

AGRICULTURAL EXTENSION SERVICE AND VEGETABLE PRODUCTION: THE CASE OF WOMEN FARMERS IN IMBULPE DS DIVISION IN SRI LANKA

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Abstract. This study was conducted to identify the agricultural extension needs of women farmers and to assess the impact of their participation in agricultural extension programs on vegetable production in the area. A sample of 145 women farmers from five Grama Niladhari (GN) divisions of the DS division was randomly selected for the study. Data were collected from a researcher administered survey and analyzed using descriptive statistics and a regression analysis. As per the results, a significant number of the women farmers have participated in most of the extension and training programs. However, some of them haven't registered in the farmer organization present in the area. Agricultural extension agents of the area have focused on dissemination of more information regarding modern farming technologies, organic farming, application of agrochemicals and fertilizers, and improving market systems. The majority of women farmers have used the knowledge received from the extension programs in vegetable farming activities. Furthermore, there is a significant and positive relationship between participation in extension programs by women farmers and an increase in vegetable production. Therefore, encouragement of women farmers to register in the farmer organization, provision of timely important extension service to them, organizing training programs, and workshops to disseminate agricultural information are crucial to further enhancement of vegetable production in this area.

Keywords: agricultural extension, vegetable production, Imbulpe, rural women farmers, Sri Lanka

INTRODUCTION

Most of the women in developing countries are more economically active in the agricultural sector than involved in paid work. Hence, gender specified key issues need to be identified in order to enhance the vegetable production of the women farmers in rural areas. According to the literature findings, globally identified key obstacles put rural women farmers at a significantly disadvantageous condition are poor accessibility to their own farmlands, unavailability of monetary facilities, marketing problems, poor access to agricultural extension and training, and gender discrimination (Glazebrook et al., 2020; Doss, 2018). Among them, access to agricultural extension and training are very important as they can provide cost effective ways of increasing food production and also increase the revenue of the farmers (Abbeam et al., 2018; Ozoya et al., 2018; Ibarhokanrhowa, 2016; Tayo et al., 2016). Extension services enable farmers to adapt the latest technologies and innovations to boost food production under the optimum environmental conditions while protecting the environment. However, increases in food production can vary according to women farmers' access to extension services (Ozoya et al., 2018). Proper extension service is a key component in improving the agricultural production of the farmers and creating a better linkage with the agricultural markets. Thus, it can help to enrich the rural livelihoods and improve food production by facilitating food security

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in the world. However, rural famers, especially women farmers, have limited access to agricultural information.

As per recent statistics, 14.4% of the economically active women stay in rural areas in Sri Lanka (Madurawala, 2018; Annual Labor Force Reports, 2017). The majority of them contribute their labor to the agricultural sector rather than the service sector (Wimalaweera, 2020; Annual Labor Force Reports, 2017).

Figure 1 shows that the labor force participation of women in the agriculture sector is higher than male involvement. Similarly, women who live in Imbulpe area also mainly work in farming activities. Most of the women who lived in rural areas usually get their monthly revenue from the agriculture sector. Thus, women farmers manage to earn a considerable monthly revenue by increasing their vegetable production (FAO, 2018). According to the literature findings, age, education, monthly income, financial accessibility, access to the agriculture inputs, farmland size and ownership, climate change, and extension program participation are the main factors affecting vegetable production of women farmers. Agricultural extension is a system of disseminating agricultural information from the research institutes to the farmers within the shortest possible time. Hence, extension service impact identification of an important aspect in increasing vegetable production (Rahman et al., 2020; Nuskiya, 2019; Ahmad et al., 2007).

The majority of the women farmers have to depend on their spouses or another male counterpart in the family for most of their requirements related to accessibility of agricultural inputs and agricultural extension programs, marketing of agricultural products, etc. (Census..., 2014). Therefore, there is a need for a successful

extension service in order to empower rural women to improve performance in agricultural activities. However, there is no proper identification of the impact of agricultural extension service on women farmers and also their effect on vegetable production in this area. Therefore, this study was conducted to find out the agricultural extension needs of women farmers for vegetable production and the impacts of agricultural extension service on vegetable production in this area.

LITERATURE REVIEW

Women represent more than half of the global population and the majority of them are underprivileged and living in developing countries of the world (World Bank, 2021; Rahman and Naoroze, 2007). When consider rural areas in the world, most of the women farmers perform traditional farming practices related to the pre-planting, planting, harvesting, and post-harvest management activities. Consequently, rural women farmers engage in small-scale farming more than commercial level farming. However, developed countries have mechanized farming practices and a considerably lower level of female contribution within the agricultural sector can be seen (Rathnachandra and Malkanthi, 2020; Ibarhokanhowa, 2016; Malkanthi, 2016). Normally, women farmers have to perform more domestic activities such as child caring and family welfare activities. They have fewer opportunities to join social networks and thus lack in monetary facilities more than male farmers. However, male farmers have a considerably higher level of access to agricultural information and participation in extension programs than women farmers (Lecoutere et al., 2019; Bahadurhartimagar, 2011). Godwin et al., 2018, has also reported that gender differences effect the use and accessibility of agricultural information sources. Gender inequality is one of the prominent features in developing countries. Therefore, the United Nations has paid more attention to gender equity under the sustainable development goals. They help to reduce the agricultural knowledge barrier for women farmers (Rathnachandra and Malaknthi, 2020; Mojaki and Keregero, 2019; Malkanthi, 2016).

Normally, men have a number of opportunities to enhance their skills and abilities related to their level of education, accessibility to modern farming technologies, agricultural extension service, and also various financing facilities (FAO, 2018). However, it seems that there are problems and difficulties for women farmers

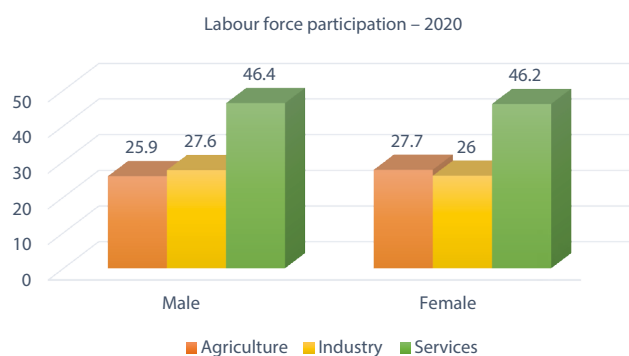


Fig. 1. Labor force participation: Gender perspective
Source: Wimalaweera, 2020.

in getting access to these facilities and opportunities. Therefore, it is important to study women farmers' situations, in particular, the accessibility of modern farming technologies, accessibility of agricultural extension service, and also the accessibility of various financing facilities that are highly important for their empowerment and food production.

Female empowerment can be achieved by allowing them to make decisions within the household, having proper social networks, providing proper access to financial and economic resources, more bargaining power with their spouses within the family, and having considerable freedom of mobility (Rathnachandra and Malkanthi, 2020; Ibhahokanrhowa, 2016). However, women are still suffering from various difficulties for the accessibility of extension services because of their high workload and caring for family members (Ozoya et al., 2018; Ibhahokanrhowa, 2016).

Thus, literature findings indicate that there is a considerable knowledge barrier regarding the accessibility of agricultural extension service on food production of the rural women farmers in Sri Lanka. Therefore, this study aimed to find out about the barriers related to agricultural information needs and the impact of the agricultural extension service on their level of vegetable production.

RESEARCH METHODOLOGY

Imbulpe Divisional Secretariat (DS) Division in Ratnapura district in Sri Lanka was selected as the study area of this research (Fig. 2).

In this area, a considerable number of male counterparts go to work in urban areas and women have to



Fig. 2. Map of the Imbulpe DS Division
Source: Annual Report of Ratnapura District, 2014.

perform many tasks such as household activities, child caring, and also farming activities. This DS division is consisted of 50 Grama Niladhari (GN) divisions. However, only five GN divisions were randomly selected for the study. They are: Seelogama, Kinchigune, Puwakgahawela, Muttettuwegama, and Karagastalawa GN divisions. Simple random sampling method was used to select a sample of 145 women farmers. A pilot study was conducted before the filed survey using 8 women farmers to make sure the suitability of the questionnaire as the primary data collection tool. After that, the researcher administered questionnaire survey was carried out from May to August 2019 in order to collect the relevant data. The questionnaire consisted of several sections, including questions to gain necessary information regarding the women farmers socio-economic situation, their participation for extension programs, reasons for not participating in the extension programs by some of them, frequency of extension program conducting by the extension officers in the study area, major focusing areas of agricultural information sharing through the extension programs, sizes of farm lands (acre), and level of vegetable production (Kg/Acre) etc. Data analyses were conducted using descriptive statistics and regression analysis. While descriptive analysis was used to identify the agricultural extension needs in vegetable production, women farmers' agricultural extension needs were identified by providing relevant agricultural information based on the findings of the literature review and the pilot study. Finally, the impact of participation in extension programs for vegetable production was identified through a simple liner regression analysis. Participation in extension programs was considered as the independent variable, and it was measured by the number of times they participated in extension programs during the last three years. For the dependent variable, the level of vegetable production by the women farmers was used. Main vegetables cultivated by these women farmers are Beans, Tomato, Okra, Capsicum, Brinjal/Eggplant and Green chili. There are two cropping seasons obtain for above noted vegetable crops per year time duration. The level of vegetable production was measured as the amount of vegetable production per unit acre (Kg/Acre).

Formula 1: Level of vegetable production by the women farmers

$$\text{Level of vegetable production} = \frac{\text{Total vegetable production per year (Kg)}}{\text{Farm land size (Acre)}}$$

FINDINGS OF THE STUDY

Socio-economic factors of the women farmers

The most important socio-economic factors of women farmers were identified, and they were studied in detail. Results are presented in Table 1.

Table 1. Socio-economic factors of women farmers ($n = 145$)

Factor	Category	Frequency	Percentage (%)
Age	20–39 years	33	22.7
	40–59 years	84	58.0
	60–79 years	28	19.3
Marital status	Single	07	4.8
	Married	130	89.7
	Widowed	08	5.5
Educational level	No primary education	06	4.1
	Primary education	47	32.4
	GCE (O/L)	83	57.2
	GEC (A/L)	09	6.2
Monthly income (LKR)	1–20,000	25	17.2
	20,001–40,000	108	74.4
	40,001–60,000	12	8.3
Number of family members	2–4	28	19.3
	5–7	95	65.5
	8–9	22	15.1

Source: field survey, 2019.

As per the results of table 1, most of the respondents (58%) were under the age category of 40-59 years or middle age. The mean age value of the sample was 48.81 years. Furthermore, 89.7% of respondents were married, and most of them (63.4%) had received education up to GCE Ordinary Level. Also, the majority of the respondents (65.5%) reported that they have 5-7 members in their families. Therefore, up to a certain level, they can use family labor in their farming activities. While 74.4% of women farmers have received in between LKR 20,001 – 40,000 as monthly income,

17.2% of them have reported that it is below LKR 20,000. The mean value of the respondents was LKR 15,061.76.

Agricultural extension needs and vegetable production

Agricultural extension needs for the farmers in vegetable production were studied, and they were tested with these women farmers. The findings are shown in Table 2.

Table 2. Agricultural extension needs and vegetable production ($n = 145$)

Items	No. of Respondents		Percentage (%)
	1	2	
Have you attended extension training programs organized by extension agents			
Yes		90	62.1
No		55	39.9
If not, why			
Not registered in the farmer organization		18	12.4
Financial constraints		07	04.8
Not invited for any one		04	02.7
Not important to me		14	09.6
Not enough time		12	08.3
How often extension training programs are conducted			
About three months' time		61	42.1
Three months – six months' time		14	09.6
Six months – nine months' time		08	05.5
More than nine months' time		04	02.7
The agricultural extension training focus on			
Modern farming technologies			
Yes		43	29.7
No		50	34.5
Application of agrochemicals and fertilizers			
Yes		59	40.7
No		31	21.4

Table 2 – cont.

	1	2	3
Improved crop varieties			
Yes		34	23.4
No		56	38.6
New cropping systems			
Yes		39	26.9
No		51	35.1
Improving market systems			
Yes		64	44.1
No		26	17.9
Organic farming			
Yes		72	49.7
No		18	12.4
Does the training hold often			
Yes		71	48.9
No		19	13.1
Has your vegetable production increased			
Yes		67	46.2
No		23	15.9

Source: field survey, 2019.

Based on the findings of Table 2, a large number of women farmers (62.1%) have participated in extension training programs organized by the extension agents. However, 39.9% of women farmers haven't participated in any extension training program. Out of them, the majority has mentioned that they are not registered in the farmer organization. Therefore, their motivation to register in farmer organization is very important. Moreover, 42.1% of women farmers mentioned that extension agents are conducting extension programs during three months' time intervals. However, 51.7% of respondents mentioned that extension agents usually conduct their extension programs in six months' time intervals. As per the findings, agricultural extension agents of the study area have mainly focused on disseminating information on modern farming technologies, organic farming, application of agrochemicals and fertilizers, and improving market systems. It was significant that 48.9% of women farmers have gained their knowledge from the

extension programs. Another important finding was that 46.2% of respondents mentioned that extension trainings have contributed to increases in their vegetable production.

Impact of participation in extension programs on vegetable production

The impact of participation in extension programs on vegetable production was assessed using a regression analysis. Participation in extension programs was considered as the independent variable and measured by the number of extension programs participated by the women farmers during the last three years. The dependent variable was the vegetable production of women farmers. It was measured by the amount of vegetable production per unit acre (kg/acre) per year.

Table 3. Extension program participation and vegetable production of women farmers

Participation in extension programs		Vegetable production (kg/acre)
number of extension programs*	number of women farmers	
0–5	26	110.2
6–10	37	292.7
11–15	09	296.7
16–20	18	386.7

*During three years' time period.

Source: field survey, 2019.

The number of extension programs participated in by most of the women farmers was between 6 and 10. However, a higher amount of vegetable production was shown by the respondents who participated in between 16 and 20 extension programs. The results of the regression analysis are presented in Tables 4 and 5.

As per the results of table 4, R square value (0.556) denotes a moderate level of correlation between women farmers' participation in extension programs and level of vegetable production. Also, it contributes 55.6% of the total variation in the dependent variable explained by the independent variables. $P < 0.05$ indicates that there is a significant and positive relationship between participation in extension programs and increase in vegetable

Table 4. Model summary of the impact of extension program participation and vegetable production

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	.746 ^a	.556	.551	84.336	.556	110.402	1	88	.000

a. Predictors: (Constant), Participation in extension Program by the women farmers

b. Dependent Variable: Vegetable production of women farmers

Source: results of regression analysis.

Table 5. ANOVA^a table of the impact of extension program participation and vegetable production

Model	Sum of squares	df	Mean square	F	Sig.
1 Regression	785250.359	1	785250.359	110.402	.000 ^b
Residual	625912.141	88	7112.638		
Total	1411162.500	89			

a. Dependent variable: Vegetable production of women farmers

b. Predictors: (Constant) participation in extension program by women farmers

Source: results of regression analysis.

Table 6. Coefficients of the impact of extension program participation and vegetable production

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% confidence interval for B	
	B	Std. error	Beta			lower bound	upper bound
(Constant)	85.950	18.730		4.589	.000	48.729	123.172
extension program participation	18.737	1.783	.746	10.507	.000	15.193	22.281

a. Dependent Variable: Vegetable production of women farmers

Source: results of regression analysis.

production. According to Table 6, the standard error (1.78) represents the degree of deviation of observed values from the regression line in 95% confidence interval. This value should be below or approximately equal to 2.5 for the increment of the model preciseness. Therefore, this model obtains considerable precision.

The coefficient was denoted as (+) 0.746. It presents the strong, positive relationship between the women farmers' participation in extension programs and increase in vegetable production in this area. Therefore,

when women farmers' participation in extension programs is higher, they can increase their vegetable production.

DISCUSSION

According to the mean age value of the sample (48.8 years), most of the women farmers represent the economically active population, and thus, they have a potential to enhance vegetable production. The average

monthly income of the respondents is in between LKR 20,001 and LKR 40,000. Hence, the majority of the women farmers have the ability to earn a considerable monthly income from their vegetable farming activities.

Based on the findings of the regression analysis, there was a significant, positive relationship between the women farmers' participation in extension programs and vegetable production in this area. Meanwhile, similar findings have been reported by a number of researchers from many other countries. According to the study of Ibhahokanrhowa (2016), in Esan West Local Government Area of Edo State, Nigeria, there is an impact of participation in extension programs in vegetable production. In addition to this, Ozoya et al. (2018), it has been reported that there is a considerable level of impact on vegetable production by participation in extension programs. Furthermore, based on the findings of the Abbeam et al. (2018) in Ghana, there is a significant impact of women farmers participation in extension programs on vegetable production. Therefore, FAO in 2003 identified the importance of dissemination of timely important extension services to enhance food production by minimizing the issues associated with food security. In addition, according to a study in Malayasia by Samsudin and Bin, 2010, extension services related to the modern farming technologies and new cropping systems have the potential to increase food production successfully. In Nigeria, agricultural extension acts as an important strategy for boosting vegetable production (Akpomedaya, 2004). The study in Kenya by Chege et al. (2018) showed that extension services positively influence the food security of smallholder farmers of the country. Nevertheless, the profitable nature of smallholder soybeans production has been found from a gender perspective. The findings revealed that women farmers' soybean production is considerably lower than male farmers due to poor participation in education, extension and training programs, higher input prices, lower purchasing prices of the producers, and poor market access. Consequently, these researchers have recommend conducting extension programs for women farmers to upgrade the level of soybean production in Zambia (Mafimisebi et al., 2015).

CONCLUSION

According to the findings of the study, most of the women farmers are in middle age and married. Furthermore, the majority of them belong to the economically active

population and have a sufficient level of education and potential to engage in farming without much difficulties. Moreover, up to a certain level they can also use family labor in their farming activities.

Although most of the women farmers participate in extension programs organized by the extension agents, a significant number of women farmers are not doing so, as they are not registered in the village farmer organization. Agricultural extension agents of the area have focused on disseminating information mainly regarding modern farming technologies, organic farming, application of agrochemicals and fertilizers, and improving market systems. The majority of women farmers have gained agriculture knowledge and understanding through the extension programs and use them to enhance their farming practices.

Several factors affect the vegetable production of these rural women farmers. They have comparatively poor access to their own farmlands, a lack of financial facilities, poor marketing facilities, a lack of access to agricultural extension and trainings, the problem of gender discrimination, etc. Out of these factors, access to agricultural extension program shows a conspicuous effect on vegetable production. There is a significant as well as a positive relationship between the women farmers' participation in extension programs and increase in vegetable production in the area. Therefore, when women farmers enhance their participation in extension programs, they are able to increase their vegetable production significantly. Extension service support effective dissemination of up-to-date agricultural information, facilitate well-organized information networks, and facilitate field training for women farmers. Thus, women farmers are encouraged to utilize modern farming technologies, participation in the farmer societies, input accessibility, financial facilities, and market accessibility through the extension programs.

RECOMMENDATIONS

Based on the findings of this research study, the following recommendations can be drawn for further development for vegetable production of women farmers.

- Provision of timely important and suitable extension service for the women farmers in appropriate time durations.
- Motivation of women farmers to register in farmer organizations.

- Persuasion of women farmers to participate in extension programs.
- Provision of latest agricultural knowledge regarding modern farming technologies and innovations for women farmers.

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