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FACTORS AFFECTING WOMEN FARMERS' PARTICIPATION IN AGRICULTURAL EXTENSION SERVICES FOR IMPROVING THE PRODUCTION IN RURAL DISTRICT OF DENDI WEST SHOA ZONE, ETHIOPIA

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ABSTRACT

This study investigated the factors affecting women farmers agricultural extension services consisting of production related information in improving the production capacity of farmers in Dendi district. Required data were collected from three kebele's of Dendi district from 120 randomly selected households (60 participants and 60 non-participants female headed), 10 in-depth interviews with key informants and eight focus group discussions. The data were entered in SPSS software and organized in tables and figures and further described and analyzed following descriptive statistics, bivariate correlation, and multiple linear regression analysis procedure chi-square test, independent sample t-test and one-way analysis of variance (ANOVA). The result of the regression model revealed that marital status, age of farmers access to market, access to credit and contacts with agricultural extension agent's increases women's' participation to agricultural extension service, Age, educational level, family member less than 64 years old, use of improved seed, and knowledge and attitude on agricultural extension Service (AEAS) for income were found significantly influencing the index of all respondents' and male headed farmers' diet diversification function. On the other hand, farming experience was found significantly influencing the index of female headed farmers' participation on rural women's to agricultural extension service. Therefore, it was recommended that women in agricultural extension service programmes be sustained and encouraged by Dendi woreda agricultural office.

KEYWORDS: Extension Service, Binary Logit, Constraints, Policy Makers

INTRODUCTION

A good number of studies (e.g. Adekanye, 2009) have revealed that; three out of four poor people in the developing world live in rural areas, and most of these people depend directly or indirectly on agriculture as their main source of livelihoods. It was also voiced that in the twenty-first century, agriculture remained a fundamental tool for lifting the rural people out of poverty.

Many agricultural development programmes are on ground with the aim of increasing food production and improving the standards of living in Nigeria. Although women farmers are actively involved in the process of food production, processing and marketing, social and economic constraints have placed barriers around their access to scientific and technological information (Daman, 1997). Thus, the women folk involved in agriculture are not adequately equipped with the requisite technical knowledge to enable them make the best use of farm inputs for more optimum yield.

Many women however do not participate fully in agricultural programmes due to ignorance, low income (Adekanya, 1988; Inter-America Development Bank., 2000), inaccessibility to credit facilities and poor communication (Nonyelu, 1996; FAO., 2006) etc.

The role played by women in agriculture extension activities and the rural society is fundamental to agricultural and rural development in Africa. Agriculture is, therefore, important to the national economy as a source of employment in Africa. According to FAO (1998) about 73% of the rural population in Africa consists of small farmers. Women comprise almost 50% of the agricultural labor force in Eastern Asia and sub-Saharan Africa and 20% in Latin America. In sub-Saharan Africa, Agriculture accounts for approximately 21% of the labor used to produce food both for household consumption and for sale. According to the studies of(Chukwu and Ifenkwe,1996) based on formal existing statistics, women contribute about 31% of agriculture active workforce in developing countries informal and local statistics were used to estimate the number of working women at agriculture more than formal statistics. For instance, in Egypt based on formal statistic, the act of rural women was reported to be about 36%, while local statistic indicates between 35 and 50%; In Congo based on formal statistics, women's share account for 60% of the workforce in agriculture, whereas informal statistics reported it as 80%. This statistical difference exists in most developing countries.

In connection with agricultural extension services, Chukwu (2014) stated that, "The agricultural extension services have been largely designed, crafted and implemented with the male head of the household as the intended client, and failed to recognize that women are active, productive engaged economic agents with their own financial needs and constraints". Even though millions of women throughout the world contribute to national agricultural output and family food security, detailed studies from Latin America, South Asia, and Sub-Saharan Africa consistently indicate that rural women are more liable constraints in accessing agricultural extension services than men of equivalent socio-economic conditions (Chukwu, 2014). Thus, Women tend to have less contact with extension services than men and generally use lower levels of technology because of problems of access, cultural restrictions on use or lesser interest in doing research on women's crops and livestock (World Bank, 2003).

Such bias in the provision of assets and services in favor of men has institutional and cultural underpinnings. Much has been written about the past failures of government extension services to reach women farmers and the cultural bias which has, in many countries, prevented women from active participation in group training, extension meetings and, most importantly, access to inputs such as fertilizer and credit. Equally important is the fact that the agencies for these services have been predominantly dominated by men – according to the FAO only 15% of extension workers were women (FAO, 2006). In the late 1980s only 13 per cent of agricultural field agents in the developing world were women and in Africa the figure was only 7 per cent. Even in rural areas where women constituted a larger share of agricultural producers, almost all extension agents were male (IADB, 2000). These male extension workers often tend to direct their services to male farmers or heads of households, excluding women members of male-headed households (World Bank, 2003).

The role of women in agricultural development has been very well recognized in the last couple of decades by international development agencies, national governments and researchers (FAO, 2006). The same document further indicated that while the contributions of both female and male farmers were substantial and essential to agricultural development; the gender division of agricultural activities has constrained women's access to extension services and hence the achievement of agricultural development goals has been deteriorated because agricultural extension services in

developing countries is predominantly focusing to male farmers only.

Effective agricultural extension services were appear important issue in Ethiopia, where agriculture supports 85% of employment, 50% of exports, and 50% of gross domestic product (GDP) (IFPRI, 2010). This is because agricultural extension services were proved to be one of the most important effective means to reach farming households in the rural areas (Adekunle, 2013). The role played by both women and men in rural agricultural development program via extension service should equally be competitive and complementary. However, in Ethiopia there is a wide gender gap in terms of access to assets (i.e. land, livestock, credit, and inputs) (World Bank et al., 2008). Furthermore, programmes and projects that do not pay due attention to gender in their activities, often widens existing inequalities between men and women. Particularly in Ethiopia, while one can observe that in most parts of the rural area, women is intimately involved in most aspects of agricultural production and household nutrition, it is widely viewed that "women do not farm" (EEA and EEPRI, 2006). We noted that agricultural extension programs that ignore women's farming roles in agriculture, affect agricultural production negatively and corresponding failure to achieve development objectives (FAO, 2006).

Moreover, the key role played by women in agriculture in the past did not seem to be acknowledged in government statistics and decision-making (Asawalam, 2001). This situation has started to change over the last two or three decades and much has been achieved in giving recognition to the importance of women in the agricultural sector in many parts of the developing world including Ethiopia. So far, no study has been conducted in the study area on women farmers' participation in agricultural extension services for improved household income.

The aforementioned moments were also more challenging the Ethiopian women farmers. They have constraints including lack of land for farming, limited access in communication between men and women control of agricultural products, credit facilities, skill training, education, extension services and information, their contribution is not appreciated. In this sense, women are negatively influenced by traditional pattern and economic policies. Although in most of the regions, women are responsible for most of the food production and work on both family farms and as wage laborers, most of them do not have legal control over the land resource. Most of women's work lies in the margin of major development efforts and programs. Hitherto without the complementarities of women's attempt, such efforts and programs would barely work even though men own such assets and inputs as land, credit, seeds, livestock technology and infrastructure (Tesfaye, 2015). This study was therefore aimed at determining the level of women farmers' participation in agricultural extension service, identifying their constraints and improving their participation thereby enhancing agricultural productivity in Dendi district. In order to address this objective, household survey, focus group discussion, and in-depth interview were administered.

OBJECTIVE OF THE STUDY

- To analyze women farmers' participation in agricultural extension service in the study area.
- Determine the level of participation of women farmers in agricultural extension service in the study area.
- Identify the challenges faced by the participants and non-participants in agriculture extension activities programme in the study area.

MATERIALS AND METHODS

The study was conducted in Oromia Regional State, West Shoa zone Dendi Woreda which was purposively selected because, there were problems related to women participation and pilot study was conducted in the study area to check the existence of rural women's participation towards agricultural extension service. Multistage sampling had been used for this study.

At the first stage, from the total 10 Kebele Association of the Woreda, only three Kebele Associations with the highest number of rural heads were selected purposively to study the factors affecting rural women's accessing the agricultural extension service. Accordingly Galessa, Faji Galila and Burka were selected. There were 697 women's households present in the sampled Kebele Associations. Secondly, stratified sampling was employed to select respondents from among participant and non-participant with equal sample size of 60 households from each stratum. Finally, systematic random sampling techniques were employed to ratify. Ratio sampling was used to fix the number of sample respondents selected from each Kebele Associations.

DATA COLLECTION METHODS/TECHNIQUES

In this study, data collection methods were done through interviews, questionnaires and documentary sources. Two sets of data were employed for the empirical analyses, primary and secondary data.

The primary data were collected through field questionnaire administration and interview while the secondary data were obtained from Dendi woreda agricultural office documents.

Interview

This technique was used to gather information from the Dendi woreda agricultural office, three experts and rural women's, two administration officers, two agriculture officers, two women affairs officer, two micro-finance officer, eight extension workers (two each from each Kebele's).

Questionnaires

Sets of questionnaires were administered to interview 120 women's from participant and non-participant. Information collected through questionnaire included: women's characteristics such as age, sex, marital status, level of education, household size, farming experience, loan utilization and implementation of the project as well as information on income sources for extension service utilization.

Sampling Techniques

The target population was rural women's', the sample sizes were 120 rural women which were drawn from 697 women from four different Kebele Associations. One of the motives of the survey was to study variation in the patterns of agricultural. To this end three kabeles Association were selected based on the above stated variations and to make the study manageable, sample rural women were taken from each rural district using simple stratified random sampling techniques (Table1).

Table 1: Distribution of Sampled and KAs rural Women

Respondent Category	Rural kebeles'							
	Faji Galila		Galessa		Burka Dimtu		Total	
	N	n	N	n	N	n	N	n
Participatory	145	24	165	25	70	11	380	60
Non-participatory	62	12	205	38	50	10	317	60

N: Total population n: sample sizes

METHODS OF DATA ANALYSIS

The primary data have been analyzed and presented by using both descriptive and inferential statistical techniques. The descriptive techniques include percentage, frequency, mean, while the inferential statistical techniques used were Chi- Square and t-test. The Chi-Square and t-test were employed to see the association or homogeneity between the agro ecological zones with reference to responses regarding agricultural extension activities and coping strategies used by rural women farmers during famine (scarcity of food) and its impacts

RESULTS AND DISCUSSIONS

Age of Respondents

It is evident from Table 2 that majority of the participant and non-participant women belonged to 31-40 years age category (50.00% and 41.66% respectively). The percentage of respondents in the old age category was 51-60 years was very low for both participant and non-participant groups (10.00% and 13.33% respectively). This finding reveals that majority of the respondents were middle aged and belonged to 31-40 years. They conclude that with age people loose energy to get involved. But participant percent is low in greater than 30 age group as compared to non-participant and with age, participant percent increases(50>41.66 for 31-40,25>16.67 for 41-50).So with age more people are involved in agricultural extension services. Statistically there was a significant mean difference (t=2.662) at less than 5% probability level. This result is in agreement with the findings of conducted by Ranjan (2004).

Table 2: Age of Respondents'

Variables	Participant		Non-participant		t-Test
Age/Years	**Number**	**Percentage**	**Number**	**Percentage**	
<30	9	15	17	28.33	
31-40	30	50	25	41.66	
41-50	15	25	10	16.67	
51-60	6	10	8	13.33	2.662
Mean	**42.00**		**38.0**		

Source: Own Computation, 2015

Marital Status

It was found that majority of the participant and non-participant respondents were married 72.20% and 65.00% respectively. The distribution of participant and non-participant respondents was also more or less same in other categories. The difference was not statistically significant. The study implies that being married or not was not related to access of rural women's' to Agricultural extension service. It is expected that single households was contributing to production the least while married households are contributing the highest(Table 3).

Table 3: Marital Status

Variables	Participant		Non-participant		Total	
	No	Percent	No	Percent	No	Percent
Single	3	5.0	6	10.0	9	7.5
Married	43	72.2	39	65.0	82	68.33
Divorced	8	12.8	5	8.33	13	10.8
Widowed	6	10	10	16.66	16	13.3
Mean	**8.5**		**7.8**		**6.77**	

Source: Own computation, 2015

Level of Education

It is obvious from Table 4 that majority of the participant and non-participant respondents were illiterate (70.00% and 78.33% respectively). The study area was therefore, dominated by illiterate women farmers with a mean educational level of 8 years. Statistically there was no significant mean difference between participant and non-participant groups on the level of education. It is expected that if majority of the respondents were educated then the adoption of modern communication techniques becomes easier. Level of education is a discrete variable measured in years of formal schooling. It is expected that education plays an important role in promoting farmers involvement and utilization of agricultural extension services. The differences in the distribution of educational level between female participants and non-participants is statistically significant ($_{X}^{2}$ =7.38; P < 0.01).

Nonetheless, education is one of the important variables, which increases farmer's ability to acquire, process and use agricultural related practices. Low level of education and high illiteracy rate is typical in developing countries like Ethiopia, (IFPRI, 2000) while a higher level of education of farmers is assumed to increase the ability to use agriculture related practices in a better way. The low level of literacy among female headed households may negatively influence their participation in and utilization of agricultural extension service that may improve agricultural production and nutrition than male headed households with relatively higher literacy rate. This is also in agreement with a research conducted by Adekunle (2013).

Table 4: Education Level

Variables	Participant		Non -Participant		$_{X}^{2}$ value
Level of Education	**Number**	**Percentage**	**Number**	**Percentage**	
Illiterate	42	70.0	47	78.33	
Literate	18	30.0	13	21.67	**7.38**
Mean	**8.0**		**7.5**		

Source: Own computation, 2015

Household Size

It was found that majority of the participants (53.33%) had more than 7-10 family members whereas majority of the non-participants (53.33%) had 4-6 family members.. However the-average family size of women respondents were six persons. This suggests that there is a lot pressure on the women for the upkeep of the households, which probably leads to more work on the farm(Table 5). Statistically there was no-significant difference between participants and non-participants on the household size. This result is inconsistent with the research conducted by Huria (2014).

Table 5: Distribution of Respondents According to Household Size

Variables	Participant		Non -Participant	
Household sizes	Frequency	Percentage	Frequency	Percentage
1-3	4	6.67	6	10
4-6	24	40.0	32	53.33
7-10	32	53.33	22	36.67
Mean	7.5		7.4	

Source: Own computation, 2015

Farm Sizes

It is clear from Table 6 that majority of the participants (61.67%) had 1-3 ha of cultivable land whereas 80.00 per cent of the non-participants had less than 1 ha of land. The average farm sizes of the respondents were 1.4ha and 0.9ha for non-participants and participants respectively. Statistically there was a significant mean difference (t=3.772) at less than 1% probability level with regard to farm size between participants and non-participants. This result is in agreement with the findings of Chukwu and Chinaka (2001).

Table 6: Farm Size (Hectare)

Variables	Participant		Non -Participant		T-test
Farm sizes/ha	Frequency	Percentage	Frequency	Percentage	
<1	18	30.0	48	80.0	
1-3	37	61.67	8	13.33	
>3	5	8.33	4	6.67	3.772
Mean	1.4		0.98		

Source: Own computation, 2015

Farming Systems

The result of the Table 7 indicated that, majority of the respondents, 56.7percent of participants and 66.67 percent of non-participants practiced sole cropping while only 10.0% of participants and 13.33 percent of non-participants were practiced mixed cropping. It is concluded from the results that the dominant farming systems were sole cropping. Statistically there was a significant mean difference (t=4.662) at less than 10% probability level. This result does agree with the findings of Ekong (2003). However, it is inconsistent with the finding of Auta, S.J (2004).

Table 7: Farming Systems

Variables	Participant		Non -Participant		t-test
Farming systems	Frequency	Percentage	Frequency	Percentage	
Sole cropping	34	56.70	40	66.67	
Mixed farming	20	33.30	12	20.0	
Mixed Cropping	6	10.0	8	13.33	4.662
Mean	1.86		1.54		

Source: Own computation, 2015

Farming Experience

The result of the Table 8 showed that, 26.67 per cent of the participants had 10-20 years of farming experience followed by 16.66 per cent with 21-30 years. Only 33.30 per cent of the participants had more than 30 years of farming experience. Among the non-participants, 38.33 per cent had 10-20 years of farming experience followed by 28.33 per cent with less than 10 years of farming experience. Statistically there was a significant mean difference (t=2.672) at less than

10% probability level. This result does in agreement with the report of World Bank (2008).

Table 8: Farming Experience

Variables	Participant		Non-Participant	
Farming experience	**Frequency**	**Percentage**	**Frequency**	**Percentage**
<10	4	6.66	17	28.33
10-20	16	26.67	23	38.33
21-30	10	16.66	10	16.67
>30	20	33.30	10	16.67
Mean	10.4		8.4	

Source: Own computation, 2015

Methods of Messages Disseminated

The participation of women farmers was more in fertilizer application (35%), followed by mixed cropping (20.00%) and methods of pest control(18.34%). The participation was very less in mixed farming (6.65%), followed by poultry production (8.33%) and animal husbandry (11.67%). It indicated that the messages were among the most important challenges faced by women farmers in Dendi district (Table 9). Statistically, there was a significant (t=4.34) difference between participant and non participant on the participation of agricultural extension activities. This was in agreement with the findings of (Chukwu and Ebeniro, 2000).

Table 9: Distribution of Respondents According to Types of Messages Disseminated

Variables	Participant		Non-participant	
Mode of Dissemination	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Methods of fertilizer application	21	35.0	18	30.0
Methods of pest control	11	18.33	13	21.67
Message on animal husbandry	7	11.67	11	18.33
Message on poultry production	5	8.33	8	13.33
Message on mixed cropping	12	20.00	7	11.66
Message on mixed farming	4	6.67	3	5.0
Mean	**3.65**		**4.63**	

Source: Own computation, 2015

Effectiveness of the Message

It is evident from Table 10 that 41.66 percent indicated the messages were effective followed by 33.34 per cent reported as very effective. Only a few percentage of participants reported the messages were ineffective and highly ineffective(3.33% and 5.00 %) whereas the non-participant reported messages were ineffective and highly ineffective(41.66% and 11.67%).This shows that the messages were important for women farmers in Dendi district. Statistically there was significance (t= 7.23) difference between participants and non-participants on the participation of agricultural extension service based on the effectiveness. This was in agreement with the findings of (Chukwu and Ebeniro, 2000).

Table 10: Effectiveness of the Message

	Participant		Non-Participant		t-test
Variables	**Frequency**	**Percentage**	**Frequency**	**Percentage**	
Highly effective	20	33.34	5	8.33	
Effective	25	41.66	3	5.0	
Fairly	10	16.67	20	33.34	
Ineffective	2	3.33	25	41.66	7.23
Highly ineffective	3	5.0	7	11.67	

Mean	**4.7**	**2.7**	

Source: Own computation, 2015

Extension Contact

The results of the survey indicate that 52.2 percent of the respondents had extension contact, while 47.8percent did not have any contact with extension agents. Group wise, 66.7percent of the non-participant and 31.6percent of the participant reported that they had extension contact (Table 11). The Chi-square value, revealing differences (x^2-value=10.005) between the two groups, was significant at 1percent probability level.

Table 11: Extension Contact

Description	**Participant**		**Non-Participant**		x^2**-Value**
Variables	**Number**	**Percentage**	**Number**	**Percentage**	
Had extension contact	36	66.7	12	31.6	
No extension contact	18	33.3	26	68.4	10.005***
Mean	**6.4**		**2.4**		

Source: Own computation, 2015

Source of Information

Table 12 showed that Extension agent was the most important source of agricultural information for both participants (58.33.7%) and non participants (63.3%). This was followed by radio for participants (21.67%) and television for non-participants (16.67%). The source of Extension agent as the most popular source of agricultural information among the respondents was in agreement with the findings of Farinde and Soetan (1999) that reported that 100% of Oyo women possess radio and obtained their information through Extension agent. All information would be made available to them even without electricity-by making use of the cheap dry cell batteries as a source of power. The least popular source of agricultural information among the participants and non-participants was the internet for 3.5percent, and 0.6percent respectively.

Table 12: The Distribution of Respondents According to their the Source of Information in Agricultural Extension Activities

Variables	**Participant**		**Non-participant**	
Source	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Radio	13	21.67	10	16.67
Bulletin	1	1.67	2	3.33
TV	4	6.67	3	5.0
Extension agent	35	58.33	38	63.33
Poster	1	1.67	1	1.67
Friends	4	6.67	3	5.0
Exhibition	2	3.33	3	5.0
Mean	**3.68**		**3.09**	

Source: Own computation, 2015

Table 13: Summary of Continuous Variables

Variables	**Participant (60)**		**Non-participant (60)**		**Total (120)**		**T-Value**
	Mean	**Sta.dev.**	**Mean**	**Sta.dev.**	**Mean**	**Sta.dev.**	
Farming systems	1.7965	3.5902	5.696	5.900	1.8666	1.8800	.3581***
Farm size	2.18	2.15	5.19	5.26	3.95	4.5	1.539**
Age of respondents	34.5	45.4	39.6	40.6	32.56	40.56	2.339**

Farming experience	6.95	4.564	4.45	3.644	8.12	9.432	3.326***
Message type	3.44	2.45	3.56	3.446	7.45	6.76	2.434
Effectiveness of message	4.7	4.3	2.4	2.1	4.5	2.12	

Source: Own computation, 2015

***, ** represent the level of significance at 1% and 5% respectively

The correlation between socio economic characteristics of the respondents and their participation in agricultural extension activities is shown in Table 14. The result from this table shows that age, household size, farming experience had a negative correlation of -0.011, -0.035, and -0.0034 respectively but it was not significant. Educational level, household income and farm size has a positive correlation of 0.1067, 0.223 and 0.88 respectively but was not significant. The implication of that increase in educational level household income and farming experience were add to an increase in the level of participation while an increase in age, household size and farming experience will lead to a decrease in participation. Thus the null hypothesis is accepted since there is no significant relationship between socio economic characteristics of the respondents and their participation in agricultural extension service.

Table 14: Correlation between Socio-Economic Characteristics of the Respondents and Their Participation in Agricultural Extension Services

Variable	Correlation	Decision
Age	-0.01128	NS
Education	0.10679	NS
Household size	-0.03572	NS
Household income	0.22309	NS
Farming experience	-0.00342	NS
Farm size	0.08872	NS

Source: Own computation, 2015

Econometrics Result

Econometric analysis was carried out in order to identify the factors influencing Women Farmers' Participation in Agricultural Extension service. Multiple regression models were employed to estimate the effects of the hypothesized explanatory variables on Women Farmers' Participation in Agricultural Extension Service. Prior to running the logistic regression analysis both the continuous and discrete explanatory variables were checked for the existence of multicollinearity and high degree of association using variance inflation factor (VIF) and contingency coefficients. The VIF values for continuous variables were found to be very small (much less than 10) indicating the absence of multicollinearity between the independent variables. Likewise, the results of the computation of contingency coefficients revealed that there was no serious problem of association among discrete variables. For this reason, all of the explanatory variables were included in the final analysis. More specifically, six continuous and five discrete explanatory variables were used to estimate the multiple regression models. Contingency coefficient values ranges between 0 and 1 and as a result of chi-square variable with contingency coefficient below 0.75 shows weak association and value above 0.75 indicates strong association of variables. The contingency coefficient for the dummy variables included in the model was less than 0.75 that did not suggest Multicollinearity to be a series concern. The result of VIF and contingency coefficient computed from the survey data are presented on table 13 and 14 respectively (Table 15).

Table 15: Multicollinearity Test for Continuous Explanatory Variables

Regression	Collinearly statistics	
Variables	Tolerance	VIF
Age of respondents	0.922	1.317
Farming sizes	0.907	1.338
Marital Status	0.87	1.215
Household Sizes	0.959	1.264
Farm Experience	0.891	1.366
	0.966	1.256

Source: Own computation, 2015

Regression Model

Multiple Logistic regression models were used to assess the factors influencing rural Women Farmers' Participation in Agricultural Extension service. Based on the result of multicollinearity diagnostics' tests for both continuous and dummy explanatory variables, no variable was found to be highly correlated or associated with one of the other variables. The likelihood ratio test statistic exceeds the Chi-square critical value with 12 degrees of freedom. The result is significant at less than 0.01 probabilities indicating that the hypothesis that all the coefficients except the intercept are equal to zero is not reasonable. Likewise, the log likelihood value was significant at 1% level of significance. Another measure of goodness of fit used in logistic regression analysis is the count $R^{2,}$ which indicates the number of sample observations correctly predicted by the model. In other words, the i^{th} observation is grouped as a non-defaulter if the computed probability is greater than or equal to 0.5 and as a defaulter otherwise. The model results showed in table 16 that the logistic regression model correctly predicted 71.5 of 120, or 84.8 percent of the sample women farmers.

Table 16: Multicollinearity Test for Discrete Variables

Variables	EDL	AG	RPM	AW	LOC	INR
EDL	1.000	0.054	0.07	0.121	0.284	0.183
AG		0.043	0.060	0.141	0.186	0.176
RPM		1.000	0.007	0.073	0.012	0.022
AW			1.000	0.036	0.197	0.154
LOC				1.000	0.035	0.023
INR					1.000	1.00

Source: Own computation, 2015

Factors Influencing Women's Participation in Agricultural Extension Service

Multiple regression analysis of the data indicated in Table 17 that five of the variables were significantly related to level of participation of women farmers in Agricultural extension service programme. The variables were level of education, Extension contact, Access to market, marital status and Age of farmers. They significantly affect level of women participation at 1 per cent, 5 per cent and 10 percent level of significance respectively. This is plausible because older farmers would tend to stick to farming, reflecting on their occupation and would work hard to improve on their output. Any new agricultural programme that would bring this improvement, the farmer wants to be associated with it and have greater desire to participate in it.

With regards to education level, the positive coefficient (0.054) implies that as level of education increases, level of participation in Women's in agricultural extension service programme decreases which is expected. The higher the educational level of the farmer, higher the chances of getting better paying jobs or the higher the tendency to be involved in politics and less increased participation in AES programmes. In general, this study re-affirms the position of many other studies, including that of Chukwu (2014) that age and educational level are the factors affecting women participation in urban agriculture. The coefficient for marital status was positive and significant at 10 per cent level of significance

suggesting that women's marital status influence their level of participation of Women's in Agricultural extension service programmes. Most of the successful women's' participants in Agricultural extension service programme opined that they have a good understanding, support and encouragement from their husbands in terms of advice and funding. This could have stimulated such farmers to increase their level of participation in AES programmes. This study is in agreement with Sabo (2006) which showed significant relationship between marital status and participation of Women's in Agricultural extension activities programme in Dendi district.

Coefficients for household size, farming experience and farm size were however not significant with level of participation. One possible explanation with regard to household size for this relationship with level of participation might be that most of the participants now discourage the over reliance on family labour on the farm in order to enable their children have access to formal education. In the case of farming experience, it might be that most of the experienced farmers tend to invest their resources and incomes into other ventures instead of increasing their level of participation in Agricultural extension service programmes.

Table 17: Multiple Regression Estimates of Socio-Economic and Institutional Determinants of Women Participation in Agricultural Extension service Programme

Variables	Estimated Coefficients	Odds Ratio	Wald Statistics	Significance Level
Access to Market	0.231**	3.516	.459	0.001
Access to land	0.075	.681	.219	0.798
Household size	0.008	.295	3.217	0.513
Marital status	0.443*	0.200	.717	0.023
Farming experience	0.023	.648	.119	0.435
Farm sizes	0.282	.2.773	0.306	0.428
Extension contact	0.102***	1.611	3.080	0.000
Level of education	0.054***	6.546	5.703	0.000
Age of farmers	0.022*	2.844	2.906	0.032
Access to credit	0.223	.779	.371	0.543
Membership of cooperatives	0.482	1.026	019	0.344
*=significant at 10% **= significant at 5% ***= significant at 1% NS=not significant	R^2= 0.711 Adjusted R^2=0.655 F-ratio=12.67			

Source: own computation, 2015

CONCLUSIONS

This study was designed to investigate the effectiveness of agricultural extension services consisting of both production and nutrition related information in improving the production and nutrition of farmers and women farmers in particular in Dendi district.

The first specific objective was to analyze the impact of rural women's socio-economic characteristics and access of particularly women farmers' to agricultural extension and household's involvement in formal and informal institutions in explaining farm households' agricultural production. In this study age was found to be significant in determining agricultural production for both participant and non-participant headed farmers. This finding is in agreement with the report by Rebecca (2012) which indicated the age characteristics of the household head as positively contributing variable

if he/she is in middle age category because he/she could actively engage in agricultural activities; and with the report by Maser (2011) which indicated an individual may lose ability and energy to get involved in agricultural activity of yield increasing practices as he/she gets older and older.

Since in the study area illiteracy rate was very high (70.0 and 78.33percentof respondents, respectively for all respondents, participant and non-participant), educational status was found significant in determining agricultural extension service for both participant and non-participant farmers. This finding is in agreement with argument of Adekunle, (2013) that stated educational status of a household head positively affects the knowledge, attitude and practices towards accessing to modern agricultural extension service and better agricultural production technology. Thus, we concluded that high illiteracy rate could be one of the limiting factors for women's access to agricultural extension service for all women's farmers in general and for female farmers in particular in Dendi district.

The expectations that as the size of cultivated land and Total land used in the household increases, the probability of farm household income increasing did not hold true for female headed households in the study area, while the finding for male headed household was as hypothesized. Thus, we concluded that female headed farmers' agricultural production in the study area was limited by resource holdings. The study revealed that household income increases with the use of improved seed for both female and male headed households. Thus we conclude that there is a need for agricultural extension services to focus on increased use of improved seeds for female headed households so as to increase their agricultural production.

The study also shows that majority of the women farmers in the area participated actively in individual Services of extension except farmer field days while the women's participation in mass media activities, were relatively low except in TV advert and Radio where they participated actively. The major types of message dissemination to the women were friends, village radio and TV. The bulletin was the least source of information. The women farmers did not have the expected access to professional extension agents. There was no significant relationship between educational level, household size, household income, farming experience, age and farm size of the respondents and their participation in agricultural extension Activities.

The livelihoods of rural people in the study area are completely dependent on agricultural incomes. For the agricultural works women have a lion's share in the area which is performed by all able-bodied household members. Despite the fact that women have extra-load than men because they participate in all activities, these efforts do not reflect in to the quality of their lives in terms of income and social status due to cultural taboos.

The impact of household family size on agricultural extension service was not significant for all respondents, while for female headed farmers the impact was not significant. This result is not in agreement with the opinion that suggested household with higher heads might be more advantageous than household with small family size in terms of participation in agricultural extension services (Adekunle, 2013) (provided that many of the family members are in productive age group). Thus, based on the finding of this study, we conclude that in the case of all respondents and male headed farmers, as the number of persons in the household increases, the probability of farmers' orientation towards use of agricultural inputs that increases agricultural production might have been reduced, may be because of its effect on increasing household consumption needs.

Thus the finding in this study, in the case of female headed farmers, is not in agreement with the arguments of Lerman (2004) which promoted credits as an important engine to enhance farmer's skills and knowledge, linking of farmers with modern technology through the purchase of inputs and investment on agricultural technology and then boosting household's agricultural production. The impact of farmer's contact with agricultural extension agents was positive and significantly ($P < 0.03$) related to increased household agricultural production of male farmers; and all respondents, while for female farmers the impact was positive but not significant.

RECOMMENDATIONS

The following recommendations were being made in view of the aforementioned findings of the study: -

- Government should encourage and assist women farmers by giving them special attention in terms of access to needed farm inputs and incentives. New farming implements should be made affordable and available to the women.
- Women adult literacy education programme is required to help women farmers acquire basic skills and abilities to seek and receive agricultural information through extension agents. This will make them to participate more in reading extension leaflets, bulletin, newsletter etc.
- Credit facilities should be provided by the government either through various women group and co-operate so as to enable they participate fully in agricultural activities.
- Finally considering women designated roles in agricultural production effort, agricultural information to farmers should be gender specific and sensitive.

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In agricultural-dependent economies, extension programmes have been the main conduit for disseminating information on farm technologies, support rural adult learning and assist farmers in developing their farm technical and managerial skills. It is expected that extension programmes will help increase farm productivity, farm revenue, reduce poverty and minimize food insecurity.Â Rural farmers farming on small hectares of land can be attributed to conditions such as lack of adequate credit, lack of access to product market, lack of adequate extension contacts, among others.Â In this study, we hypothesized that participation in ACDEP agricultural extension programmes positively affects the welfare of the participating farm households through improvement in farm productivity and income. 38 Factors that influence women participation in agricultural training programs. 38 Access to the land and means of acquiring land . 39 Working in groups .Â Women make up the workforce in agricultural production. Das (1995) estimated that African women represent from 30 to 80 percent of the agricultural labor force.Â production especially in rural areas where three quarters of Tanzaniaâ€™s population lives. In an effort to address food insecurity, agricultural training program planners are expected to be aware and remove any factors that might prevent participation of this group of farmers. Agricultural extension services globally are face with a challenge to become more effective and responsive. This chapter examines the developments of agricultural extension services in Sri Lanka over the past two decades.Â Pluralism in agricultural extension system. There is no single agricultural extension service-providing agency which can cater to all the needs of farmers.Â The district agricultural extension systems need to be supported by local and national services and knowledge centers in case of demand for knowledge service extends beyond the district level, as part of the new extension system (Heemskerk and Davis, 2012).