Years in farming are independent of happiness, but the land area of about 0.71 hectares is associated with happiness. The larger the economic area for production, the better and bigger profit will be expected.

The number of about 3 hours per day (Table 2) suggests that older age is less efficient in farming and does not influence happiness. Only 20% of the farmers owned machinery for land cultivation. About 15% of the farmers used the traditional variety, which tends to correlate with happiness positively. The monthly income from farming is approximately 4,901.93 PhP, which is significantly related to the farmer's well-being.

On the other hand, other monthly income does not have a relationship to happiness. The average value of farm assets is closed to 1,1048.98 PhP, which refers to the market value of tools, equipment and farm work animals. The local government is rated low (2.92), which means that the farmers do not experience good government program benefits for rice farming. Leisure time is rated low (3.92) while the social relationship is rate average (5.33).

This means that farmers devoted their time more to their family members and loved ones rather than doing leisure activities like gambling, drinking liquors, community gathering, religious gathering and the likes. Lastly, they rated their health for about 5.94, which suggests that, on average, farmers are in moderately good health condition, and their health condition is directly associated with their well-being (Table 2).

Table 2: Descriptive statistics and Spearman correlation for actual happiness and its influencing determinants of rice farmers (n = 177)

VARIABLES	MEAN	MIN	MAX	STD. DEV.	Correlation Coefficient ($\hat{r}_s$)

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Actual Happiness[a]	4.85	2	10	1.6701	
Expected Happiness[a]	6.42	1	10	2.6297	0.648***
Age	54.03	22	89	12.7480	0.078
Male	0.80	0	1	0.3994	-0.163**
Head of family	0.82	0	1	0.3812	-0.213***
Household size	3.89	1	9	1.5516	0.155**
Years of residense	48.84	5	89	16.2099	0.023
Number of dependents	1.34	0	7	1.3899	0.088
Years in education	7.59	1	16	3.0625	0.276***
Married	0.79	0	1	0.4037	0.048
Years in farming	25.34	1	68	15.5833	-0.070
farm area in hectare	0.71	0.13	4	0.5669	0.253***
Work hours in a day	3.12	1	8	1.3389	-0.063
Use of technology	0.21	0	1	0.4078	0.127*
High Yielding variety	0.85	0	1	0.3606	-0.183**
Owner of farm land	0.23	0	1	0.4194	0.207***
Member of Organization	0.86	0	1	0.3433	0.025
Owner of Machinery	0.15	0	1	0.3550	0.082
Yield per hectare[b]	52946.71	6428.57	105000	20712.62	0.161**
Rating for yield[a]	5.89	2	10	1.9143	0.289***
Farm inputs per hectare [b]	22617.3	3066.67	75600	12320.38	0.211***
Rating forfarm inputs[a]	5.41	1	9	1.9197	0.209***
Profit per hectare[b]	30380.26	1032	65900	13729.03	0.067
Rating for profit[a]	5.83	1	10	1.8783	0.213***
Monthly income[b]	4901.93	129	21250	3805.67	0.303***
Rating m_income[a]	5.2090	1	10	2.3077	0.043
Monthly Hhconsumption[l]	2053.11	0	14000	1468.10	0.221**
Rating Hhconsumption[a]	5.99	1	10	2.5450	0.045
Other monthly income[b]	1316.38	0	21000	1995.97	-0.014
Rating om_income[a]	4.22	1	10	2.8349	-0.024
Farm asset[b]	11048.98	0	209000	25848.43	0.119
Rating farm assets[a]	3.18	1	9	1.6276	0.234***
Household assets[b]	48492.28	500	1126510	100151.3	0.295***
Rating Hhassets[a]	3.51	1	9	1.6518	0.494***
Monthly Hhexpense [b]	4952.82	1100	22433	2937.04	0.261***
Rating Hhexpense[a]	3.55	1	10	1.7865	0.412***
Government Support[a]	2.92	1	9	1.5683	0.396***
Leisure time[a]	3.92	1	9	1.8833	0.491***
Social relationship[a]	5.33	1	10	2.0096	0.415***
Health[a]	5.94	1	10	2.6717	0.396***

Note: a - Scale 1 to 10
b - Philippine Peso (50 US Dollar)
* - significant at 10% level.
** - significant at 5% level.
*** - significant at 1% level.

3.2. The Expected and Actual Happiness of Rice Farmers

Table 3 shows that there is a significant difference between expected and actual happiness. This suggests that farmers have a higher expectation before the rice farming business starts but are disappointed with the actual situation after harvest. This expectation gap

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of happiness is highly significant at a 1% level. This suggests that farmers' actual happiness is relatively low since their predetermined goals are not being met at harvesting time.

At first, farmers expect to have a good income from rice farming that will compensate for the agricultural inputs and labor inputs. However, rice price has been decreasing allegedly due to imported supply from other countries, which implies that business farm was negatively affected. This result is consistent with the study of Pandey et al. (2010), Knight and Gunatilaka (2010), and Casinillo (2020).

Table 3: Wilcoxon signed-rank test for actual and expected happiness in farming

Variables	Sample	Z_c	p − value
Actual happiness and expected happiness	177	-5.128^{***}	<0.001

Note: ***p<0.01

3.3. Econometric Models for Rice Farmers

In OLS models (Table 4 and Table 5), the response variable is the actual happiness (Scale: 1-10) of the rice farmers. The said models are highly significant at a 1% level, and this implies that in the said models, all coefficients taken together are not equal to zero, which further implies that the econometric determinants explain the variation in the actual happiness in farming.

The variance inflation factor (VIF) values for both models are lesser than ten which implies that the model area is free from multicollinearity problems. The Breusch-Pagan test reveals that the variances of the OLS model in Table 4 are not heteroscedastic ($\chi_c^2 = 0.03$, p-value=0.8708) while OLS model in Table 5 is heteroscedastic ($\chi_c^2 = 9.89$, p-value=0.0017), thus, it is corrected. For the logit models (Table 4 and Table 5), the response variable is the binary response, that is, 0-unhappy farmer (1-5) and 1-happy farmer (6-10).

The said models are both significant at a 1% level, which means that all the model variables' combined effect is different from zero. Hence, the models have some relevant explanatory power to explain the happiness of farmers. The ordered logit models in Table 4 and Table 5 are also significant at 1% level. These models also possess relevant explanatory power to explain the degree of happiness.

Table 4 shows that farmers' age and civil status do not influence their happiness in farming. It reveals that female farmers are more likely to be happy at farming than men, which is statistically significant in the 3 models. This suggests that females are more motivated and creative to work in farm activities than the household chores routinely. Household size is a

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significant determinant of happiness in the binary logit model, which means that more family members contribute happiness at work, which is a source of motivation.

The years in education for farmers contribute to positive well-being, which is consistently significant in 3 models (Table 4). This shows that the skills and knowledge learned from school are helpful in the field, which results in a competitive farmer. A farmer who used a traditional rice variety is more likely happy based on the binary logit model (Table 4). The output of the traditional rice variety is more expensive in the market compared to the high-yielding variety.

Monthly income is significant for the three models (Table 4). This result is consistent with the literature studies (Graham & Pettinato, 2001; Štreimikienė & Grundey, 2009; Ng, 2002). Aside from monthly income, household assets also contribute to their happiness due to more benefits and comfort in everyday living. This result is in line to the study of Frey (2008) and Cummins (2000). It refers to the market value of all current and fixed assets owned by the household family. It also shows that a farmer with lesser household expenses is more likely to be happy.

Table 4: Econometric models for rice farmers with actual happiness as a dependent variable and socio-demographic profile (n=177)

INDEPENDENT VARIABLES	OLS MODEL		BINARY LOGIT MODEL		ORDERED LOGIT MODEL	
	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR
Constant	2.2575***	0.89796	-3.4039**	1.60929		
Age	0.0209	0.01336	0.0099	0.02379	0.0145	0.01989
Married	0.3564	0.31161	0.4322	0.54667	0.7197	0.47429
Male	-0.5415*	0.3088	-0.9166*	0.48703	-1.0119**	0.47176
Household size	0.0722	0.07905	0.2202*	0.13194	0.0633	0.12361
Years of residense	-0.0073	0.01009	0.0132	0.01757	-0.0032	0.01504
Years in education	0.1090**	0.04240	0.1279*	0.07394	0.1568**	0.06542
Work hours in a day	0.0677	0.08884	-0.1192	0.14704	0.1955	0.13452
Use of techhnology	0.0135	0.30038	0.0939	0.49355	-0.0027	0.44387
High Yielding variety	-0.4512	0.33556	-1.1639**	0.53814	-0.2853	0.49582
Owner of farm land	0.3304	0.2868	0.5242	0.46381	0.9874**	0.44508
Monthly income[b]	0.0001***	0.00003	0.0002***	0.00006	0.00013**	0.00005
Monthly Hhconsumpti	0.0001	0.00009	-0.0001	0.00014	0.00006	0.00014
Other monthly income	0.00002	0.00006	-0.0001	0.00011	-0.00005	0.00009
Farm asset[b]	-0.0001	0.00005	0.0001	0.00009	-0.0001	0.00001
Household assets[b]	0.0001***	0.00001	0.00002	0.00023	-0.0001*	0.00003
Monthly Hhexpense[b]	0.0001	0.00004	0.00004	0.00009	-0.00017*	0.00008
R-squared	0.3096					
Adjusted R-squared	0.2405					
Pseudo R-squared			0.2059		0.2090	

Note: b - Philippine Peso (50 US Dollar)
* - significant at 10% level.

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** - significant at 5% level.
*** - significant at 1% level.

The number of years in farming and farmers' total land area is not a significant determinant (Table 5). In the ordered logit model, at a 10% level, the number of hours working on the farm is significant. This infers that the more time spent on the farm, the more productive they are and the more likely happy farmers are.

The ordered logit model (Table 5) reveals that a farmer who owns the land farm is more likely to be happy. A farmer who owned the rice farm does not give a share to someone during the harvest. Leisure activities are also a significant factor that contributes to happiness in the ordered logit model. This shows that leisure activities relieve stress at work and more likely lift their well-being as a farmer.

Leisure activities are allocated more time if the workers receive a higher income, which positively influences their utility or well-being. Table 5 reveals that social relationship is significant in the OLS model. This implies that in the study of Markussen et al. (2018), farmers are closely related to other people, particularly their family members.

Thus, they feel comfortable working and increase their relatedness with positive influence to their well-being. Health in the binary logit model shows that if farmers are healthy, they are more likely to be happy and productive when working at the farm (Table 5). This result is consistent with the study of Deaton (2008) that deals with subjective well-being and health.

Table 5: Econometric models for rice farmers with actual happiness as a dependent variable and other determinants (n=177)

INDEPENDENT VARIABLES	OLS MODEL		BINARY LOGIT MODEL		ORDERED LOGIT MODEL	
	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR
Constant	1.1861*	0.70771	-6.0538***	1.39889		
Years in farming	0.0017	0.00760	0.0068	0.01571	-0.0011	0.01154
farm area in hectare	0.2067	0.18937	0.6104	0.45239	0.4739	0.36505
Work hours in a day	0.1141	0.10141	0.0463	0.18324	0.2474*	0.14722
Use of technology	0.0975	0.28861	0.1022	0.54196	0.1837	0.45334
High Yielding variety	-0.0199	0.32271	-0.8589	0.63368	0.2757	0.49917
Owner of farm land	0.2726	0.25335	0.3337	0.54297	0.7866*	0.44214
Rating m_income[a]	-0.0196	0.07231	0.1697	0.14355	-0.0656	0.11751
Rating Hhconsumptio	0.1018	0.06207	0.0439	0.12690	0.1711*	0.10186
Rating om_income[a]	-0.0148	0.04286	-0.0647	0.08223	-0.0268	0.06666
Rating farm assets[a]	-0.1423	0.08762	-0.3057	0.24536	-0.2784	0.18204
Rating Hhassets[a]	0.4742***	0.10646	0.5094*	0.27032	0.5620***	0.20419
Rating Hhexpense[a]	-0.1310	0.09479	0.0095	0.25342	-0.1316	0.18613
Government Support[a]	0.0538	0.09975	-0.0787	0.16760	0.2208	0.14475
Leisure time[a]	0.1328	0.09598	0.1779	0.14285	0.2585**	0.12672
Social relationship[a]	0.16024*	0.08339	0.2341	0.15367	0.1283	0.11964

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Health[a]	0.0549	0.54797	0.2451*	0.12167	0.0348	0.08922
R-squared	0.3861					
Pseudo R-squared			0.3045		0.2107	

Note: OLS model is corrected from heteroscedasticity
a - Scale 1 to 10
* - significant at 10% level.
** - significant at 5% level.
*** - significant at 1% level.

3.4. Comparing Rice Farmers and Wage Workers

Table 6 shows that wage workers' actual happiness is about 6.32, which implies that they are moderately happy. Their expected happiness is 9.38 which could be described as very happy. Like the rice farmers, the decrease of actual happiness from expectations is due to the predetermined goals and plans that do not meet in the actual situation. On average, the farmers' actual and expected happiness is lower than the wage workers, and it is statistically significant (Table 6).

Wage workers experience more happiness compared to farming because of the difference in the nature of their work. Farming is an exhausting job that is under the heat of the sun and experiences heavy muscular activity. Table 6 also shows that farmers are older than wage workers, and about 60% of these wage workers are female. Most of them are vendors and saleslady. It is shown that wage workers are more educated than farmers (Table 6).

Most of the farmers are head of the family (82%), while only 42% of the wage workers head of their respective families. On average, rice farmers have higher monthly income and assets compared to wage workers (Table 6). Leisure time is relatively low for farmers and wage workers since most of their time is devoted to working. After work, they are exhausted, which prevents them from doing enjoyable activities and bonding with family members. However, wage workers are more socially oriented and healthy than the rice farmers (Table 6).

Table 6: Mean comparison for the level of happiness and its socio-economic determinants of rice farmers (n = 177) and wage workers (n = 50)

VARIABLES	RICE FARMER (MEAN)	WAGE WORKERS (MEAN)	T-TEST (t_c)
Actual Happiness[a]	4.85	6.32	7.538^{***}
Expected Happiness[a]	6.42	9.38	14.011^{***}
Age	54.03	38.98	-7.277^{***}
Male	0.80	0.40	-5.199^{***}
Years in education	7.59	9.32	4.207^{***}
Married	0.79	0.66	-1.842^{*}
Head of family	0.82	0.42	-5.320^{***}
Household size	3.89	3.60	-1.210
Years of residense	48.84	29.40	-7.576^{***}

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Monthly income[b]	4,901.93	3,303.80	-4.726^{***}
Household assets[b]	48,492.28	45,528	-0.206
Rating Hhassets[a]	3.51	4.48	2.305^{**}
Monthly Hhexpense [b]	4,952.82	4504.16	-0.996
Rating Hhexpense[a]	3.55	4.30	1.850^{*}
Leisure time[a]	3.92	3.45	-1.612
Social relationship[a]	5.33	7.34	6.441^{***}
Health[a]	5.94	8.86	14.209^{***}

Note: a - Scale 1 to 10
b - Philippine Peso (50 US Dollar)
* - significant at 10% level.
** - significant at 5% level.
*** - significant at 1% level.

The OLS model is highly significant at a 1% level. This implies that all coefficients taken together are not equal to zero, suggesting that the econometric determinants explain the variation in the actual happiness in farming and wage work (Table 7). The model is free from multicollinearity problem and by Breusch-Pagan test it reveals that the variances of OLS model are not heteroscedastic ($\chi_c^2 = 0.42$, p-value=0.5188). Binary and ordered logistic models are both significant at 1%. The R-squared and pseudo R-squared values for the three models confirm that variables increase the explanatory power of the model substantially.

Table 7 presents regressions for the actual happiness of farmers and wage workers. In the first variable, "Rice farmer" a dummy, the reference category is wage work. It reveals that wage worker is more likely to be happy compare to farmers. It is significant at 5% level for the three models. This is because of the agricultural input prices in rice production increasing and low prices of rice sack, which leads to low economic profit for farmers while wage workers are receiving fixed monthly income.

Expected happiness does influence the actual happiness for three models (Table 7). This suggests that some expectations on their work are met in actual experiences and influence their well-being. Age and gender are not significant factors of the well-being of a worker. The number of years in education increases the workers' knowledge and skill, which statistically significant and directly influences happiness at work. This infers that an educated worker is more likely happy due to the advantages learned from schools.

The ordered logit model (Table 7) shows that a married worker is relatively happy at work. This implies that the feeling of being close to someone will positively influence the degree of happiness. The three models suggest that a worker who is not a head of the family is more likely to be happy and significant. It means that a worker with less responsibility to the family members can fully enjoy the income alone, which will influence well-being.

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The effect of income on subjective well-being is strong and statistically significant in all regressions. Household assets are also significant at OLS model and ordered logit model, which infers that the worker's overall assets' market value directly influences happiness. A worker with a higher income tends to have more assets and better comfort in life.

Leisure and socialization of workers have positive effects on happiness in the OLS model. To relieve stress during the working period, the respondents spend some time leisure activities and interact with their family and friends. Health in OLS and ordered logit models have indirect relationships to well-being, and they are statistically significant. The lower their satisfaction on health condition implies to work less in a day and signals not to overdo things at work but instead spend time resting at home, which increases their degree of happiness.

This might be due to lighter activity which results in less stress at work. This result on the health issue is not consistent in the studies in the literature (Deaton, 2008; Frey, 2008; Guazzelli & Zilli, 2016), and this is only applicable for the wage-workers, which is not revealed in Table 4 that health has negative effects on rice farmers' happiness.

Table 7: Econometric models for rice farmers and wage workers with actual happiness as a dependent variable and its influencing determinants (n=227)

INDEPENDENT VARIABLES	OLS MODEL		BINARY LOGIT MODEL		ORDERED LOGIT MODEL	
	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR	COEFFICIENT	STD ERROR
Constant	2.1423***	0.60191	-5.5103***	1.67491		
Rice farmer	-0.6459**	0.27008	-1.6215**	0.65764	-1.6479***	0.54189
Expected Happiness	0.3165***	0.04544	0.5494***	0.12751	0.4803***	0.09443
Age	0.0086	0.00832	-0.0251	0.02111	0.0066	0.01598
Male	0.0771	0.22079	0.5986	0.58468	-0.1796	0.42480
Years in education	0.0648**	0.03065	0.0633	0.08064	0.1056*	0.06039
Married	0.2515	0.21052	-0.1023	0.55738	0.7992*	0.41469
Head of family	-0.6259***	0.23568	-1.2751**	0.60370	-1.0441**	0.46327
Household size	0.0736	0.05630	0.2199	0.14826	0.1183	0.10869
Years of residense	-0.0063	0.00639	0.0171	0.01680	-0.0060	0.01221
Monthly income[b]	0.0001**	0.00002	0.00014**	0.00006	0.00009**	0.00005
Household assets[b]	0.00004***	0.00001	0.00007	0.00006	0.00001**	0.00005
Monthly Hhexpense	-0.00002	0.00003	-0.00006	0.00010	0.00003	0.00008
Leisure time[a]	0.0956*	0.05027	0.2228*	0.12566	0.1189	0.09778
Social relationship[a]	0.1143**	0.05685	0.2288	0.15529	0.0898	0.10834
Health[a]	-0.1394***	0.05211	-0.1276	0.13840	-0.2411**	0.10153
R-squared	0.5539					
Adjusted R-squared	0.5222					
Pseudo R-squared			0.4552		0.3138	

Note: a - Scale 1 to 10
b - Philippine Peso (50 US Dollar)
* - significant at 10% level.
** - significant at 5% level.
*** - significant at 1% level.

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4. CONCLUSION AND RECOMMENDATIONS

This study presents some important determinants that explain the degree of happiness in farming among rice farmers. The study also documented significant and positive determinants of the feeling of happiness in farming. Results reveal that the farmer's actual happiness is relatively low compared to the expected happiness. This could be attributed to the high market prices of agricultural inputs coupled with a low market price of harvested rice.

Further, some expectations in farming, like predetermined goals on yield and profit, are not met at the time of harvesting. This leads to a decrease in the actual feeling of happiness relative to the farmer's expectations. The number of years in education positively increases the farming capability to work wisely, increasing happiness.

This is due to the new techniques and skills learned from school that make rice production more effective and convenient to manage, making the farmer more competent. Furthermore, it is more likely to be happy if the farmer owns the land farm. Farmer's monthly income is a significant determinant of well-being. An increase in income helps buy the basic needs of the household members.

This leads to an increase in farmers' household assets, which increases the feeling of happiness in farming. This might be due to the benefits and comfort that additional assets brought to farmer's lives. Further, leisure and social activities can strengthen the bonds to friends and family members, which can be a stress reliever.

Thus, to have a fulfilling family life, a farmer must limit their work hours in the farm and spend time with family bonding. The indicators of health have positive effect on the degree of happiness. This concludes that if a farmer is satisfied with their health, then a farmer is working hard and productive in the farm, increasing their happiness level despite the hardship in farming.

The local government may further expand the agricultural project's implementation so that more farmers can benefit and improve their productivity in farming and happiness in farming. The department of agriculture needs to have a farmer's needs assessment before introducing new technology to optimize its implementation. The projects and subsidies are of great help to the farmers to maintain the rice production and supply in Hilongos, Leyte.

The government must also impose a price control policy for agricultural inputs relative to the price of rice's final outputs. This will help the farmers obtain the desired profit and

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income that satisfy their families' needs and have decent living conditions. It is also recommended that the rice farmers in the barangay must organize a cooperative. This will improve their bargaining power and allow them to buy farm inputs in bulk, giving them a chance to avail themselves wholesale prices.

The farmers will be able to maintain a fulfilling family life by limiting work hours in a day. This strengthens the bond of the family members, which positively increases the degree of happiness. To increase farmers' income, farmers' must diversify their crops, not only focusing on rice. Lastly, it is recommended for further empirical analysis on the economics of happiness in farming to include variables related to farmers' access to credit since this is one of the limitations of the current study.

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