

Agricultural extension services and household food security of women rice farmers in the Ayeyarwady region of Myanmar

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ABSTRACT. The study aimed to analyze women's households' farming practices towards household food security, particularly in six villages of the Ayeyarwady region. Data were collected from 126 randomized respondents. Findings show that the respondents are respondents who had a mean age of 45 years, married, natives of the study sites, and have attended primary education with an average of four family members. The government is the primary agency that provides training programs, mostly in rice production. They have access to extension worker visitation in which the most common topic discussed is pest management. Less than a fourth of the respondents are members of farmer organizations. Most respondents keep only 1 to 2 kinds of food, boiled their food, had poor dietary adequacy level and suffer from moderate to severe hunger at one point in time. Non-parametric Spearman's rank correlation coefficient was used to determine the degree of association for extension services and household food security. Non-farm income is significantly associated with food access and vegetable training program is significantly associated with all food security dimensions while livestock raising, and rice production are significantly associated with three food security dimensions. Membership in farmer organizations is significantly associated with all dimensions of food security. The extension system can focus its investments on vegetable training programs, livestock raising and rice production, strengthening farm organizations and diversifying non-farm income sources.

Keywords: *Access to extension services, food security, women households*

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INTRODUCTION

Agriculture is among the most important sectors in the economy of Myanmar. From 2014 to 2015, the agriculture sector contributed 20% of the GDP and total export earnings. Myanmar has more than 22 million ha, of which more than 8 million ha are devoted to rice (Shwe & Hlaing, 2011). Almost 75% of the farmers' income comes from rice farming (Larry, 2013). Ayeyarwady, Bago, Mandalay, Yangon, and Sagaing regions are Myanmar's main paddy growing areas.

Ayeyarwady, in the Delta region, is considered the traditional rice bowl of the country. The main source of income is derived from farming in the Ayeyarwady region. Livestock and fisheries are significant food sources and are the primary sources of income for farmers (Win & Myint, 2016). Ayeyarwady is severely affected by climate change impacts. It loses an average of 11.4% of harvest annually to storms, floods, and pests, which is higher than the national average of 7.8 % (UNDP, 2014). In 2008, Cyclone Nargis devastated much of the area of the Delta region (Win & Myint, 2016). Delta region is categorized as one with the lowest food security rate with 11.4 % of its annual rice harvest losing to storms, floods, and pests (UNDP, 2014).

This study is pioneering in the sense that there remains an absence of studies pertaining to women's farming practices and their access to agricultural extension services in Myanmar. Win and Myint (2016) reported that agricultural extension services led to improved production and income, enhanced well-being of rural nutrition and food self-sufficiency of households. Studies show that women play a significant role in ensuring food security, yet most technologies do not reach them because of poor extension support system (ADB, 2016). According to the data of Department of Agriculture (2016), the total number of female-headed households is 95,703 compared to 748,831 of male-headed households. Although women comprise 40.2 % of the labor force in the Delta region, they received limited attention from the government (ADB, 2016). According to Win and Myint (2016), even male-headed households in the Delta region have difficulty participating in extension activities, and this situation disadvantages women-headed households who are said to have even more difficulty accessing services. Hence, the study investigated the access to extension services of women-headed households and their food security situation.

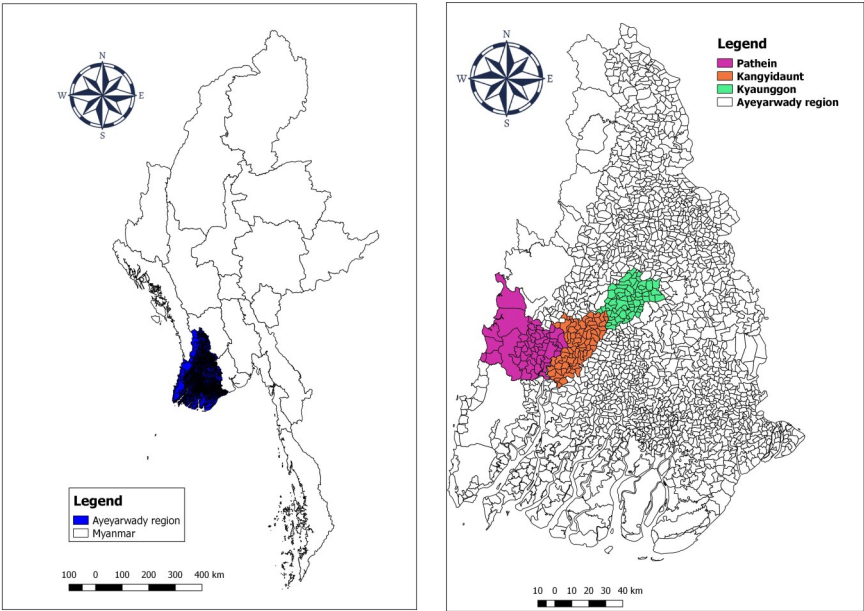
Thus, the study's general objective is to analyze access to extension services and food security of women headed households in the Delta region of Myanmar. Specifically, the study aimed to: 1) describe the

socio-economic profile of the respondents; 2) discuss the agricultural extension services in the study townships, Delta region; 3) determine the factors that affect food security and analyze the relationship between extension services and food security of female-headed households; and 4) propose an extension framework.

METHODOLOGY

The study was conducted in the six rice-producing villages of three townships in the Ayeyarwady region of Patheingyi District, Myanmar. The study villages were Kan Ni Phyar and Zayat Kwin in Patheingyi township, Ywa Thit Kone and Kwin Yar Kyi villages in Kangyidaut township, and Hlae Seik and Zayat Seik in Kyaunggon township. The Ayeyarwady region has an area of 35,140 km² and lies between 16°50" north and longitudes 95°10" east. It has a population of 6.2 million. The Ayeyarwady region is known as Myanmar's rice bowl. After the devastation brought by Cyclone Nargis in 2008 and Cyclone Komen in 2015, most farmers could not farm their lands because of salinity and saltwater intrusion and as such, male farmers migrated to other regions to seek employment, leaving their wives and children behind. Figure 2 shows this study's research locale.

Figure 1
Location of the Study Area



Data Collection

Letters were sent to concerned government agencies seeking support and permission for the conduct of this study. The data were collected through personal interviews of the respondents using a structured survey questionnaire, which was translated from English into Myanmar Language. Pretesting of the questionnaire was conducted before the actual conduct of the survey. Six villages from three townships were considered for this study. There were 21 women farmers from each village that served as respondents in this study; hence, the total number of respondents was 126.

Key informant interviews (KIIs) and a focus group discussion (FGD) were also conducted. The key informants were from the extension services, a women's organization and from the academe. The key informants were chosen to talk about three key topics: 1) agriculture and extension services of the study region, 2) academic institution of agricultural extension services, and 3) women in agriculture.

An FGD was conducted on December 25, 2018 to collect data through a semi-structured group interview process. The group comprised of six women leaders of organizations in the research sites. Data collection activities were conducted from November to December 2018.

Data Analysis

The data were encoded using SPSS version 25.0 software. Descriptive and inferential statistics were employed in analyzing the data. The data obtained from the open-ended questions and FGD were categorized. Descriptive analysis was included in the presentation and discussion of the frequency and percentage. The mean and range of the data were determined. Non-parametric Spearman's rank correlation coefficient or Spearman's Rho was used to determine the relationship between the independent variable (extension services) and the dependent variables (food availability, food accessibility, food utilization, and food stability).

RESULTS AND DISCUSSION

Socio-demographic Profile of the Respondents

Age. Age of the respondents ranged from 23 to 65 years. The mean age is 45, and a third of the respondents were around 41-50 years of age (Table 1). According to Landicho (2016), farmers aged 41-50 years are

still productive and can devote their time and energy to farm development activities. This finding indicates that most respondents are at a good age to conduct farm activities.

Civil status. Most respondents (75.40%) were married, while only 3.17% were separated (Table 1). Kao (2009) reported that women farmers are actively engaged in supporting their families. They are busy doing domestic chores and taking care of their children's welfare. They also have no access to information. Thus, it is important and urgent to help women farmers overcome their learning barriers.

Table 1
Socio-demographic profile of respondents

Variables	Frequency (n=126)	Percentage
Age		
30 and below	9	7.14
31– 40	37	29.37
41– 50	39	30.95
51– 60	31	24.60
61 and above	10	7.94
Range	23 – 65	
Mean	45	
St. Dev.	10	
Civil Status		
Single	19	15.08
Married	95	75.40
Widower	8	6.35
Separated	4	3.17
Educational Attainment		
No Education	8	6.35
Primary School	58	46.03
Middle School	33	26.19
High School	15	11.90
College/University	7	5.56
No Response	5	3.97
Household Size		
Small (1 – 5 members)	77	61.11
Large (6 – 12 members)	49	38.89
Range	2 – 12	
Mean	4	
St. Dev.	2	

Educational attainment. About 46.03% of the respondents had attended primary school education, while 6.35% had not attended formal schooling (Table 1). The findings indicated that half of the respondents had low education, and, by extension, literacy. Chanthavong (2012) reported that women are poorly educated in most of Asian countries because boys' schooling is customarily preferred since girls are trained to assist the mother in household chores and help earn income. Myanmar Census (2014) reported that 14.4% of females never attended schools and adult literacy rate is for females is 86.9%, lower than that of males at 92.6%. The same report also stated reported the low educational attainment of women where 18.8% of those aged 25 and above never attend schools, and 25.3% had incomplete primary education.

Household size. About 61.11% of the households have small household size (1-5 members), while the rest (38.89%) have large household size (6-12 members). The average household size is 4 (Table 1). According to the 2014 Myanmar Population and Housing Census Thematic Report on Housing Conditions and Household Amenities, the average Myanmar national household size is 4.4 (Department of Population, 2015). Therefore, most of the respondents fall within Myanmar's average national household size.

Income. Vicol and Pritchard (2019) refers to the Ayeyarwady Delta as a place of contradiction given that it is a rice bowl of Myanmar but that approximately 32% of the population live below the poverty line, higher than the 26% data nationwide. Farm income remains the dominant source of income while off farm income is often also farm related such as those working as farm workers in other fields while non-farm income refers to running a small stall of various goods or engaging as casual laborers doing odd jobs (Table 2). This finding is consistent with that of the report prepared by Prior (2018) where farmers derive income mostly from farm and off farm income.

Table 2
Perceived total annual gross income of the respondents (in USD)

Source of Income	Mean	Median	Mode	Std. Dev.	Range	
					Min	Max
Farm income	4,756	3,051	2,101	5,444	23	43,424
Off-farm income	842	630	5	940	2	3,502
Non-farm income	1,873	420	70	5,501	1	28,016
Total income	7,471				2	43,424

Note. USD 1 = MMK 1427.77

The total gross income of USD 7,451 for a family of four is higher compared to the per capita monthly income of farmers in the Ayeyarwady region at MMK 57,665 or MMK 691,980 per annum as reported by the Central Statistical Organization (CSO), UNDP and WB (2020). The main limitation in the reported figure is that it mainly recorded the total sales and the wages received from various sources. FAO (2016) reports that income can greatly vary as a result of monsoon rains which can delay planting season to several months because of inundation and thus, negatively impact on farm income.

Agricultural Extension Services

Rivera and Qamar (2003) long posited that agricultural extension plays a significant role in achieving food security among farmers. In a recent review of literature study of Raidimi and Kabiti (2019), the authors concluded that agricultural extension services can improve food security among farmers. This portion of the study looks into the access to individual and group extension services as well as membership to organizations which are considered important sources of information and knowledge for small holder farmers who have lower educational attainment.

Table 3 shows that 96.83% of the respondents obtain extension support from extension workers while the remaining percentage miss out on this aspect because their homes are not easy to visit. This figure shows improvement in agricultural extension since the study of Oo and Ando (2012) which noted the inadequacy of extension workers in relation to the number of farmers that needed to be visited. In fact, 43.44% of those visited by extension workers were able to get advice twice a month.

Meanwhile, most of the respondents received advice regarding pest management, what crops to be planted, nutrition management and timing of planting different crops. More than half of the respondents were highly satisfied with the advice that they received (Table 4).

Table 5 shows the respondents' participation in training programs given by the various extension agencies. A little more than half (51.59%) of the respondents reported having attended extension training, while 48.41% of respondents were not able to do so they either did not receive information regarding the training (62.30%), had no time to attend to training programs (29.51%), while the rest said that it is inconvenient for them to do so because their residence is very far from the training site. In terms of access to extension services and vocational training, women-headed households had limited access to extension services and vocational

training as compared to men-headed households. More men-headed households received training programs than women-headed households in Ayeyarwady region (USAID, 2013).

Unsurprisingly, all of those who were able to attend training programs attended rice production techniques, majority of which were provided by the government, particularly the Ministry of Agriculture (36.36%) followed by Saemul Undong (23.38%) (Table 6). Moreover, the

Table 3
Access to individual extension method

Variables	Frequency	Percentage
Visited by extension workers (n = 126)		
Yes	122	96.83
No	4	3.17
Times visited by extension workers (n = 122)		
Once a month	21	17.21
Twice a month	53	43.44
Thrice a month	13	10.66
Once in 2 – 3 months	2	1.64
1 – 6 times a year	20	16.39
Others	9	7.38
No response	4	3.28

Table 4
Advice received from extension worker

Variables	Respondents who were given advice (n=126)		Slightly Satisfied		Moderately Satisfied		Highly Satisfied		No Response	
	F	%	F	%	F	%	F	%	F	%
Suitable crops	98	78.78	5	5.10	23	23.47	62	63.27	8	8.16
Time to grow	81	64.29	2	2.47	14	17.28	49	60.49	16	19.75
Soil preparation	76	60.32	2	2.63	13	17.11	51	67.11	10	13.16
Nutrition management	93	73.81	2	2.15	13	13.98	61	65.59	17	18.28
Pest management	104	82.54	3	2.88	22	21.15	64	61.54	15	14.42
Water management	61	48.41	2	3.28	12	19.67	42	68.85	5	8.20
Harvesting	65	51.59	2	3.10	12	18.46	45	69.23	6	9.23
Postharvest management	52	41.27	1	1.92	5	9.62	42	80.77	4	7.69
Marketing	46	36.51	2	4.35	10	21.74	28	60.87	6	13.04

Note. Multiple response

Table 5
Attendance to group extension training

Variables	Frequency	Percentage
Attendance in a training or demonstration (n=126)		
Yes	65	51.59
No	61	48.41
Reasons for not attending (n=61)		
Not aware	38	62.30
No time	18	29.51
Living very far from residence	5	8.20

private sector has extended training on rice price production. This is expected given that Ayeyarwady region is known as the rice bowl of the area. Other topics included vegetable production and livestock raising (Table 6).

Table 6
Attendance to training, type of training and training providers

Variables	Rice Production (n=77)		Vegetable Production (n=7)		Livestock (n=9)	
	F	%	F	%	F	%
Government Organizations						
Ministry of Agriculture	28	36.36	3	42.86	4	44.44
Saemaul Undong	18	23.38	1	14.29	1	11.11
Cooperative Department	1	1.30	-	-	3	33.33
Non-government Organizations	3	3.90	2	28.57	-	-
Private Sector	19	24.68	-	-	1	11.11
No Response	8	10.39	1	14.29	-	-

Note. Multiple response

These findings are not surprising since according to Aye (2015), the government is the main extension supporter. Aye further explained that the Ministry of Agriculture, Irrigation and Livestock (MOALI) which serves as its agricultural extension department is primarily tasked to provide farmers with Farmers Field Schools (FFS) and Training and Visit (TV) System. These programs are oriented towards achieving higher

production yields by educating big scale groups and producing crops with block-wise production. The private sector also provided training programs in relation to the products that they sell while NGOs participation in providing training is negligible.

LIFT (2015) also reported that the government, private sector and non-profit organizations provide information on livelihoods and food security for the rural population including Ayeyarwady division via extension information channels.

Table 7 shows that social organizations have the most respondents followed by farmer's organizations, with 37 and 30, respectively. Very few are members of women and religious organizations. Based on interviews with extension workers, some organizations, such as Saemul Undong, poured credit and farm inputs through the organizations. As such, one way to improve knowledge and access of extension services and inputs is through membership in organizations.

Table 7
Membership in different types of organizations

Market Support	Type of Organizations									
	Farmer's (n=30)		Women's (n=3)		Religious (n=1)		Social (n=37)		Others ^a (n=11)	
	F	%	F	%	F	%	F	%	F	%
Membership Status										
Active	30	100	3	100	1	100	35	94.59	3	27.27
Inactive	-	-	-	-	-	-	1	2.70	4	36.36
No response	-	-	-	-	-	-	1	2.70	4	36.36
Position in the Organization										
Member	30	100	3	100	1	100	34	91.89	6	54.55
Officer	-	-	-	-	-	-	1	2.70	-	-
No response	-	-	-	-	-	-	2	5.41	5	45.45

Note. ^a Others include Pyae Mahar, cooperative department, and company; multiple responses

Food Security of the Respondents

Food security exists when “all people at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 2003). To measure the food security status of households, the four components of food security, availability, access, utilization and stability served as the guide in gathering the data.

Food availability. It is measured by the presence of food inside the household (Boles et al., 2014). This study found that most respondents keep only 1 to 2 kinds of food, which could either be fruits (58.73%), vegetables (50%), or meats (90.48%). Based on the data, the respondents have an abundant food supply of different kinds of vegetables (46.03%) while they only have 1 to 2 kinds of dairy products (Table 8).

Table 8
Food availability of the respondents (n=126)

Variety	1 to 2		3 or More		None	
	F	%	F	%	F	%
Fruits	74	58.73	14	11.11	38	30.16
Vegetables	63	50.00	58	46.03	5	3.97
Frozen vegetables	6	4.76	1	0.79	119	94.44
Legumes	60	47.62	1	0.79	65	51.59
Dairy products	16	12.70	-	-	110	87.30
Meat products	114	90.48	12	9.52	-	-
Rice	51	40.48	3	2.38	72	57.14

As the respondents are rural dwellers, most of them do not have refrigerators and they do not keep frozen vegetables (94%). This finding bears similarity with the report of Gearhart (2013) stating that households in Myanmar keep only one to two kinds of food in every food item such as fruits, vegetables, legumes, dairy products, meat, and cereal.

Food access. The Household Dietary Diversity Indicator Guide of the United States Agency for International Development (USAID) was used as a tool to determine whether farmers had access to various food products. Under the guideline endorsed by USAID in 2006, the respondents' food attitudes and behaviors were collected using the previous 24 hours as a reference period (24-hour recall). The food access data of respondents were collected based on the 12 main food items in the food box during the 24-hour period. The average food consumption of the respondents is six, within the range of 2 to 12. The individual results based on the 12 main food items were divided by the number of total respondents (126) and then multiplied by 100. First, the household Dietary diversity score (HDDS) variable was calculated for each household. The value of this variable ranged from 0 to 12.

HDDS (0-12) Total number of food groups consumed by members of the household. Values for A through L will be either “0” or “1”.
Sum (A + B + C + D + E + F + G + H + I + J + K + L)

Second, the average HDDS indicator was calculated for the sample population using the following:

Average HDDS (%) = $\frac{\text{Number of households with B, D, or F} = 1 + 2 + 3}{\text{Total number of households}} \times 100$

All respondents are rice consumers. This is not surprising as rice is the staple in Myanmar. It is followed by vegetables at 90.48% (Table 9). RoUM in the Myanmar Census of Agriculture in 2010 stated that the top food item of Myanmar households is cereal and the second is vegetables (FAO, 2013).

Table 9
Food access of households

Food items	Frequency (n=126)	Percentage
Rice	126	100
Vegetables	114	90.48
Fish and seafood	81	64.29
Fruits	73	57.94
Meat, poultry, offal	54	42.86
Miscellaneous	47	37.30
Root and tubers	40	31.75
Eggs	39	30.95
Sugar/honey	34	26.98
Pulses/legumes/nuts	27	21.43
Oil/fats	24	19.05
Milk and milk products	9	7.14
Average HDDS		6
Minimum HDDS		2
Maximum HDDS		12

Note. Multiple response

This research found that the minimum household dietary diversity (HDDS) score was 2 and the maximum HDDS was 12, while the average HDDS was 6. FAO (2016) also reported that Ayeyarwady experienced inadequate diet during the mission and coping mechanisms included borrowing food or eating less or eating only rice.

This means the respondents, on average, ate six kinds of 6 food items while they had the minimum 2 food items and the maximum food items 12 for 24 hours. According to Walker and Fisher (1997), a person should eat 20-30 different types of food items every day and the dietary adequacy levels are described based on food variety consumption: >30 food items is very good; 25-29 food items is good; 20-24 food items is fair; < 20 food items is poor; and <10 food items is very poor. Hence, it could be said that the respondents had poor dietary adequacy level and their average food access was also extremely low. Interestingly, while meat product is available in their pantry, food eaten by most respondents is rice and vegetables.

Food utilization. Total food utilization results show that the respondents mostly boiled their food before eating such as rice (84.02%), fish (85.41%), and pork (100%), among others. They also fry vegetables such as water spinach (58.16%) and cauliflower (92.41) while they eat lettuce (91.34%) and banana (100%) raw for salads and as fruit, respectively. (Table 10).

Table 10
Utilization of food

Variety	Method of Preparation					
	Boiled		Fried		Raw	
	F	%	F	%	F	%
Starch						
Rice	87	84.02	-	-	-	-
Seafood						
Fish	67	85.41	-	-	-	-
Meat						
Pork	27	100	-	-	-	-
Eggs	20	50.23	-	-	-	-
Vegetables						
Roselle	19	49.16	-	-	-	-
Water Spinach	-	-	19	58.16	-	-
Tomato	13	68.07	-	-	-	-
Salad						
Cauliflower	-	-	12	92.41	-	-
Lettuce	-	-	-	-	10	91.34
Fruit						
Banana	-	-	-	-	52	100

Food Stability

The questionnaire used was adapted from USDA Household Dietary Diversity and Household Hunger Scales to represent household food stability (Bickel et al., 2000). The HHS was developed in 2006 to measure hunger in developing countries (Ballard, et al 2011) while the HDD reflects dietary of food eaten in the past 24 hours (Swinsdale & Belinsky, 2006) and has since been used in different developing countries. In this case, the HHS score was calculated using the formula below:

$$\text{HHS} = \frac{\text{Survey-weighted sample of households with household hunger score} > 1}{\text{Survey-weighted sample of households in the FFP project implementation area}} \times 100$$

- HHS categories
- a) little to no hunger in the household (0-1)
 - b) moderate hunger in the household (2-3)
 - c) severe hunger in the household (4-6)

According to the results, 99% of the respondents experienced hunger, ranging from moderate to severe states.

Table 11
Household hunger scale (HHS) of the respondents

Statement	Frequency (n=126)	Percentage
1	2	1.59
2	106	84.12
3	18	14.29

This finding is similar to Deitchler et al. (2011) who reported that the moderate household hunger scale is higher than other household hunger scales. Minn and Oo (2017) reported that poor diet quality has contributed to high levels of stunting and malnutrition along with high levels of anemia, iodine, and vitamin A deficiency observed among Myanmar population, and, specifically, among children in the Ayeyarwady region.

Association between Income and Food Security

Income is considered a positive factor in improving food security (Table 12). Results of this study show that non-farm income is the only source of income which is positively associated with only one dimension of food security – and that is food accessibility. Non-farm income engaged in were mostly retail selling or engaging in contract labor, and as such could explain the positive correlation with food accessibility. Increasing non-farm income positively effects food accessibility and thus, may be a good investment for agricultural extension services. Non-farm income could improve food security and can be useful in terms of shocks such as unexpected crop failure. This finding agrees with the reports of Chang and Mishra (2008) and Qureshi et al. (2015), that says increasing non-farm income could enable greater investments in agriculture leading to higher income. Consequently, non-farm income could improve food security even through inter-temporal food consumption smoothing or by ameliorating food shortage risks in case of unexpected crop failures.

Table 12
Association between income and food security

Income	FAV	FAC	FU	FS
Farming income	-0.137 ^{ns}	-0.244 ^{**}	-0.176 [*]	-0.278 ^{**}
	0.063	0.003	0.024	0.001
Off-farm income	0.018 ^{ns}	0.089 ^{ns}	0.072 ^{ns}	-0.095 ^{ns}
	0.420	0.160	0.212	0.144
Non-farm income	0.002 ^{ns}	0.143 [*]	0.139 ^{ns}	0.057 ^{ns}
	0.492	0.055	0.060	0.262

Note. * Significant at P<0.05
 ** Highly significant at P<0.01
 ns - No significant correlation

Legend. FAV - Food availability
 FAC - Food accessibility
 FU - Food utilization
 FS - Food stability

Visitation and the conduct of training programs are key strategies to improve knowledge and skills in production in rural population with low literacy levels. However, it is interesting to note whether investments in extension through the conduct of visitation and training program actually reduce food insecurity. It is also interesting to note which intervention would have the greatest benefit to food insecure households. Results show that between farm visits and attendance to training, investments in the latter have better potential for improving the food security situation of farmers (Table 13). Of all the training programs, vegetable production training is consistently significant with all dimensions of food security posted highly significant association with FAC, FU and FS. Increasing investments in vegetable production training programs is therefore a good plan for any extension organization.

Investments in livestock production is likewise a good investment given its highly significant and significant correlation with FU, FS and FAC respectively. Rice production training is also a good investment given its highly significant correlation with FS and significant correlation with FAC and FU.

Table 13

Association between extension services and food security dimensions

Extension Services	FAV	FAC	FU	FS
Visited by extension workers	0.068 ^{ns} 0.226	-0.029 ^{ns} 0.371	0.070 ^{ns} 0.217	-0.039 ^{ns} 0.330
Number of rice production training	0.137 ^{ns} 0.063	0.188* 0.018	0.165* 0.032	0.224** 0.006
Number of vegetable production training	0.148* 0.049	0.221** 0.006	0.275** 0.001	0.309** 0.000
Number of livestock training	0.079 ^{ns} 0.191	0.204* 0.011	0.210** 0.009	0.519** 0.000

Note. * Significant at $P < 0.05$
 ** Highly significant at $P < 0.01$
 ns - No significant correlation
 (This means that $P > 0.05$.
 These were not included)

Legend. FAV - Food availability
 FAC - Food accessibility
 FU - Food utilization
 FS - Food stability

Overall, the respondents can improve their knowledge related to food security and they can ensure food safety in their respective households by attending the training programs. This finding agrees with the report of the Salesian Missions (2014), which found that agriculture training programs educate farmers about modern techniques in agriculture and livestock farming to improve food security and increase income potential.

Association between Organizational Membership and Food Security

Membership in farm organization is highly significant with FAC and FS and significant with FAV and FU while membership in social organization is highly significant with FAV. As only 29% of the farmers are members of organizations, it is important that extension workers encourage farmers to become members of farm organizations.

Table 14

Correlation between organizational membership and food security

Extension Services	FAV	FAC	FU	FS
Farm organization	0.203*	0.241**	0.182*	0.403**
	0.011	0.003	0.021	0.000
Social organization	0.341**	0.024 ^{ns}	0.024 ^{ns}	-0.087 ^{ns}
	0.000	0.397	0.397	0.166
Women organization	-0.141 ^{ns}	-0.127 ^{ns}	-0.127 ^{ns}	-0.068 ^{ns}
	0.058	0.078	0.078	0.224
Religious organization	-0.98 ^{ns}	-0.92 ^{ns}	-0.92 ^{ns}	0.120 ^{ns}
	0.138	0.153	0.153	0.090

Note. * Significant at P<0.05

** Highly significant at P<0.01

ns - No significant correlation

Legend. FAV - Food availability

FAC - Food accessibility

FU - Food utilization

FS - Food stability

CONCLUSION AND RECOMMENDATIONS

The respondents have a mean age of 45 years old, attended primary school, married and with an average household size of 4. Almost all respondents had access to farm visitation by extension workers but only some farmers had access to the training programs, mostly in rice production. Women remain to have poor access to extension services in this study region. Access to resources such as training programs and membership in farmer organizations remain weak.

Respondents suffer from food insecurity, with almost all experiencing moderate to severe hunger in a day. Food diversity is below the desired adequacy level, with most respondents eating two kinds of food groups only: rice and vegetables. Food security can be improved by investing in vegetable training programs, diversifying non-farm income and strengthening farmer organizations to encourage women to become part of these organizations.

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