

Factors Affecting Role of Women in Various Agricultural Activities with Special Reference to Crop Diversification in Haryana

*Dr. Akshu¹, Dr. Suman Rani², Dr. Lalit Sharma³, *Dr. Sonam⁴, Dr. Neha Phogat⁵

¹* Assistant Professor, Department of Economics, Maharshi Dayanand University, Rohtak, Email ID - akshuhooda@mdurohtak.ac.in

²Assistant Professor, College of Vocational Studies, University of Delhi, Email ID - sumanmalikeco@gmail.com

³Assistant professor, Department of Economics, Guru Jambheshwar University of Science and Technology, Hisar, Email Id – lalitsharma.1@gjust.org

⁴Assistant Professor, Department of Economics, Sanskaram University, Jhajjar, Haryana. Email ID - sonam.liberal@sanskaramuniversity.ac.in

⁵Assistant professor, Department of Mathematics, M.D. University, Rohtak. Email ID – drnehaphogat96@gmail.com

***Corresponding Authors:**

Dr. Akshu

Email ID: akshuhooda@mdurohtak.ac.in

Abstract

With the advent of Green Revolution, there was a substantial growth in agriculture sector of Haryana. However, over the years, the increased production and penchant of farmers towards paddy and wheat cultivation gave rise to numerous problems. The crop specialization started affecting the environment negatively, resulting into its degradation and eventually impacting the human health. Crop diversification might be helpful in addressing these concerns and can possibly be a breakthrough in overcoming the slumping agricultural economy. Women are involved in multifarious activities ranging from household chores to agricultural and domestication tasks. Their empowerment can help in largely diversifying the crops. This paper endeavors to identify the factors affecting the role of women in various agricultural activities with reference to crop diversification in Haryana. The researchers used primary data for this purpose and analysed the data by using the Logistic Regression Analysis in the study. The study revealed that education, head of households, ownership of land holding, and land cultivated by the households are the statistically significant factors that can affect the participation of women in decision-making regarding various agricultural activities with special reference to crop diversification in the state.

Key Words: Agricultural Activities, Women Participation, Decision Making, Education.

JEL Classification: Q22, Q120.

INTRODUCTION

Haryana is one of the states that were at the receiving end of the benefits derived from the Green Revolution due to favorable agro climatic conditions, fertile alluvial plains, and proper irrigating systems. Agriculture sector of the state contributes around 3 per cent to the Gross Domestic Product (GDP) of India, but its share in Gross State Domestic Product (GSDP) declined over time from 46 per cent in 1980-81 to 20.92 per cent in 2022-23, even though it remains vital for employment and livelihoods. Haryana engages more than 60 per cent of the workforce in its agricultural endeavors (Haryana Kisan Ayog). Therefore, the agriculture sector provides large employment prospects.

With the advent of Green Revolution in India there were tremendous changes in the agricultural scenario. India was successful in overcoming the issues of acute food deficit and became self-sufficient in food grains. Similarly, there was a substantial growth in agriculture sector of Haryana. However, over the years, the increased production and penchant of farmers towards paddy and wheat cultivation gave rise to numerous

problems. The crop specialization started affecting the environment negatively, resulting into its degradation and eventually impacting the human health. The monocropping also curtailed the production of other traditional and leguminous crops. The intensified use of chemical fertilizers resulted in contamination of soil

and water (Singh, 2016; Tuteja, 2015). Excessive usage of natural resources and inefficient irrigation practices decreased the water availability in many areas. Paddy cultivation which requires large amounts of water gradually reduced the water tables in some districts. 60 per cent of geographical area experiences soil degradation – alkalinity, salinity, and water logging, threatening the food security in the longer run (R.B. Singh, 2000). Hence, it is imperative to solve these issues by introducing systematic changes like modification of the cropping patterns, also known as crop diversification. Crop diversification might be helpful in addressing these concerns and can possibly be a breakthrough in overcoming the slumping agricultural economy, as suggested by the Ministry of Finance (2016).

In developing countries, crop diversification has become a key alternative to traditional farming, aiming to boost growth, preserving natural resources, and generating employment. In simple terms, it involves changing crops or cropping patterns to enhance land productivity sustainably. Diversifying agriculture is vital for improving nutrition and reducing poverty. It also helps farmers increase their income by reducing reliance on a single crop (R. Khanam, 2018). Sawant (1993) identifies two types of diversification: enterprise diversification, where resources shift between sectors like crops to livestock, and crop diversification, involving a shift from food to non-food crops. For Gupta and Tiwari (1985), increasing crops is the meaning of diversification. In the Indian context, the gist of crop diversification is to shift from less rewarding crops towards higher profitable crops (FAO, 2001; Hazra, 2001).

Vyas (1996) and Chand (1999) emphasize changing cropping patterns, such as replacing rice-wheat monoculture with more profitable horticultural crops. Crop choices should align with agro-climatic conditions to restore natural resources. The rice-wheat system is increasingly seen as unsustainable, linked to stagnant productivity, declining employment, groundwater depletion, and soil degradation. Albeit, crop diversification seems a great solution, it still cannot eradicate all the problems in itself and thereby the policy makers need to focus on other required areas too, such as the participation and role of women in agriculture, as the emerging agricultural crisis affect women's livelihoods in a larger way than anticipated.

Women constitute about half the population of India. Their participation in agriculture is significant for the sustained development of the country. As per Oxfam India (2018), approximately 80 per cent women in India are employed in the agriculture sector. 55 per cent of the total female workforces are agricultural labourer while 24 per cent of them are cultivators. However, gender disparity has been reflected by the fact that women hold only 12.8 per cent of the entire operational holdings (Census, 2011). The growing migration of men from rural to urban areas in search of better non-farm jobs and higher incomes led to the 'feminization' of agriculture. This further increased women's responsibilities as entrepreneurs, cultivators, and labourers. Presently, there are 48 per cent men in agriculture sector as compared to 75 per cent females. Due to out-migration, desertion or widowhood, women head more than 20 per cent of rural houses (Planning Commission; Economic Survey, 2017-18). Women are responsible for the production of 60 to 80 per cent of the country's food and 90 per cent of the dairy production (Oxfam India, 2018).

Women are involved in multifarious activities ranging from household chores to agricultural and domestication tasks. Their empowerment can help in diversifying the crops to a great extent. In conformity with IFPRI (Bryan et al., 2021), greater the involvement of women in decisions regarding crop production more is the diversification of crops in households. In other words, it was observed that the households where the production decisions were taken by the women of the house tend to have diverse crops, mostly replacing crop production with vegetable farming. Therefore, for reaping more benefits from crop diversification, it is important that women should be empowered economically and socially with introducing certain changes. As per NITI Aayog's suggestions (Patel and Sethi, 2021), participation of women at community level and investments in women farmers related schemes should be enhanced in order to speed up the empowerment

mission for a better economy.

Hence, an attempt has been made to identify the factors affecting role of women in various agricultural activities with special reference to crop diversification in Haryana.

RESEARCH METHODOLOGY

This section deals with the methodology adopted for the present study. Research methodology is a way to solve the research problem in an organized manner. Research methodology is the procedure for conducting a study. It should be planned carefully. The reliability, adequacy and accuracy of results depend on the information collected in a systematic manner.

Haryana state has been selected purposively because there is ample amount of potential for agricultural development by increasing women’s participation in the sector since Haryana is one of the recipient states of green revolution. Multistage sampling has been used for the research work. The sampling has been done in four stages i.e., District, Blocks, Villages and Farmers. At the first stage a total of four districts namely Kaithal, Hisar, Rohtak and Sonapat have been selected randomly for the research. For collecting primary data, it has been decided to select two blocks from each district therefore, a total of eight blocks have been selected randomly. On the same scale, two villages from each block have been selected. In totality, 16 villages have been selected for collecting the primary data. At last, 20 households from each village have been selected randomly. In this manner, a total of 320 households have been selected from the state of Haryana. Therefore, the sample size is one state, four districts, eight blocks, sixteen villages and three hundred and twenty farmers. To fulfill the objectives of the study, women involved in agriculture have been interrogated to analyse their extent of participation on a five-point Likert scale. Regarding various agricultural activities, women interviewees categorized their roles into major or minor decision makers, equal decision makers, sole decision makers or whether having no participation at all (Kaur, 2011).

Further, logistic regression model has been used to find out the factors affecting role of women in decision making regarding various agricultural activities with reference to crop diversification.

Logistic Regression

When the variable is categorical, logistic regression is the proper regression strategy to use (binary). The logistic regression, like all regression studies, is a predictive analysis. Logistic regression is a statistical method for describing and explaining the relationship between one dependent binary variable and one or more nominal, ordinal, interval, or ratio-level independent variables. We can use a logistic regression model to create a link between a binary outcome variable and a set of predictor factors. The logit-transformed probability is described as a linear connection with the predictor variables.

Let Y be the binary outcome variable signifying failure/success with values 0 and 1, and p be the probability of y being 1, $p=P(Y=1)$. Let $x_1 \dots x_k$ represent a set of predictor variables. Then the logistic regression of Y on $x_1 \dots x_k$ estimates parameter values for $\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k$ via maximum likelihood method of the following equation.

$$\text{logit}(p) = \log\left(\frac{p}{1-p}\right) = \alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k \tag{1}$$

Exponentiate both sides and find the multiplicative inverse.

$$\frac{1-p}{p} = \frac{1}{\exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k)} \tag{2}$$

Divide the fraction on the left side of the equation in half and add one to both sides,

$$\frac{1}{p} = 1 + \frac{1}{\exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k)} \tag{3}$$

$$\frac{1}{p} = \frac{\exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k) + 1}{\exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k)} \tag{4}$$

Finally, take the multiplicative inverse to get the probability formula, $P(Y=1)$

$$p = \frac{\exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k)}{1 + \exp(\alpha_0 + \alpha_1 x_1 + \dots + \alpha_k x_k)} \tag{5}$$

FACTORS AFFECTING THE ROLE OF WOMEN IN AGRICULTURE SECTOR

This part of the paper determine various factors influencing different agriculture activities, with reference to crop diversification. To identify the same, every one of the respondents is presented with a series of statements

which requires their ratings regarding each statement based on the degree of their participation in decision making, as compared to men regarding various agricultural activities, on a five-point Likert scale with a range of sole decision maker to no participation at all. The answers have been analysed. Further, logistic model has been applied on the factors that affect women’s role in decision making related to the agriculture sector.

Coefficient of selected variables of Logistic analysis

The estimates presented in table no. 1 provide information about how the dependent and independent variables are related to each other, where women participation in decision making is the dependent variable. These estimates indicate the amount of increase (or decrease, if the coefficient's sign is negative) in the predicted log odds of women participation = 1, that would be expected by an increase of 1-unit (or decrease) in the predictor, while holding all other predictors constant. The coefficients of the non-significant independent variables are not substantially different from zero, which should be noted when interpreting the results. Because these coefficients are often difficult to read as they are in log-odds units, they are frequently transformed into the odds ratios. This can be done manually by calculating exponentiation of the coefficient, or otherwise by referring to the right-most column labelled as "Exp(B)" in the table no. 1.

Table No. 1 Coefficient of logistic analysis in Haryana 2021-22

Particulars	B	S.E.	Wald	Df	Sig.	Exp(B)
Age	.310	.262	1.396	1	.237	1.363
Education	1.318	.289	20.735	1	.000	3.736
Head of households	2.962	.768	14.881	1	.000	19.339
Family type	19.773	3525.442	.000	1	.996	386764886.569
Size of family	-.170	.227	.559	1	.455	.844
Ownership of land holding	2.991	.816	13.428	1	.000	19.904
Family income	.120	.113	1.123	1	.289	1.128
Land cultivated by households	-.392	.134	8.537	1	.003	.676
Constant	-21.438	3525.443	.000	1	.995	.000

Source: Calculations based on survey schedule of current study area

Dependent Variable: Women participation

Predicators: constant, age, education, head of households, family type, Size of family, ownership of landholding, family income, land cultivated by households.

Further, table no. 1 reveals the results of logistic regression. Multiple factors are utilized in the table, some of which are significant while others are not. One unit change in age causes 0.310 per cent increase in women participation in the decision making in agriculture sector which means that older women tend to engage more in decision making process but the effect is insignificant on dependent variable. As one unit change in education causes 1.318 per cent increase in participation of women in decision-making, the effect is statistically significant on dependent variable. The results indicate that as educational level of women increases, their participation in decision making also increases. This may be because educated women have better understanding of technology and can adapt the digitalization in a better way. The table further revealed that one unit change in head of households causes 2.962 per cent increase in participation of women. Its effect on dependent variable has been found statistically significant. The Exp(B) shows that female headed households have 19.3 times greater participation in decision making as compare to male headed households.

Moreover, one unit change in Family type from joint to nuclear causes 19.773 per cent increase in decision making power of women, whereas its effect on dependent variable is insignificant

Further, table no. 1 shows that one unit change in size of family causes -0.170 per cent decrease in women participation in decision making which also depicts the negative insignificant effect on dependent variable. Besides, one unit change in ownership of land holding causes 2.991 per cent increase in decision making power of women and it has been found having statistically significant effect on participation of women. It may be because if women have ownership of the landholdings, then they are more economically empowered. Ownership of landholding has statistically significant effect on participation of women in decision making. Further, the data revealed that one unit change in family income causes 0.120 per cent increase in women participation in decision making regarding agricultural activities and the effect on dependent variable is statistically insignificant. The results also shows that one unit change in land cultivated by the sampled households causes -0.392 per cent decrease in decision making and found statistically significant at 5 per cent level of significance. It shows that the participation of women in decision making is decreases with the increase in size of land cultivated by the farmers.

Logistic Model summary of selected variables.

The logistic model summary in table no. 2 indicates that the overall model is statistically significant, $\chi^2_{df=8} = 286.165, p < 0.05$.

Table No. 2 Model Summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square	DF	Sig. of Chi-square
144.562 ^a	0.591	0.799	286.165	8	.000

Source: Calculations based on survey schedule of current study area

Dependent Variable: Women participation

Predictors: constant, age, education, head of households, family type, Size of family, ownership of landholding, family income, land cultivated by households.

The explained variation in the dependent variable based on our model range from 59 per cent to 79 per cent depending on the Cox & Snell R Square or Nagelkerke R Square, respectively.

CONCLUSION

The study presented the factors affecting the role of women in various agricultural activities with special reference to crop diversification in Haryana. The results revealed that the extent of participation of women as compare to that of men in agriculture sector is significant but major decisions were not taken by women as compared to men. The study indicate that education, head of households, ownership of land holding, and land cultivated by the households are the statistically significant factors that can affects the participation of women in decision-making regarding agricultural activities with special reference to crop diversification in the state. The results indicate that as educational level of women increases, their participation in decision making also increases. This may be because educated women have better understanding of technology and can adapt the digitalization in a better way. one unit change in ownership of land holding causes 2.991 per cent increase in decision making power of women and it has been found having statistically significant effect on participation of women. It may be because if women have ownership of the landholdings, then they are more economically empowered.

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