

Determinants of Women's Participation in Agricultural Extension Services among Rural Women Farmers in Yilmanadensa District, Northwest Ethiopia

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Abstract

Women play a very significant role in agricultural production in Ethiopia by contributing between 40-60 per cent of labour to agricultural production. Despite this, rural women farmers in Ethiopia including Yilmanadensa district rarely enjoy extension services and have little contact with extension service organizations. The low participation of women farmers in agricultural extension services in Yilmanadensa district is the main reason for conducting this study. Therefore, this study is conducted to investigate the determinant factors of women's participation in agricultural extension services in Yilmanadensa district. The study adopted cross-sectional survey research design. The paper is based on a review of literature and an analysis of data collected from 127 sample respondents using a semi-structured questionnaire. Qualitative data were collected through key informant interviews and focus group discussions. Binary logit regression was employed to analyse the collected data. It was found that farming experience, sex of the development agent and access to credit shows significant and positive relation with participation whereas, time spent on domestic activities and sex of the household headship shows significant and negative relationship with women's participation. Thus, appropriate number of female agricultural extension workers should be assigned, labor saving and women friendly technologies should be promoted and disseminated through the extension system.

Key Words: Rural Women, Participation, Agricultural Extension Services, Yilmanadensa District, Ethiopia

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Introduction

Women being an integral part of a farming household provide 60 to 80 per cent of all agricultural labor. Various researches conducted on the contribution of women to agricultural development in the developing countries (FAO 2011a) suggest that women's contribution to the farm work is as high as between 50 and 75 per cent of the total farm task performed and 79 per cent of women in least developed countries who are economically active report that agriculture is their primary economic activity (Doss, 2011). The contribution of the women ranges from tasks such as land preparation, planting, weeding, fertilizer application, harvesting, threshing, storing, food processing, milling, transportation and marketing as well as the management of livestock (World Bank, 2010, Rahman & Ibrahim, 2007). However, their contribution is often overlooked due to some social barriers and gender bias.

Rural women in Ethiopia play a dominant and important role in agricultural production in the country. In Ethiopia, women take the leading role in agricultural activities, making up to 60-80 per cent of the labour force (FAO, 2010a; Cohen and Lemma, 2011; CSA, 2014). Rural women are intimately involved in all aspects of agricultural production such as land preparation, hoeing, weeding, harvesting, threshing, transportation and usage (Cohen and Lemma, 2011; CSA, 2014). This contributes to ensure food security, suppress inflationary pressure and supply inputs for industry (CFGB, 2015).

They are however accorded little attention. Consequently, there are some constraints facing the rural women's adoption of agricultural innovation which include failure of extension workers to reach them, lack of incentive for adoption of innovation, limited access to credit inputs and lack of access to membership in cooperatives and other rural organizations (Ogundiran, 2013; FAO, 2010b).

The role of extension today is not only technology transfer and training of farmers but also includes food security, empowering farmers, dealing with marketing issues, addressing resource conservation and nutrition issues. Moreover, the extension system should tackle the hurdles that women face in agricultural production, as these services provide a means for women to learn

new or improved production techniques, empower them to receive training and advice, to organize themselves (Ogundiran, 2013; Ijeoma & Adesope, 2015; apantaku & Oyegunle, 2016).

However, women rarely enjoy extension services and have little contact with extension service organizations. Empirical studies revealed that women received only five per cent of the total extension resources all over the world dedicated to programs for female farmers. Women form just 15 per cent of extension personnel in the world and their roles also remain largely unrecognized and they have been virtually ignored by agricultural intervention programs (World Bank, 2010; Ogundiran, 2013). The failure to recognize the different roles of males and females is costly because it results in misguided projects and programs, foregone agricultural output and incomes, and food and nutrition insecurity (FAO, 2010b; Apantaku & Oyegunle, 2016).

The National Policy of Ethiopia on women, formulated in 1993, ensures gender equality in programme implementation at all levels of government. The government introduced PASDEP (Plan for Accelerated and Sustained Development to End Poverty). Annual progress report 2007/8 states that PASDEP aims to reach all female headed households and 30 per cent of married females in agricultural extension programs. However, according to the Growth and Transformation Plan-I (GTP-I) document of the Ethiopian government, increasing extension services to female farmers in rural areas remains challenging (Mengistie, 2015).

In rural Ethiopia in general rural women farmers in the study areas in particular have limited participation in agricultural extension services (Quisumbing et al. 2014). That is why, traditionally women are not considered as “farmers” which is a predominant problem in many developing countries (World Bank, 2010; Cohen and Lemma, 2011). Even if females do participate in extension services, they may not be given equal recognition for their responsibilities and skills. They are also restricted and marginalized in terms of providing equal responsibilities, decision making power and access and control over resources. This is because farmers and farming activities continue to be perceived as “male”

by planners and agricultural service deliverers, thereby ignoring the important and increasing role females play in agriculture. Moreover, technology packages delivered by extension services sometimes reinforce stereotypic divisions of labour (Manfre et al. 2013). The annual report of Yilmanadensa district indicated that women farmers rarely participate in agricultural extension services in the district (District Agricultural Office, 2018). Therefore, this study seeks to investigate the determinate factors influencing rural women's participation in agricultural extension services in Yilmanadensa district.

Research Methodology

The study was conducted in Yilmanadensa district, Amhara region, Ethiopia. The district is 441 km away from Addis Ababa, capital city of Ethiopia and 42 km from Bahir Dar, the regional capital. Geographically, the study area lies within 11°38' 24'' - 11°42' 0'' N latitude and 37°28' 48'' - 37°32' 24'' E longitude with an area coverage of 99180 hectares. The altitude of the district is between 1800 and 3200 m.a.s.l with average rainfall of 1270mm/year and average temperature of 16°C (District Agricultural Office, 2018). The total population of Yilmanadensa district is 222631, of which 108159 are males and 114472 are females. Agriculture is the predominant occupation of the people in the district (ibid).

This research employed both qualitative and quantitative approaches. The study adopted cross-sectional survey research design and employed three stage sampling.

Among the 35 rural kebeles in the district, three rural kebeles (the lowest level of government in terms of geographical jurisdiction in Ethiopia headed by the Kebele chairperson) namely Debrermewi, Adethana, and Kelilet were selected using simple random sampling technique. The households were stratified based on the participation in agricultural extension services, as participants and non-participants. Then, simple random sampling technique was used to select participants and non-participants from the list available with the development agents in the three rural kebeles. Probability proportion to size technique was

used to determine the sample size from each selected kebele. The sample size for collecting quantitative data for this research was determined based on the formula proposed by Cochran (1977).

$$n = \frac{N}{1 + N(e)^2}$$

Where n= the sample size

N = total number of households

e = marginal error or degree of accuracy 8% (given by researcher)

1= designates the probability of the occurrence of event

$$n = \frac{N}{1 + N(e)^2} = \frac{695}{1 + 695 (0.08)^2}$$

$$= 127$$

Therefore, a total of 127 women were selected from a total of 695 households. The details of the selected sample household are presented in Table 1.

Table 1. Details of total number of households and sampled households

Study area	Sampled kebeles	Total number of HHs			Sampled household heads		
		Participants	Non-participants	Total	Participants	Non - participants	Total
Yilman adensa District							
	Debremewi	150	72	222	27	13	40
	Kelilet	182	48	230	33	9	42
	Adethana	87	156	243	16	29	45
Total		419	276	695	76	51	127

Source: Yilmanadensa District Agriculture office (2018)

Data were collected from both primary and secondary sources. Primary data were collected from primary sources by using semi-structured interview schedule, focus group discussion and key informant interview. The details are given in Table 2. The secondary data were collected through a review of relevant reports of district agricultural offices, published and unpublished sources.

Table 2. Data collection methods and tools

SN	Type of respondents	Method of data collection	Tool used to collect data	Number of respondents
1	Women farmers	Interview	Semi-structured interview schedule	127
2	Development agents	Key informant Interview	Interview guided check list	5
3	Women affair office Experts	Key informant interview	Interview guided check list	3
4	Kebele administrators	Key informant	Interview guided check list	2
5	Selected participants and Non-participants	Focus Group Discussion	Checklist	18

Source: Developed by the researcher, 2018

Model specification

The dependent variable is whether or not the woman participates in any agricultural extension service. The dependent variable in this case is a dummy variable (binary), which takes a value of 1 for participants and 0 for non-participants. Therefore, a binary logistic model was employed to identify determinate factors that affect rural women farmers' participation in agricultural extension services.

The decision to participate in AESs is therefore dichotomous between two mutually exclusive alternatives: either to participate or not to participate. The probability that an individual makes a particular choice is influenced by a vector of explanatory variables. A particular choice is made when the combined effect of the vector of the explanatory variables reaches the critical level (breaking

point). Thus, a decision to participate in AESs will occur only when the combined effect of the explanatory variables ($X_i'\beta$) reaches a certain unobservable critical value Y_i^* . So that:

$$Y_i = 1 \text{ if } X_i'\beta > Y_i^* \text{ OR } Y_i = 0 \text{ if } X_i'\beta < Y_i^* \dots\dots\dots (1)$$

Where Y_i^* is a latent variable and represents the unobserved level of participation in AESs. By the application of probability theory, the probability that a given woman participates in AESs is given by

$$P = \text{Prob} (Y_i=1) = f (X_i' \beta) \dots\dots\dots (2)$$

and the probability that a given woman does not participate in AESs is given by

$$1 - P = \text{Prob} (Y_i=0) = 1 - f (X_i' \beta) \dots\dots\dots (3)$$

In this study, binary logit is employed to estimate the probability of participation in AESs. The logit model specified for the study is stated as

$$L = \text{Log} \left[\frac{p_i}{1 - p_i} \right] = \beta_0 + \sum \beta_i X_i + U_i \dots\dots\dots (4)$$

Where: p_i = the probability that women actively participate in agricultural extension services, the binary variable, $p_i=1$ for participant women and $p_i=0$ for non-participant women; β_0 = the constant term; β_i = a vector of β unknown coefficients of the determinants of participation in AESs; X_i = a vector of independent variables that determine participation in AESs; U_i is the stochastic error term and $i = 1, 2, 3 \dots N$ observations. The Z statistic is used to test the significance of the individual parameters. The likelihood ratio test (LRT) is employed in testing the fitness of the model. In this study the multi-collinearity problem among explanatory variables was checked before conducting the analysis. Variance Inflation Factor (VIF) is used to test the existence or association among the continuous explanatory variables and contingency coefficient (CC) for dummy variables. In this study, Statistical Package for Social Science (SPSS) version 22.0 computer software was used to run the analysis.

Table 3. Definition of variables and its hypothesized effect

SN	Independent Variables	Type of variable	Description of variable	Effect
1	Age of respondent	Continuous	Age of household head in years	-
2	Level of Education	Dummy	Literate / Illiterate	+
3	Number of dependents	Continuous	Measured as number of dependents in the family: children below 15 years and aged persons above 65 years of age in a HH	-
4	Sex of Household head	Dummy	Male headed/Female headed	-
5	Land holding	Continuous	Measured as land size owned/rented in hectares	-
6	Livestock holding	Continuous	Measured by TLU; Size of livestock owned by HHHs	+
7	Farming Experience	Continuous	Number of years involved in vegetable production (measured in years)	+
8	Access to credit	Dummy	Takes 1 if the respondent had access to credit and 0 otherwise	+
9	Sex of Development agent	Dummy	Sex of extension agent, if Female =1 otherwise=0	+
10	Contact with development Agents	Dummy	If contact with extension agent, takes a value of =1 and otherwise =0	+
11	Access to Mass Media	Dummy	If had access to mass media 1; otherwise 0	+
12	Participation in Community Affairs	Dummy	If woman participate = 1, otherwise=0	+
13	Distance from FTC center	Continuous	HHs proximity to the FTC center measured in km	+
14	Distance from market center	Continuous	HHs proximity to the nearest market center in km	+
15	Access to input	Dummy	If woman had access =1 otherwise=0	-
16	Mobility Constraint	Dummy	Takes a value of 1 if a woman had a mobility constraint and 0 otherwise	+
17	Reproductive role	Dummy	If the women farmer influenced by their role in reproductive activities 1 and 0 otherwise	-
18	Time spent in domestic activities	Continuous	Total time devoted by the woman in doing Household activities	-
19	Access to labor saving household technology	Dummy	If women had access to modern cooking fuels like Improved stoves without fumes, Biogas, Solar cookers, Modern bio-fuels (e.g. ethanol, plant oils), Electricity take a value of 1 and otherwise 0.	+

Results and Discussion

Determinants of Rural Women's Participation in Agricultural Extension Services

The binary logit model results revealed that rural women's participation in agricultural extension services was determined by the interaction of different demographic, socio-economic, institutional and women related factors. The results of the Binary Logistic regression model estimate indicate that out of the explanatory variables included in the model, the coefficients of the seven explanatory variables were found to be significant indicating that any change in this variable will substantially influence on the probability of being a participant in agricultural extension services.

The variables viz., land holding, farm experience, sex of development agent and access to credit show significant and positive relation with participation. This indicates that any increase in any of these variables will increase the probability of women's participation in agricultural extension services.

On the other hand, time spent on domestic activities, sex of household headship and mobility constraints show significant and negative relationship with women's participation. The negative relationship implies that an increment in any of these variables will reduce women's participation in agricultural extension services among women farmers studied.

Discussion

Land Holding Size: The effect of land holding size significantly influences the probability of participation. The coefficient of this variable is positive and significant at less than 5 per cent probability level towards participation. For a unit increase in farm size, the odds of participating in agricultural extension services significantly increases by a factor of 1.23 times. This means that households who have access to more farm land are more likely to participate in agricultural extension services as compared to households who have less land. This finding is in line with the finding of Martey et al. (2013) who observed

Table 4. Binary Logistic regression estimates of determinants of rural women's participation in agricultural extension services

Variables	B	S.E.	ALD	DF	SIG	EXP(B)
LEVEL OF EDUCATION	.242	.733	.084	1	.772	.809
TOTAL NUMBER OF DEPENDENTS	.424	.292	2.113	1	.146	.654
SEX OF THE HOUSEHOLD HEAD	2.480	.977	6.442	1	.011	.084**
FARM EXPERIENCE	.156	.039	15.606	1	.000	1.169***
LAND HOLDING	.207	.097	4.595	1	.032	1.230**
TOTAL LIVESTOCK HOLDING	.443	.438	1.022	1	.312	1.557
ANNUAL INCOME	.000	.000	1.592	1	.207	1.000
ACCESS TO CREDIT	1.585	.783	4.099	1	.043	.205**
SEX OF DEVELOPMENT AGENTS	2.467	.830	8.829	1	.003	11.783***
CONTACT WITH DEVELOPMENT AGENTS	1.443	1.163	1.539	1	.215	4.233
DISTANCE FROM FTC	.398	.503	.626	1	.429	.672
ACCESS TO INPUT	.861	.758	1.290	1	.256	.423
MOBILITY CONSTRAINT	1.121	.654	2.939	1	.086	.326*
REPRODUCTIVE ROLE	.944	.675	1.953	1	.162	2.570
TIME SPENT ON DOMESTIC ACTIVITIES	.566	.190	8.835	1	.003	.568***
CONSTANT	4.455	2.725	2.673	1	.102	86.099

Dependent Variable Participation in Agricultural Extension Services

Note *, ** and *** = Significant at 10, 5 and 1% respectively

-2Log likelihood = 75.456^a

Cox & Snell R square = .540

Nagelkerke R square = .729

Chi -square = 102.380

Sign. = .000

that farm size positively influenced the household heads decision to participate in agricultural projects.

Sex of the Household Head: The coefficient of this variable is negative and significant at less than 5 per cent probability level towards participation. The result indicates that, women in male- headed households were .084 times less likely to participate in agricultural extension services than women-headed households. It implies that women in male-headed households have a less probability of participation than women headed households. Perhaps, this could be due to the reason that women in male headed households have to get the permission from their husband. In male-headed households, the head of the family mostly takes all the responsibilities outside the home and thrusts all the household work to the women.

This finding contradicts with the finding of Berger et al. (2014) who reported that women who are heads of households will have even greater difficulty in attending trainings and study tours, since their workloads are heavier and they do not have access to additional family labour to perform agricultural tasks in their absence.

Farming experience: It reflects the number of years since the farm operator first began farming. Farming experience was positive and significant at less than 1% level of significance. With increasing experience, a woman farmer may be able to better assess benefits of agricultural extension service. Women with more farming experience were more likely to participate in agricultural extension services than those who have less experience. The results also reveal that for one-unit increase in farming experience, the odds of being able to participate in agricultural extension services significantly increases by the factor of 1.169 times. Therefore, women's experience in farming increases their probability of participation in agricultural extension program. This confirms the finding of Chioma (2014) who reported that farming experience was found to be positively associated with participation. This contradicts with the finding of Rehman & Ibrahim (2007) who indicated that farming experience had no significant effect on the farmers' access to agricultural information.

Access to credit: Access to credit helps them by easing financial constraints to purchase farm inputs such as seeds, fertilizers etc. The coefficient of access to credit is positive and significant at less than 5 per cent probability level. As shown in Table 4, women who had better access to credit were .205 times more likely to participate in agricultural extension services than women who had no credit access. This implies that women who have access to credit have a better possibility of getting farm inputs.

The result is consistent with the finding of Martey et al. (2013) who reported that access to credit enables farmers to overcome their financial constraints associated with production and adoption of innovations.

Sex of Development Agents: The beta coefficient is positive and significant at less than 1 per cent probability level. The result of logit model showed that those women farmers who have contact with female development agents were 11.783 times more likely to participate in agricultural extension services than those who had no contact. It implied that female extension workers are often in a better position to help female smallholder farmers in the adoption of innovations.

This finding is consistent with the report of Swanson et al. (2011) which stated that the presence of women extension agents was a factor in increasing women farmers' participation in extension activities. The Swiss Agency for Development and Cooperation recommends women-to-women extension for better transfer of information to women farmers (SDC, 1995).

Time spent on domestic activities: As expected, the beta coefficient for time spent on domestic activities is negative and significant at less than 1 per cent probability level. The relationship is negative, which means that the women who spent more time in domestic activities, are less likely to participate as compared to women who have leisure time. The result indicates that as time spent on domestic activities increases by one hour, the probability of women participation in agricultural extension services decreases by a factor of .568 units while other variables are kept constant. The possible explanation for this result is that respondents who spent more time on domestic activities had less probability to participate in agricultural extension services.

Women and girls are traditionally tasked to do all domestic maintenance work, hauling water, firewood gathering, food processing and preparation, cooking and other domestic chores. Household work done by women is characterized by long and strenuous days with very few relevant and affordable technologies to ease their workload and drudgery. The heavy workload already imposed on women often prevents them from adopting improved technology that requires additional labour inputs.

Studies across a wide range of developing countries show that rural women spend a significant amount of their time on reproductive and household activities, increasing their daily hours of work in comparison to men. It is estimated that women spent 85–90 per cent of their time on childcare, water and food collection, cooking and other care activities (FAO 2011b; Flavia et al. 2015).

Mobility constraints: The coefficient of mobility constraints is negative and significant at less than 10 per cent level of probability. As mobility constraint decreases by one unit, it is 0.326 times more likely that the women participate in agricultural extension. This implies that as mobility constraints decrease by one unit the odd ratio increases by the factor of .326. Those women who have no mobility constraints can participate in any association, development intervention, etc. Time and mobility constraints may prevent women from accessing public extension and formal agricultural information services. In such situations, women rely extensively on their female social networks to learn about new agricultural technologies.

However, the remaining six explanatory variables were found to have no significant influence on the probability of participation in agricultural extension services. The non-significant variables were education, number of dependents, livestock holding, annual income, contact with development agents, distance from FTC, access to input and reproductive role. These variables, therefore did not determine women farmers participation in agricultural extension services in this study.

Conclusion and Recommendation

The results of the Binary Logistic regression model estimate indicate that out of the 12 explanatory variables included in the model, the coefficients of the six explanatory variables were found to be significant in determining the probability of women farmers being a participant in agricultural extension

services. Sex of the development agent, farming experience, land holding size and access to credit shows significant and positive relation with participation. This implies that any increase in any of these variables will increase the probability of women's participation in agricultural extension services. On the other hand, time spent on domestic activities, mobility constraints and sex of household head shows significant and negative relationship with women participation. The negative relationship indicates that an increment in any of these variables will reduce women's participation in agricultural extension services among studied women farmers.

In the study area, majority of the respondents have no contact with female agricultural extension workers. This implies that the linkage between the women farmers and the DAs is very weak. Therefore, to improve the rural women's participation, assigning and allocating appropriate number of female agricultural extension workers (DAs) is recommended. The district agricultural extension office needs to plan a mechanism that can encourage women farmers to participate in AES. Participation in agricultural extension services may further increase women's workload. All stakeholders should give great attention and priority to reduce the workload of women by providing access to labour saving household technologies.

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