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Research Paper

Agriculture as a Catalyst for Women's Socio-Economic Progress: Insights from Bhiwani

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ABSTRACT

The present study examines the association between women's involvement in agricultural activities and various socio-economic factors using the primary cross-section data on 250 women respondents by employing the Multinomial Logic regression model in Bhiwani District, Haryana State for the year 2024. The agricultural activities are categorized into farming, non-farming, and household activities. Participation in farming activities is related to crop cultivation and livestock management; participation in non-farming activities includes fisheries and poultry farming, and household activities denotes no participation in agricultural activities. The findings reveal that education, age, and land size affect women's participation in farming and non-farming agricultural activities significantly negatively.

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1. INTRODUCTION

Agriculture plays a significant role in economic prosperity of the world economy and has a vital importance in developing and underdeveloped countries particularly. There is no doubt that this sector accounts for a small share of the global economy but still remains central to lives of the poor. In 2019-20, 26.7 percent of the world population is directly employed in agriculture but just contributed 4 per cent to global economic output (World Bank, 2020). It is recognized as an engine of growth at international levels as it has potential to improve its role in food security of a country via nutritive food, procurement of green manure from animals which increase the fertility of soil, supplement in income generation of the family, employment generation and poverty alleviation (FAO, 2016). Agriculture is considered the backbone of developing countries like India. It is not merely an occupation; it is a way of life throughout centuries and has shaped the thought and outlook of millions of people. It is the main occupation of rural poor families. The major part of the country's population earns its livelihood from it, although; its share is continuously declining on the national income graph till 2024. It is a key to food security, poverty alleviation, and the country's overall development (Azul et al., 2009). In the Indian economy the share of agriculture in Gross Domestic Product has increased to 19.9 percent in 2020-21 from 17.8 percent in 2019-20. It accounts for 7.39 per cent of total global agriculture output

(Economic Survey, 2021).In India and the agrarian state of Haryana; it still employs two-thirds of the female labour force (Census, 2011). Women are the major producer of feed, fuel, and fibre in this sector. Their participation in the labour force is continuously changing across the region along with national economic activities. Within Asia, the sub- regional averages range from 35 percent in South Asia to 50 percent in East and Southeast Asia whereas the female share in Indian agriculture has reached to over 30 percent (FAO, 2016). In India, 41.1 per cent of females are marginal farmers, 24.4 per cent are cultivators and 29.2 per cent are engaged in other work, but, still major agricultural operations such as harvesting, weeding, threshing and sowing except for plowing, which is performed by men (Census, 2011). The participation of women with their male partners seems continuously increasing under various farming and non -farming activities as crop production, livestock keeping, poultry farming, horticulture, fishery and almost 60 per cent of agricultural operations like the sowing of seeds, transportation of saplings, crop protection, winnowing and storage activities are solely handled by women.

Literature Review and Hypothesis Building

Education and Women's Participation in Agriculture

Education is significantly affecting women's participation both in farming and non-farming activities as the higher the level of education, the more the tendency of a woman to migrate to seek better job or placements (Demise &Johanna, 2007). The more educated women have less preference for agricultural activities due to more job availability than farming (Naris & Jansen, 1987; Keyed, Gunwale& Coffin, 1990). To log bones et al. (2013) reveal that females' level of education is a core factor and inversely associated with their participation in farm production due to better job opportunities in other sectors of the economy. The farmers with a low level of schooling are found to be poor in managing crises in their enterprises (Moor & Sharma, 2011) and building the supply chain can increase the efficiency of dairy farmers (Moor & Sharma, 2012)

Education significantly influences the number of female- headed farmers (Haile, 2016). Most agricultural participants (almost 70 percent) are illiterate, whereas the mean education is eight years in West Bengal (Pal & Holder, 2016). The study also reveals that education plays a significant role in promoting female farmers involvement, and utilization of agriculture extension services and education increased the decision-making power of the female in agriculture. Education has a significant yet negative impact on women participation in agriculture and allied activities as more educated women prefer a job in other sectors than agriculture (Zamora et al., 2013).

Hence, it is interesting to test the following hypothesis:

H_{01}: Women's participation in agrarian activities is not related to their level of education.

Age and Women's Participation in Agrarian Activities

Haile (2016) reveals that age is also an important variable in female involvement in farming and related activities. Age is a crucial factor in affecting the efficiency of agriculture in India (Singh, 2007b). The findings show that almost half of the women belong to the age group 31-40 (middle-aged) in agriculture and allied activities, whereas the participation rate is relatively low for those below 30 years and older age categories (above 50 years). The age of women is positively & significantly associated with the level of involvement in decision - making in agriculture (Pal & Holder, 2016). Chagall, Dhaka & Sula lakh (2013) and Demise & Johanna (2007) also report that older women participate more in agricultural activities than the younger age groups. Kumara & Moro (2020a) reveal that a lower level of education hinders the process of idea transmission and a higher education level enhances innovation by opening new avenues (Kumara & Moor, 2020b). Hence, it is imperative to test the following hypothesis:

H_{02}: Age does not affect women's participation in agrarian activities.

Land Holding Size and Women's Participation in Agrarian Activities

Landholding is an important factor influencing agricultural activities as crop production and livestock management (Khan et al., 2012). Families with less land cannot afford paid labor, so their females are actively involved in crop production activities (Habit, 2004). Armand (2019) reveals an inverse association between women's participation in farming and landholding size, whereas females of families with less land are heavily reliant on livestock management. Zamora et al. (2013) show a negative and significant relationship between landholding size and female participation in crop production. Probably, families with more land have a lesser intention of their female relatives working in farming. Hence, the following hypothesis will be tested for the same:

H_{03}: There is no relationship between the size of land holding and women 's participation in agrarian activities.

Economic Category and Women's Participation in Agrarian Activities

The economic category has a significant influence on the level of involvement in farming and decision-making in almost all agricultural activities (Pal & Holder, 2016). In rural families, females belonging to the above poverty line category are participating in agricultural activities with greater frequency than below poverty line families (Chagall, Dhaka & Bushwalker, 2013). So, it is interesting to test the following hypothesis:

H_{04}: Women's participation in agrarian activities is not affected by their economic category.

Family Size and Women's Participation in Agrarian Activities

There were mixed findings about family size and women's participation in agriculture and allied activities. Zamora et al. (2013) investigate whether family size has any influence on women's participation in crop production. However, it has a significant impact on other activities of agriculture, especially the management of livestock. Moro (2024) conceives that the

large family supports the choice of professional activities; skill affects the wage-earning potential of workers (Madam Moro, 2020) and influences the risk-taking propensity (moor, Medan & Chiara, 2020). it is relevant to test the following hypothesis:

H_{05}: Household size is independent of women's participation in agrarian activities.

METHODOLOGY

The Data and Sampling Procedure

The present study is based on primary cross-sectional data of women's participation in various farming and non-farming activities as crop production, livestock holding, poultry farming, dairy, fishing, etc., in the district of Bhiwani, Haryana State in India. The study employs a multistage random sampling technique for selecting a representative sample. At the first stage of the multistage sampling, out of 22 districts of Haryana, one district is randomly selected. At the second stage of sampling, out of 7 blocks of the chosen district, the Loharu block is randomly selected, while the third stage is marked with a random selection of five villages from the selected block (Figure 3, Appendix). At the fourth stage, a total of 250 randomly selected females from the selected five villages are interviewed in the year 2024.

Specification of the Variable Used in the Study

Table 1 presents the nature, type, and coding of variables used in the study.

Table 1: Descriptions of Variables Used in the Study

Variable	Category of Dummy Variables	Nature of data
Women Participation	Household activities: a Farming activities: b Non-farming: c	Nominal
Age	0-30 years: a 30-50 years: b above 50 years: c	Ordinal
Education	Illiterate: a Up to Senior Secondary Level: b Above Senior Secondary Level: c	Ordinal
Economic Category	Below Poverty Line (BPL): a Above Poverty Line) APL): b	Nominal
Land ownership	Landless: a Have land: b	Nominal
Size of Land	No land: a Up to 2 hectares: b More than 2 hectares: c	Ordinal
Family Size	Small Family (up to 4 members): a Large Family (More than 4 members): b	Ordinal

Results and Discussion

Table 2 presents a synoptic view of the leading factors of women's participation with their frequency of distribution. More than two-thirds of selected respondents reported that they have studied up to senior secondary, small women farmers possess land up to 2 hectares and crop production and livestock holding is their main occupation within the age group of 30-50 years.

Table 2: Sample Statistics of the Women's Participants in Bhiwani, Haryana

Characteristics	Frequency	Percentage
Women's Participation in Agriculture	66	26.4
No Participation Farming	172	68.8
Non-Farming	12	4.8
Education of Respondents	48	19.2
Illiterate	142	56.8
Up to Senior Secondary, Above Senior Secondary	60	24.0
Age of Respondents		
0-30 years	60	24
30-50 Years	126	50.4
Above 50 Years	64	25.6
Size of Family		
Small Family (up to 4 members) Large Family	52	20.8
(More than 4 Members)	198	79.2
Land Ownership	74	29.6
No Yes	176	70.4
Size of Landholding		
No Land	74	29.6
0-2 hectare	142	56.0
Above 2 hectares	34	24.4
Economic Category	79	31.6
BPL APL	171	68.4

Table: 3 reveal the fitness and adequacy of the constructed model. In the model fitting statistics, the Likelihood ratio chi-square of 314.66 with p-value is less than 0.05, a common α value. So, the null hypothesis is rejected. Our model fits significantly better than the null model in the pseudo R^2 value; the Negele Ker value is almost near 0.5 and represents that almost 50 per cent variation in the endogenous variable is explained by the selected determinants of women's participation altogether.

Table: 3 further indicates that respondents having education up to senior secondary prefer 0.134 times more farming activities over no participation whereas respondents above senior secondary level show 0.234 times less preference for the same, and both coefficients are statistically significant. Similarly, in Table: 3, under non-farming activities, the coefficient of education for both categories of education is significant, but respondents having education up to senior secondary have 0.412 times more preference for participation in non-farming activities, whereas for those with education is above senior secondary, this likelihood is 0.192 times less for the same.

Table 3 further envisages that the coefficient of age group is also significant for both the category 30-50 years and above 50 years, and it is revealing that the respondents of age group 30-50 years are 0.482 times more likely to participate in farming over reference category of no participation. In contrast, for the above 50 years, this preference is -0.416 times less than the benchmark category. At the same time, the table pinpoints that the age group is insignificant for above 50 years respondents whereas, for the age group 30-50 years, it is statistically significant and shows -0.218 times less preference for non-farming activities over the base category of no participation in farming.

Table 3: Parameter Estimates of Multinomial Regression Model for Women Participation in Bhiwani, Haryana

Farming and Non-Farming Activities						
Activities/ Variables	**Farming Activities**			**Non-Farming Activities**		
Predicators	B(SE)	Wald (Sig)	Probability	B(SE)	Wald (Sig)	Probability
Intercept	-1.29	0.596	0.275	-1.34	1.151	0.261
	(2.164)	(0.430)		(1.164)	(0.480)	
Up to Senior	.134	2.63**	1.03	.0412	2.31 **	0.959
Secondary	(0.082)	(.012)		(0.113)	(.010)	
Above	-.23	2.15**	0.79	-0.19	4.17 *	1.211
Senior	(0.109)	(.003)		(0.046)	(.001)	
Secondary						
30-50 years	0.48	3.42*	1.61	-0.12	4.27**	1.32
	(0.141)	(.000)		(0.029)	(.032)	
Above 50	-0.42	2.45**	1.51	-0.22	0.091	0.80
years	(.196)	(0.026)		(1.401)	(0.67)	
Yes	0.67	2.09*	1.96	0.13	12.72**	1.14
	(0.321)	(.000)		(0.010)	(.039)	
0-2 hectare	0.33	2.19**	1.38	0.22	2.50	0.779
	(0.149)	(.012)		(0.042)	(.052)	
More than 2	-0.21	2.10**	1.23	-0.47	2.34**	1.599
hectare	(0.102)	(.025)		(0.020)	(.025)	
Large	-0.21	0.15	0.81	0.15	0.10	1.157
Family	(1.435)	(0.410)		(1.435)	(0.410)	
(More than 4						
Members)						
APL	0.42	0.19	1.52	0.36	1.79	1.433
	(2.129)	(0.642)		(.129)	(0.642)	
Model Test Inferences						
Fitting Critertia-2 Log Likelihood Model Chi-Square (df) Significance Level 0.000 Pseudo R- R-Square Cox and Snell Nagelkerke0.499 Mc Fadden			Intercept=351.003 Final Model=36.837 314.66(18) 0.415 0.519			

Notes: **1.** Reference categories are denoted as a: no participation; b: illiterate; d: having no land; e: zero land; f: small family: below poverty line *& ** statistically significant at 1 percent and 5 percent level of significance.

Findings of the relationship between age and women's participation in agriculture have been supported by many other studies (Azid & Chaudhary, 2001; Damisa & Yohana, 2007; Chayal, Dhaka & Suwalka, 2013 & Haile, 2016). Therefore, we reject our second maintained hypothesis that age does not influence women's participation level in agriculture. Further, as explained by Table: 3, possession of land and size of land are statistically significant and negatively related with women participation in farming and non- farming activities. Zahoor et al. (2013) depicts those families who have more land hold females who have lesser intentions of joining agricultural activities. Therefore, the third hypothesis, that is, the possession of land and land size, is independent of women's participation in agriculture, is rejected.

Table 3 further shows that the coefficients of household size and their economic categories are insignificant and supported by the research (Tologbobse et al., 2013; Huria, 2014), which shows that family size does not influence women's participation in agricultural activities due to the non-reliance of family labour. Hence, our fourth maintained hypothesis is that household size and women's participation in agricultural activities are accepted. Similarly, our fifth hypothesis that economic category has no relation with women's participation in agricultural activities is also accepted.

Conclusions and Suggestions

This study examines the relationship between women's participation and its socio-economic determinants such as age, education, size of family, economic category, owning land and size of landholding of 250 women selected through multistage random sampling in Haryana year 2024. The findings reveal that education, age and size of land negatively affect women's participation in farming and non-farming agricultural activities. The conclusions further reports that middle-aged woman having education up to senior secondary levels possessing less than 2 hectares of land show more probability of participating in farming activities when compared to non-farming and household activities. On the contrary, highly educated women with more than two hectares of land tend to participate more in non-farming activities when compared to farming and household activities.

The findings of the study indicate that the majority of selected respondents are illiterate or have education up to only senior secondary in both farming and non-farming activities. Therefore, there is a dire need to improve the status of literacy status of

women in rural areas as education is a vital factor for improving their ability to acquire and process information. Educated women can easily grasp the input-output relation of farming, updated and cost-effective techniques of agriculture. So, the government needs to arrange an intensive agriculture extension program to
improve the skills who are just involved in household management on one side and to develop essential skills and farm management skills of already involved women. Women having land up to only two hectares are actively involved in agricultural activities, so the government should focus on a women program related to operational holdings, enhancing with liberal lease-in/out terms and giving more cheap credit. Tenancy rules should be reformed so that landless women can take land on a lease basis, and this will pave a significant path in enhancing the participation of landless women in agriculture. Women having education above senior secondary are showing their interest in non-farming activities, so for more educated women, the government should focus on training programs and extension services in non-farming agriculture.

This study is limited in finding the influence of some socio-economic determinants of women's participation in agriculture. There may be several other determinants impacting the participation of women in farming and non-farming activities of agriculture. This study is also confined to a limited area in India's Bhiwani District, Haryana State, so research can be further conducted by considering a wider region and more respondents by other researchers.

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