Socio-Demography, Pesticides Use, and Health Status of Rice Farmers in Region XII, Mindanao, Philippines

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The socio-demographic characteristics, pesticides use and health status of 300 rice farmers from Region 12 in the Philippines in 2015 were assessed. Likewise, the influence of the socio-demographic characteristics on the farmers' pesticides use and health status was determined. This was done to describe the current well-being of farmers as basis for recommending strategies to improve their farming practices and health condition. Farmers were middle adults (60.6%), married (83.7%), had secondary education (50.7%), with household size of 1-4 members (62.7%), mostly non-owners (63.3%) of less than 3 hectares of land (91.7%), with total annual income of less than P101,000.00 (69.3%), nearly one third had more than 11 years farming and pesticides application experience and had availed at least one training on rice production for the last five years. Nearly 75% had health insurance. The socio-demographic characteristics did not influence significantly the pesticides use as to frequency and quantity of application and health status of the farmers. Age, however, is found a significant predictor of pesticides use as to frequency of application while civil status and farm ownership are the significant predictors of gaining normal health status as to Body Mass Index (BMI). Based on the findings, farmers still need more trainings on proper pesticides use and other farm technology options to keep their health protected and earn better profits from farming.

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1. INTRODUCTION

The Philippines is an agricultural country and rice is the top commodity produced by most farmers. The government continuously invests on the development of the agriculture sector to answer the need for self-sufficiency with its growing population. Despite this effort, the farmers who are the main resource in the agri-industry seemed missed in the value chain. Limited technical support are provided specifically in value-adding and in trading products which caused to lowered income and profitability among farmers. Not only that, as cited by Demos, et al [1] farming in itself and farming-related tasks entail significant hazards to the health and well-being of farmers.

In producing rice, practices and technologies adopted by farmers vary. Adopted measures can either directly increase yield or affect production costs. The use of modern-high-yielding varieties and the management of nutrients, pest and disease management, and water are technologies that directly contribute to higher yield, however, these production practices are continually changing over time mainly due to technologies and government programs envisioned to respond to the dynamic challenges and needs of the Filipinos [2].

Obviously, farmers use agrochemicals due to their ability to control pest to lessen production losses and increase rice productivity. Other commodities like fruits and vegetables are also known for farmers' reliance in chemical spraying due to crop yield growth effect [3]. With the continued expansion of agrochemical use, Lu, et al. [3] cited that due to pesticides exposures, farmers are at risk and had experienced symptoms such as headache, skin abnormalities, fatigue, fever, and weakness. As cited by Briones [4] pesticide hazards in the Philippines for example are compounded by the widespread ignorance of the hazards involved, poor labeling, inadequate supervision, and the lack and/or difficulty of wearing protective clothing due to the prevailing hot farm conditions. If these kind of practices continues, the most important resource of the agricultural sector which are the farmers will be affected distressfully.

On the other hand, along with pesticides use, the health status of the farmers has been one of the focus of many research lately. Most literatures dealing with the health status of farmers worldwide present contradictory findings. There are studies that measure better health in farming populations, while other studies argue for a worse health status among agricultural workers. In Mindanao, particularly in Region 12, published data about rice farmers is limited. Since there are many Filipinos confined into agriculture, specifically, rice farmers, determining these information and make them available to the agri-economic and academic institutions are timely and significant. Determining therefore these aspects of the rice farmers provide insight on the quality of their farming life and health condition which are vital information in alleviating the socio-economic status of families. Farmers could be described and understood well as one of the bases in the planning, implementation and evaluation of agricultural interventions.

2. METHODS

The study was conducted in six (6) major irrigated lowland rice-producing municipalities of Region XII, Mindanao, Philippines namely Kabacan, Mlang, and Midsayap in Cotabato province and the towns of Lambayong, Tacurong, and Esperanza in the province of Sultan Kudarat.

Descriptive-correlation research design was used in the study where top rice-producing municipalities and barangays and the individual farmers in Region XII were identified in coordination with the regional, provincial and municipal offices of the Department of Agriculture. The study population which was composed of 300 farmers was randomly and purposively acquired through an equal allocation of 50 respondents from each of the six (6) communities.

Actual interviews guided by a questionnaire were done to gather the socio-demographic characteristics and pesticides use of rice farmers. The health status of the farmers was determined by getting the Body Mass Index (BMI) through height and weight measurements. Some of the specific items in the questionnaire were patterned, adapted and modified from the "Bangladesh: Pesticide Use Main Survey" (World Bank, 2003 in Dasgupta [5])

Descriptive statistics such as frequency counts and percentages were utilized in describing the

set of data gathered on the farmers' socio-demographic characteristics, pesticides use and health status. Regression analysis was used to test the relationship of the farmers' socio-demographic characteristics and their pesticides use and health status at 5% level of significance.

The farmworkers' health status were determined through their Body Mass Index (BMI) using the formula: weight (kg)/[height (m)]^2 and resulting BMI were interpreted based on the standard set by the WHO as published in The Lancet [6] for adults as presented below:

<16 kg/m^2	severe underweight BMI
16.0 – 16.9 kg/m^2	moderate underweight BMI
17.0 – 18.49 kg/m^2	mild underweight BMI
18.5 to 24.9 kg/m^2	Normal BMI
< 18.5 kg/m^2	Underweight BMI
25-29.9 kg/m^2	Overweight BMI
30-39.9 kg/m^2	Obesity BMI
>40 kg/m^2	Extreme Obesity BMI

3. RESULTS

3.1 Socio-Demographic Characteristics of the Farmers (Table 1)

The age of the farmers ranged from 21 to 76 years, 60.6% fell under the age bracket 32-53. Only 13.0% were under 32 years old while 26.4% were aged above 53. As to marital status, majority (83.7%) of the respondents were married. It is apparent that most of the farmers have their own families. Being household heads could have prompted them to work hard in the rice farm as their main source of livelihood. Of the farmers, 65.7% reached high school to college level, 80 (26.7%) graduated and reached elementary level of education while 23 (7.7%) were college graduates. It is evident that majority of the farmers are literate. It can also be inferred that, professionals see now the benefits of farming, hence, their entry to the farm workforce.

More than half (62.7%) of the farming households have 1-4 members while the remaining 26.7% and 10.6% had 5-6 and 7 or more members, respectively. The data indicate that most of the households are categorized as small to medium in their composition and are composed mainly by the farming couple and their children. This highest percentage of the households is close to the normal family size in the country which according to Espino, Evangelista and Dorotheo [7] is 5. Eighty-two percent of the total farmers tilled 1-3 hectares of land. Only 10% of them had less than a hectare farm size and fewer still had 4-6 hectares of land (7.3%) and 7-15 hectare rice farm (less than 1%). More than 1/3 (36.7%) of the surveyed farmers owned their land while 29.7% were considered tenants, 27.7% worked as "maintainers" and only 18% leased the land they tilled.

Sixty-nine percent of the farmers earned an annual income of P5,000 – P100,999.00 from their rice production while 22.7% got P101,000.00-P196,999.00 and a few (10.0%) had an income of P197,000.00 or more. Basically, majority of those earning the lowest annual income were non-owners of land working as either maintainers, tenants or lessees. Their annual income lies below the threshold poverty level income of the country which is P120,000/annum (US S2,666.67) [7].

More than 1/3 (32.7%) of the farmers are into rice farming for more than a decade (12-21 years). Others have 2-11 years (27.3%), 22-31 years (25.7%) and 38 or 12.7% farmed for more than 32 years. The farmers who have been spraying pesticides for 12-21 years comprise 33.7%, 30% sprayed for only 2-11 years and others 37.1% sprayed pesticides from 22-51 years. The length of years devoted by farmers in applying pesticides has almost the same trend as the length of years they were into as rice farmers.

When it comes to the number of trainings attended by the farmers relative to rice production, one third of the respondents had no attendance to trainings. Interestingly, 88 (29.3%) of the farmers had attended 5-6 trainings, 51 (17.0%) with 1-2 trainings, 41 (13.7%) with 3-4 trainings while only 6.6% had 7 or more accumulated trainings for the last five years. Trainings in this case are usually attended by the experienced farmers. Nearly 75% are members of the Philippine Health Insurance (PhilHealth) either as self-employed members or had availed an indigent or PhilHealth ng Masa program of the government.

Table 1. Socio-demographic characteristics of rice farmers, Region XII, Mindanao, Philippines, 2015

Characteristics	Frequency (n=300)	Percentage (%)
Age (years)		
21-31	39	13.0
32-42	79	26.3
43-53	103	34.3
54-64	68	22.7
76-above	11	3.6
Civil Status		
Single	37	12.3
Married	251	83.7
Separated	7	2.3
Widow (er)	5	1.7
Level of Education		
Elementary Level	20	6.7
Elementary Graduate	60	20.0
High School Level	72	24.0
High School Graduate	80	26.7
Vocational Certificate	13	4.3
College Level	32	10.7
College Graduate	23	7.7
Household Size		
1-2	38	12.7
3-4	150	50.0
5-6	80	26.7
7-8	22	7.3
9 and above	10	3.3
Farm Size (ha)		
Less than 1 ha	30	10.0
1-3	245	81.7
4-6	22	7.3
7 and above	3	0.9
Farm Ownership		
Tenant	89	29.7
Lessee	18	6.0
Owner	110	36.7
Maintainer	83	27.7
Annual Income		
P 5,000.00 – P100,999.00	208	69.3
P 101,000.00 – P196,,999.00	68	22.7
P 197,000.00 – P292,999.00	16	5.3
P 293,000.00 – P388,999.00	6	2.0
P 389,000.00 – above	2	0.7
Length of Years as Rice Farmers		
2-11	82	27.3
12-21	98	32.7
22-31	77	25.7
32-41	38	12.7
42-51	5	1.7
Length of Years as Pesticide Applicator		
2-11	90	30.0
12-21	101	33.7
22-31	68	22.7
32-41	37	12.3

Characteristics	Frequency (n=300)	Percentage (%)
42-51	4	1.3
Number of Trainings Attended		
None	100	33.3
1-2	51	17.0
3-4	41	13.7
5-6	88	29.3
7 and above	20	6.6
Ownership of Health Insurance		
Owner	220	73.3
Non-owner	80	26.7

3.2 Pesticides Use Frequency of Pesticides Application per Cropping

As shown in Fig. 1, 36% of the farmers applied pesticides (either insecticide, herbicide, fungicide, molluscicide, nematicide/bactericide, rodenticide) more than 10 times per cropping season. This is followed by an application of 6-10 times(34.7%) and 29.3% had spray schedules of 1-5 times. The quantity of each of the pesticides applied by the farmers was determined and translated to relative concentration: (1) lower than the recommended rate (under dosage), (2) within the recommended rate (RR), and (3) more than the recommended rate. Fig. 2 results reveal that more than half of the farmers (51%) applied their pesticides "lower than the recommended rate." Only 24.67% followed the recommended rate or required dose during pesticide application while 24.33% used more than the recommended rate.

3.3 Health Status of Farmworkers

The respondents are within the normal BMI or normal health status, 19% were categorized as overweight, 4.3% being mild underweight, while obese farmworkers comprised 1.3% and only 0.3% was categorically in the moderate underweight status (Fig. 3).

3.4 Relationship between Socio-demographic Characteristics and Pesticides use as to Application Frequency

In Table 2, Model 1, the combined contribution of the farmers' socio-demographic characteristics such as age, civil status, level of education, household size, farm size (*ha*), farm ownership, annual income, length of years as rice farmer, length of years as pesticide applicator, number of trainings attended related to rice production in the last five years and ownership of health insurance has no significant influence in the level of pesticides use as to frequency or their number of pesticides application in one cropping season (*F-Value* = 1.583, p-*Value* = 0.103). Taken singly, the age of the farmworkers was found to be the best significant predictor to pesticide use as to frequency of pesticide application from among the listed socio-demographic characteristics at 5% level of significance (t-value = 2.163, p-value = 0.031).

The results picture out that the older is the farmworker, the better or more prudent is his pesticide practices as to the frequency/number of application. Younger ones tend to spray more often than the older farmers. The coefficient of multiple determination (R^2) was 0.057 or 5.7%. This implies that the variables in the model were able to explain up to 5.7% of the variation in the pesticide use as to frequency of application of the respondents. The remaining 94.3% of the variation is attributed to other factors not included in the model.

3.5 Relationship of the Farmworkers' Socio-demographic Characteristics and Pesticides use as to Quantity

Table 2, Model 2 shows that the combined contribution of the farmer-respondents' age, civil status, level of education, household size, farm size (ha), farm ownership, annual income, length of years as rice farmer, length of years as pesticide applicator, number of trainings attended related to rice production for the last five years and ownership of health insurance has no significant influence in the level of pesticide use as to quantity (F-value = 1.508, p-Value = 0.128). Taken singly, none of these socio-demographic characteristics is a significant predictor to pesticide use as to the quantity applied in the field.
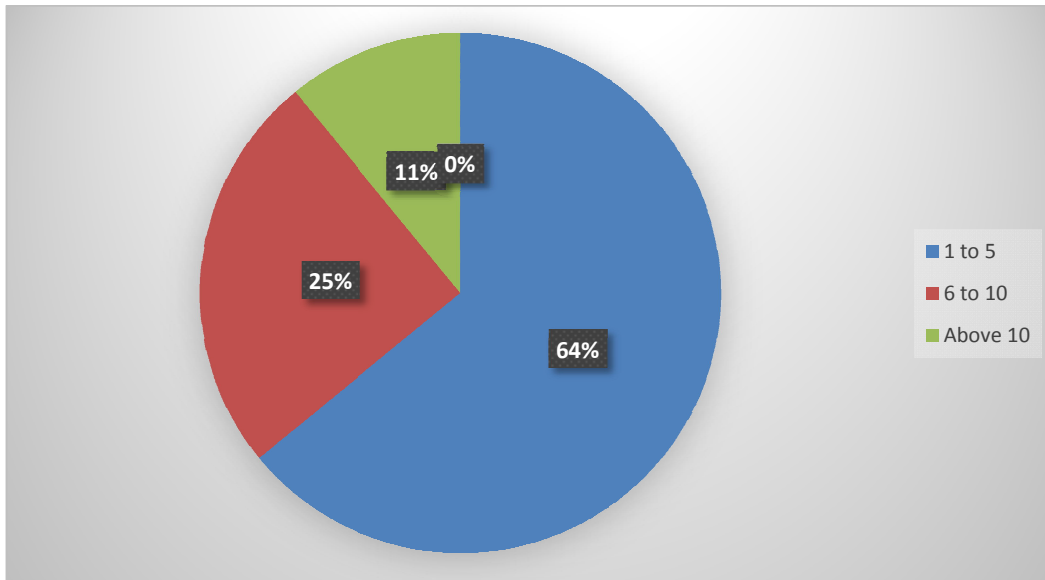
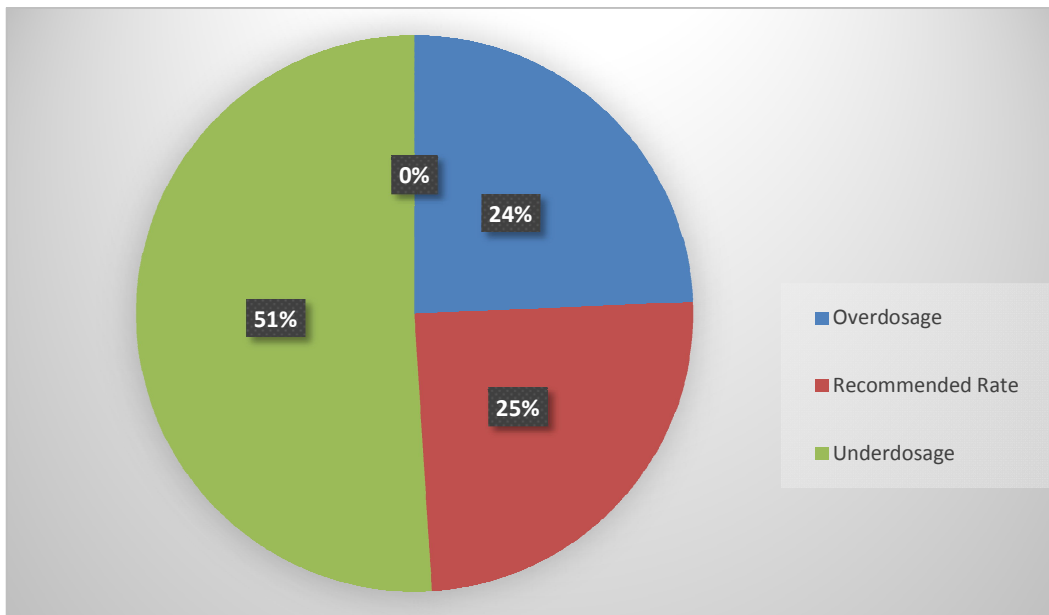**Fig. 1. Frequency of pesticides application per cropping season**

Fig. 2. Concentration of pesticides applied by farmers

Moreover, the coefficient of multiple determination (R^2) was 0.054 or 5.4% which signifies that the variables in the model were able to explain up to 5.4% of the variation in the pesticides use as to quantity applied by the respondents. Meanwhile 94.6% of the variation is attributed to other factors not included in the model.

The regression analysis (Table 2, Model 3) shows that the combined contribution of socio-demographic characteristics significantly influenced the health status of the farmworkers at 5% level of significance as reflected by the F-value of 2.351 and p-Value of 0.019. The result implies that the age, civil status, level of education, household size, farm size (ha), farm ownership, annual income, length of years as rice farmer, length of years as pesticide applicator, number of trainings attended related to rice production for the last five years and ownership of health insurance of the

respondents altogether brought significant impact in attaining normal health status by body mass index. However, when taken singly, two of the variables namely, the farmworkers' civil status (t-value = 2.271, p-value = 0.024) and nature of farm ownership (t-value = 2.429, p-value = 0.016) were noted as best significant predictors of health status.
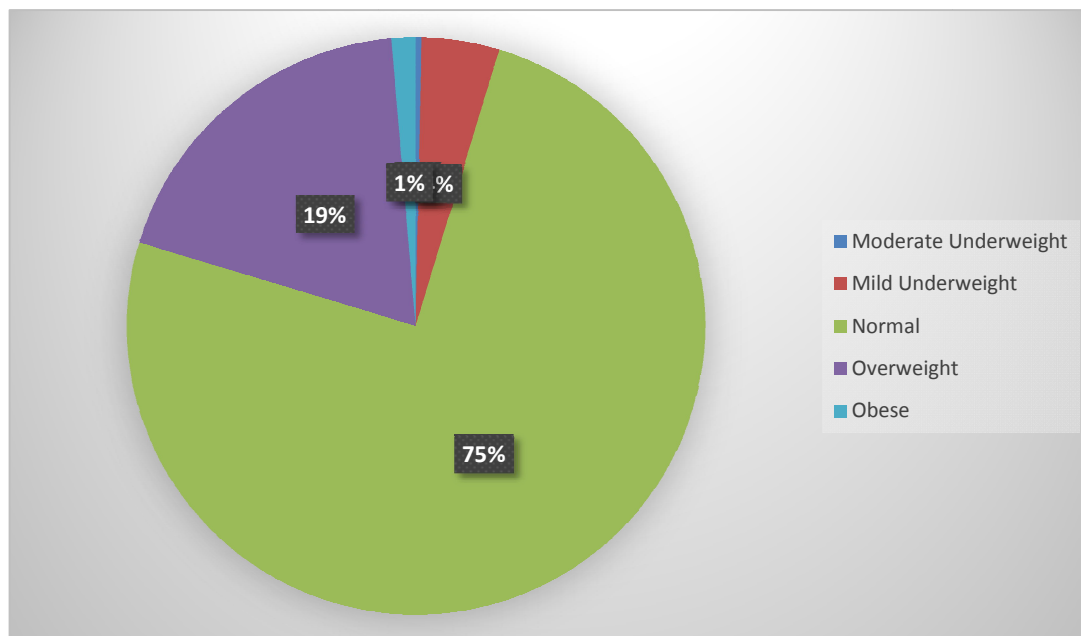

Fig. 3. Health status of farmers by body mass index

Table 2. Regression analysis on the relationship on the farmers' socio- demographic characteristics, pesticide use (frequency and dosage) and health status

Independent variables	Dependent variables		
	Coefficient ß	**t-value**	**p-value**
Model 1: Frequency of Pesticide Application			
Constant	1.204	4.167	0.000
Age	0.013	2.163*	0.031
Civil Status	0.105	0.674	0.501
Level of Education	0.035	1.060	0.290
Household Size	0.016	0.623	0.534
Farm Size	-0.024	-0.626	0.532
Farm Ownership	-0.029	-0.249	0.804
Annual Income	0.000	0.883	0.378
Length of Years as Rice Farmer	-0.001	-0.077	0.939
Length of Years as Pesticide Applicator	-0.009	-0.549	0.583
Number of Trainings Attended	-0.020	-1.086	0.278
Ownership of Health Insurance	0.208	1.819	0.070
Model statistics	(R-Square=0.57, F-Value=1.583^{ns},p-Value=0.103)		
Model 2: Quantity/Dosage of Applied Pesticides			
Constant	1.504	8.247	0.000
Age	0.006	1.508	0.133
Civil Status	-0.010	-0.101	0.920
Level of Education	0.032	1.510	0.132

Independent variables	Dependent variables		
	Coefficient ß	t-value	p-value
Household Size	0.040	2.444	0.015
Farm Size	0.022	0.923	0.357
Farm Ownership	0.025	1.693	0.091
Annual Income	0.000	-1.406	0.161
Length of Years as Rice Farmer	-0.001	-0.072	0.943
Length of Years as Pesticide Applicator	0.000	-0.018	0.986
Number of Trainings Attended	-0.006	-0.485	0.628
Ownership of Health Insurance	0.038	0.521	0.603
Model statistics	(R-Square=0.54, F-Value=1.508^{ns},p-Value=0.128)		
Model 3: Health Status			
Constant	20.263	4.167	0.000
Age	-0.014	2.163*	0.514
Civil Status	1.264	0.674	0.024
Level of Education	-0.025	1.060	0.832
Household Size	0.114	0.623	0.222
Farm Size	0.186	-0.626	0.167
Farm Ownership	1.014	-0.249	0.016
Annual Income	0.000	0.883	0.302
Length of Years as Rice Farmer	-0.037	-0.077	0.540
Length of Years as Pesticide Applicator	0.066	-0.549	0.253
Number of Trainings Attended	0.020	-1.086	0.755
Ownership of Health Insurance	0.523	1.819	0.202
Model statistics	(R-Square=0.75, F-Value=2.133*, p-Value=0.019)		

ns = not significant; * = significant at 5% level

4. DISCUSSION

Region 12 is predominantly into agriculture and rice is the main commodity produced by the 300 farmers involved in the study. In rice production, agrochemicals are part of the inputs financed in the farm. The use of pesticides in producing rice pose advantages and disadvantages both in the crop and the farmers. In this study, the socio-demographic characteristics were determined and correlated with their pesticide use and health status.

4.1 Socio-Demographic Characteristics of the Farmers

The farmers involved in the study belong to the age bracket 32-53, married, attained high school to college level education, have 1-4 members, tilled their own 1-3 hectares of land, tenants or maintainers and earning an annual income of up to P100,999.00 from their rice production. They were into farming for 12-21 years, pesticide applicators for 2 to 21 years, many had no attendance to training related to farming, and are members of the Philippine Health Insurance (PhilHealth) either as self-employed members or indigent or PhilHealth ng Masa program recipients.

Literacy (able to read and write) is not much of a problem among the farmers. This means they can communicate, participate in policy-making activities, attend to training and impose farm decisions. This trend is much better than what were found out in previously published surveys indicating that rice farmers have lower level of education. Farmers who are uneducated or with little formal education has greater tendencies to face a higher health risk, for instance, when using pesticides due to their difficulties in understanding the instructions and safety procedures included on the product labels. In contrast, Gaber and Abdel-Latif [8] in their study among 335 Egyptian farmers found that those who received school education had a higher percent of healthy behavior like: reading pesticide labels, mixing pesticides using gloves, cleaning sprayer nozzle using a wire, washing skin coming in contact with pesticides, putting a cloth on nose and mouth during spraying, washing hands and face and taking a bath following pesticide application and had a low percentage of using pesticide containers at home

than those who did not receive any school education. Conversely, Ackerson and Awuah [9] stated that farmers of higher education did not spend a lot of time on the farm in a day. This may be due to their knowledge of the risk involved in overworking the body.

As to household size, the findings corroborate with those found in the study of Markmee [10] that Thai rice farmers has household size of at least three persons, an average of 3.81 persons. Farmers with meager income could not support a bigger family size.

As reflected in the Rice Country Profile of the Philippines [11], the 2002 census noted that the average rice farm size is 1.75 hectares per landholding and the overall average farm size is 1.98 hectares. Most farms nationwide are very small, only about 0.5 to 1.5 hectares on the average. Thus, the study seems to confirm what was reported in the national census. The farm size of the farmer-respondents is also similar to the farm set-up in Pakistan where 73.3% of the farmers had small land holdings of less than 5 hectares [12].

Many of the farmers surveyed are non-owners of land, in this case, they could not easily employ immediate farm decisions whenever needed unlike the farm owners whom according to Adekunle et al. [13] have more control over their farms as to land usage. Further, such tenurial status gives them leverage as adoption of new technologies.

Basically, majority of those earning the lowest annual income were non-owners of land working as either maintainers, tenants or lessees. Their annual income lies below the threshold poverty level income of the country which is P120,000/annum (US S2,666.67) based from the report of Espino et al. [7].

It is only good to note that 50% of the farmers had a small household size (3-4 members) so they can support the basic needs for fewer family members. However, with the above income, it is expected that some basic needs are not always adequately met especially on their children's education at higher year levels.

In the report of the National Statistical Coordination Board, on the 2012 first semester states of poverty in the Philippines, it is shown that a family of five can be considered extremely poor if it is earning P5, 458 a month or just

enough to put food from the table. The same family has to earn at least P7,821.00 if it wants to satisfy other non-food needs such as clothing.

The data specify that the respondents have been farming upon reaching adulthood. This long duration of farming background, brought them sufficient knowledge or experience on rice farming and somehow learned to live with contentment as to monetary gains. The length of years devoted by farmers in applying pesticides has almost the same trend as the length of years they were into as rice farmers. Obviously, most of them have been in contact with pesticides for more than a decade already so it is not surprising that some of the farmers may verbalize health complaints as their chemical exposure is already long enough. It is a common fact that pesticides when handled improperly can trigger health risks. The duration or long years of spraying, frequency and concentration of application contribute to the possibility of health impairment occurrences among farmers.

Since most of the farmers were able to attend trainings, the knowledge, information and technologies they gained out of their attendance could have boosted their confidence to employ better management strategies on their farms. Those who had no attendance to trainings were mostly working as "maintainers" or "non-owners" of the land or were new to rice farming. It can be inferred that there are still farmers who are untrained, unskilled or unequipped with the new technologies introduced in rice farming.

The knowledge, attitude and perception of the farmers also reflect their practice of pesticide use and decision making process regarding the pest management strategy [14]. Moreover, as cited by Kumari, et al. [15], workers' knowledge of pesticide hazards help them prevent cases of acute and chronic poisoning. If the farmers have erroneous beliefs, these can seriously impair their capacity to protect themselves against pesticide risks.

It clearly shows that many farmers acknowledged the relevance of having health insurance knowing that health care nowadays is getting more expensive. They have thought that lack of health insurance could give them more problems as the need would arise as cited by Dorn [16] that health insurance answers problems dealing with health and health costs. It provides timely access to healthcare, including preventive care, diagnostic tests, and prescriptions, which can help prevent escalation of health problems.

Fig. 4. The typical rice farmer of region 12

4.2 Health Status of Farmworkers

The farmers' normal BMI results indicate a good health status, however, the number of overweight should be seriously addressed. Overweight or obese individuals have increased risks for diseases such as high blood pressure, diabetes, heart disease, stroke, arthritis, cancer, and poor reproductive health. This finding can be associated with the research work of Devi [16] on the Health Risk Perceptions, Awareness and Handling Behavior of Pesticides by Farm Workers in Kerala, India that a majority of the respondents (72.02%) are of satisfactory health status by the BMI values.

However, in the findings of Variyam and Mishra [17] in the crude and age-adjusted prevalence of selected health conditions among farm workers, laborers, and all other workers, it was found out that farm workers are about 4% more likely to be overweight/obese than all other workers on age-adjusted basis [18]. This result was better than the findings of the study that nearly ¼ of the respondents were in the overweight and obese categories.

The above satisfactory finding on the relatively normal health status of the farmers when measured with their BMI expresses seemingly that they were not affected by their prolong exposure to pesticides (applying pesticides for years). The farmers in short are healthy and being healthy has the benefits to live longer and contribute to the economic progress of the family and community. Likewise, McNamara, et al. [19] explained that a healthier farmer and farm household can devote more resources to farming and is likely that the household's greater productivity leads to higher levels of health because among other things, the healthy farm family may achieve greater income and therefore be able to purchase more and better healthcare which would lead to even higher productivity.

4.2.1 Relationship of the socio-demographic characteristics and pesticide use as to application frequency

The age of the farmers as predictor to pesticide usage is in consonance with the study on "Farmer perceptions and pesticide use practices in vegetable production in Ghana" conducted by Ntow, et al. [20] wherein they found out that in terms of frequency of pesticide application and its association to pesticide poisoning symptom, younger farmers (<45 years of age) were the most vulnerable group, because they did more spraying than older farmers (>45 years of age).On the other hand, Kumari, et al. [14] developed a pesticide safety knowledge test assess farmer's knowledge related to pesticide safety at two districts of southern Punjab Pakistan. More educated and adult respondents performed better than younger and illiterate indicating their more access to information and

extension. The finding however of Ackerson and Awuah [9] among urban agricultural farmers in Ghana is different specifying that farmers who were advance in age frequently applied pesticide than the youth. This may be due to the consciousness and perception of the urban youth on the risk of frequent usage of pesticides. Yagos and Demayo [21] and the Worldbank [22] noted the rampant use of pesticide among farmers. Strong advocacy on the use of natural means of controlling pest or practice of sustainable technologies could change this current pesticide utilization trend among farmers.

4.2.2 Relationship of the socio-demographic characteristics and farmers' health status

The regression analysis result explains that married farmworkers are of better health status than non-married ones in the same manner as farm owners than non-owners. Being married and as farm owners bring considerable benefits to the family. Married people tend to become more active as they gain constant support from their mates when making decisions about the farm. Landowners tend to be assured of a stable farm income which is advantageous in order to maintain family finances. If various needs are met, there will be fewer worries, thus, making a person not only healthy psychologically but also physically.

The above findings can also be explained by literatures from various websites pointing out that married individuals remain healthy due to stronger social relationships, from sharing resources, household and farm routines, recreation, and social responsibilities together. They tend to get support from themselves and this strongly motivates them to stay contented and happy.

On the other hand, Khan, et al. [23] shared that farm land holders are likely to use more safety measures, face less health effects and perceive less health risk of pesticide use. It is also assumed that they do not apply pesticides by themselves regularly and usually get this job done by hired labor. From this literature, the health of the farm owners is protected and that their health status remains in a healthy or normal state. For Davis, et al. [24] poor health status is the most significant predictor of missing work among such other important factors as wage rate, sick leave benefits, family structure, and age. Sicker workers had a much greater risk of experiencing one or more reduced-productivity days on the job than healthier workers.

The regression analysis likewise points out that 7.5% (($R^2 = 0.075$) of the variability in the health status of farmworkers is explained by the variability in the socio-demographic characteristics included in the test. The remaining 92.5% is explained by some unknown factors.

Generally, the farmers' socio-demographic characteristics are reflective of their pesticide use and health status. They remain healthy as shown by normalcy in BMI, however, this measure is not enough to describe health status. The current state of health of the farmers could be attributed to the age of the farmers where most are middle adults. The age of the farmers show differences in the number of pesticide application in the field. Younger farmers need reinforcement as to proper pest control to avoid more exposure to pesticides as shown in an increased number of application in rice farms. Oluwole and Cheke [25] specified that the use of protective equipment and correct procedures in handling pesticides must be sustained for the welfare not only of the farmers but also the environment.

5. CONCLUSIONS

The typical rice farmer is relatively young, head of small household, literate, experienced yet has limited training on proper pesticide use and has a meager income. These characteristics are unique and can be a focus for agricultural redirection toward alleviating the socio-economic condition of rice farmers and impose environmental responsibility through proper pesticide use.

COMPETING INTERESTS

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