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ICTs and Farm Women: Access, Use and Impact

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I

INTRODUCTION

The ICTs in recent years have witnessed major changes and are emerging as a powerful tool for accelerating agricultural growth in a developing country like India. There has been a rapid growth in the ICT sector since the late 1980s and the use of ICT has dramatically expanded since the 1990s. Simultaneously the Indian agriculture is moving towards feminisation and the role of women in agricultural growth and development has been increasing considerably. Though women's contribution in food production, food processing leading to eventual export of agricultural production has been well documented but not fully recognised they face greater constraints than men farmers (Chand *et al.*, 2012). Women farmers have been reported to be 20-30 per cent less productive than men (FAO, 2011). The less productivity of women is attributed to lack of access to resources including land, finance and technology, among other things. In addition, women's participation in benefits such as training, information and knowledge is not adequate. Despite women's significant and crucial role in agricultural development and allied fields, they have virtually no access to agricultural information, services or production assets and have very limited control over their earnings (Huyer and Carr 2002). Access to ICT means has potential to make significant contribution in the empowerment of farm women and support their endeavour for productivity enhancement in diverse farm activities. ICTs are a diverse set of technological tools and resources to create, store, generate value and manage information. It consists of segments as diverse as telecommunications, radio and television broadcasting, computer hardware, software and services and electronic media. For ICTs to benefit women in agricultural production and to challenge the existing gender imbalances in rural livelihoods, understanding of women's access to ICTs, usage of ICTs by them, barriers for access, and the impact of ICTs on agricultural productivity and ultimately the empowerment of farm women is crucial. The present study was undertaken to address some of these dimensions. More specifically this study examines the extent of farm women's access to ICTs, the use of ICTs by farm women, the determinants of farm women's access to ICTs and explore the impact of ICTs on farm productivity and women's empowerment.

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II

DATA AND METHODOLOGY

Data

This study is based on the primary data collected from selected villages in Haryana in 2009. A cluster of three villages, namely, Palri Khurd, Palra and Jajal in Sonapat district of Haryana was purposively selected for the study as this is a vegetable growing area and use of ICT means in acquiring information regarding marketing of vegetables can significantly affect the rural household economy. From each village 40 farm families of different size of holdings, viz., landless, small, medium and large (10 from each category) were selected, making an overall sample of 120 farm households for this study. Primary data on access and other aspects of ICT and its usages by farm women were collected from the female respondents of the selected farm families through well-structured and pretested schedule. The information generated by PRA/group discussion complemented the questionnaire based information collected through personal interview.

Methodology

Tabular analyses was carried out to examine the status of farm women, and the barriers they face in accessing and using ICTs, the status of access to ICT, its usages by them. To examine the relationship between ICT and other variables and identify the factors affecting access to ICT, first correlation among different variables was seen and then on the basis of correlation coefficients, variables for regression function were specified. Linear regression function was estimated to identify the factors affecting farm women's access to ICTs. The specifications of various variables used in the regression model have been presented in Annexure 1. The regression model used in the study is depicted as follows;

$$Y = \alpha + \beta_i x_i$$

where Y represents the ICT access score (dependent variable) of the women farmers and varies from 0 to 40. X_i s are the factors that influence ICT access to farm women and β_s are the coefficients of explanatory variables. The explanatory variables included farm size, caste, family type, farm income, livestock income, total farm income, total income, highest education, female education, family size, etc.

III

RESULTS AND DISCUSSION

Profile of the Study Area

The survey of the selected villages of Sonipat district of Haryana revealed that there are about 150, 300 and 150 farmers' families in Palari Khurd, Jajal and Palra villages respectively. The literacy rate is 90 per cent among males and 50 to 65 per cent in females. The selected villages are 50 kilometres away from, Delhi. Rice, wheat and vegetables dominate the cropping pattern in these villages. Among vegetables, cauliflower, cabbage, tomato, okra and brinjal are predominantly grown. Soils in these villages are sandy loam and tubewell is the main source of irrigation. About 8-10 sprays of insecticides is applied especially in cauliflower. The seeds are mainly purchased from the market shop. The soils are sandy loam and a major share of the harvested produce is sold in the local market.

TABLE 1. SOCIO-ECONOMIC PROFILE OF SAMPLE HOUSEHOLDS

Particulars (1)	Categories				
	Landless (2)	Small (3)	Medium (4)	Large (5)	All (7)
Farm size	-	1.11	2.98	12.14	5.40
Family details					
family size	5.59	5.49	4.89	6.25	5.47
M-F ratio	1.13	1.29	1.41	1.32	1.30
W-D ratio	1.85	2.06	2.89	3.37	2.45
Literacy rate (per cent)					
Male	77	92	89	92	86
Female	60	61	63	77	65
Average age					
Male	22.71	24.04	27.49	31.44	26.35
Female	20.30	26.57	27.61	31.25	26.20
Caste distribution					
General	8 (26.67)	19 (63.33)	25 (83.33)	23 (76.87)	76 (50.67)
Backward	17 (56.67)	6 (20.00)	5 (16.67)	7 (23.33)	49 (32.67)
SC	5 (16.66)	4 (13.34)	0	0	23 (15.33)
ST	0	1 (3.33)	0	0	0
Type of family					
Nuclear	21 (70.00)	21 (70.30)	20 (66.67)	20 (43.33)	82 (68.33)
Joint	9 (30.00)	9 (30.00)	10 (33.33)	10 (33.33)	38 (31.67)

Note: Figures in parentheses are percentages of the number of farmers in that category.

The social and economic status of the households plays an important role in the access of ICT means by farm women (Table 1). The analysis of the socio-economic attributes exhibits that the average size of land holding in the study area was 5.4 acres

with a variation from size of land holdings from 1.11 acres for small to 12.1 acres for large farmers with an average land holding of 5.36 acres. Land tenancy was prevalent in the form of share cropping as the large farmers who are not able to cultivate their entire land are getting it cultivated by sharing the inputs. The average size of the family was 5.5, having no relationship with size of holdings as it was 5.5 in small, 4.8 in medium and 6.3 members in large farm size groups. The average age of male and female was about 26 years and the family composition tilted in favour of workers. The worker dependent ratio of 2.45 indicated the dominance of working population in the sample households. The literacy rate for both male and female population was impressive as it ranged from 77 to 92 per cent in case of males and 60 to 77 per cent in case of females which was above the state average for males (78.5 per cent) and for females (55.7 per cent). As expected the sex ratio is tilted in favour of males; the average male to female ratio is 1.3 varying from 1.1 to 1.4 among the different classes of sample households. The sample households consists of 51 per cent of general caste, 33 per cent OBC and 15 per cent SC and only 1 per cent ST. The analysis of caste distribution revealed that landless are predominantly backward caste and the farmers of small, medium and large farms are of general caste. Out of the total 120 selected farm families, 61 per cent were nuclear and the remaining 39 per cent were living in joint family system.

ICT Access to Farm Women

Access to information resource is one of the important dimensions of women empowerment. Women farmers are generally observed to be lacking in knowledge and skills compared to male counterparts in areas like land use, water management and marketing of the produce. ICT can be an effective tool to bridge this gap. Further, the use of ICTs is effective in improving the land use, water management and marketing of the produce. ICTs access to farm women across various farm size categories was explored (Table 2). It was observed that the extent of the farm women's access to ICT depicted a direct relationship with farm size. Radio and TV is accessible to nearly one-third of women farmers up to medium size farms while 4

TABLE 2. ACCESS TO ICT ACROSS FARM SIZE CATEGORIES

ICT (1)	Farm Size Categories									
	Landless		Small		Medium		Large		All	
	N (2)	Per cent (3)	N (4)	Per cent (5)	N (6)	Per cent (7)	N (8)	Per cent (9)	N (10)	Per cent (11)
Radio	11	37	11	37	7	23	23	77	52	43
TV	9	30	15	50	15	50	22	73	61	51
Phone	1	3	2	7	8	27	23	77	34	26
Mobile	1	3	11	37	13	43	20	67	45	37
Computer	0	0	0	0	0	0	3	10	3	10

Note: Percentages are calculated within farm size categories. Total percentage across each farm size category is not 100 because same farm women may have access to more than one ICT tools.

out of 5 women farmers of large farms have access to ICT tools. Access to more modern means of ICT like phones and mobiles is less than 10 per cent for women having no land or very small farms while it increases to 67 per cent for large farm size women. Access to computers is virtually nil in all categories barring few cases (10 per cent each) among large farm size categories.

Usage

Access to ICTs is a necessary condition but not a sufficient condition for harnessing the potential benefits of ICTs. About one-fourth of the women farmers use radio, TV and phones on a daily basis while only one out of eight women viewed TV on weekly basis. The rest of the women did not use any means of ICT (Table 3). The pattern suggested that TV being the most popular means of communication among farm women can be used for dissemination of essential agricultural knowledge to them on a day to day basis.

TABLE 3. FREQUENCY OF USING ICT TOOLS BY FARM WOMEN

ICT Tools (1)	<i>(per cent)</i>				
	Daily (2)	Weekly (3)	Monthly (4)	Yearly (5)	Total (6)
Radio	23	0	0	1	24
TV	23	12	0	0.7	36
Phone	22	1	0	0	23
Mobile	0	0	0	0	0
Computer	0	0	0	0	0
Laptop	0	0	0	0	0
Email	0	0	0	0	0

Access to ICT is important to facilitate its utilisation in agricultural and non-agricultural activities. It is equally important to understand the extent of ICT usage in different agricultural and non-agricultural activities. Table 4 shows that use of radio, TV and phones ranges from 17-30 per cent and does not differ significantly for agricultural and non-agricultural activities. The use of TV was observed to be maximum for both agricultural and non-agricultural purposes. In spite of having access, the use of mobiles and computers by farm women was nil. There could be several plausible reasons for this. This may be because of their less linkage with outside agencies and knowledge centres due to their less mobility and other social and cultural reasons. The other reasons could be lack of skills and expertise for using the instruments or some tacit restrictions imposed by the male counterparts.

The analysis was further extended to study the use of ICT for specific agricultural and non-agricultural activities (Tables 5 and 6). The use of ICTs are not uniform for different types of activities. For instance, radio and TV played a significant role in disseminating the information regarding prices, technology inputs and crop protection measures. But for animal health, phone was the major source of communication. It could be due to the urgency and need to confirm the treatment of sick animals and the

TABLE 4. ACCESS AND ICT USE FOR AGRICULTURE AND NON- AGRICULTURE USE

ICT (1)	Uses							
	Access		Agricultural		Non-agricultural		Both	
	N (2)	Per cent (3)	N (4)	Per cent (5)	N (6)	Per cent (7)	N (8)	Per cent (9)
Radio	61	41	29	19	27	18	35	23
TV	78	52	43	29	38	25	52	35
Phone	38	25	26	17	28	19	34	23
Mobile	46	31	0	0	0	0	0	0
Computer	6	4	0	0	0	0	0	0

Note: Per centage are calculated out of total number of farm women households, hence overall use may be more than 100 because of multiple use by same farm women.

TABLE 5. USE OF ICT FOR AGRICULTURE RELATED PROGRAMMES

ICT (1)	Use in agriculture related programmes											
	Animal health		Crop protection		Production price		Crop input		Techno-logy		Credit	
	N (2)	Per cent (3)	N (4)	Per cent (5)	N (6)	Per cent (7)	N (8)	Per cent (9)	N (10)	Per cent (11)	N (12)	Per cent (13)
Radio	13	9	14	9	41	27	19	13	23	15	11	7
TV	1	1	7	5	2	1	5	3	28	19	0	0
Phone	26	17	3	2	1	1	0	0	0	0	0	0
Mobile	0	0	0	0	0	0	0	0	0	0	0	0
Computer	0	0	0	0	0	0	0	0	0	0	0	0

Note: Percentage are calculated with respect to total farm women households. Row total and column total may be more than 100 per cent because of multiple use.

TABLE 6. OTHER USES OF ICT BY FARM WOMEN

ICT (1)	Health Related		Education Related		Entertainment		News		Films/Songs/Game	
	N (2)	Per cent (3)	N (4)	Per cent (5)	N (6)	Per cent (7)	N (8)	Per cent (9)	N (10)	Per cent (11)
	Radio	13	9	14	9	41	27	19	13	23
TV	35	23	42	28	77	51	42	28	67	45
Phone	0	0	0	0	0	0	0	0	0	0
Mobile	0	0	0	0	0	0	0	0	0	0
Computer	0	0	0	0	0	0	0	0	0	0

Note: is calculated with respect to total farm women households. Row total and column total may be more than 100 per cent because of multiple use.

importance of livestock animals in farm household economy. Interestingly, this was the only major purpose of using phones by the farm women. The results exhibited that ICT has been helping farm women in selling their farm produce especially vegetables at current market rates and also in adopting improved technologies for cultivation of vegetables. Besides, agricultural uses, ICTs especially Radio and TV have been used by farm women for health, education, news and entertainment.

Among non-agricultural activities, entertainment and film songs have been observed as most common uses of TV and radio by farm women (Table 6). Maximum use of TV and radio for entertainment implies that agricultural knowledge should be imparted to farm women by means of interesting and entertaining programmes instead of traditional ones. Thus, the ICT have been helping them to maximise their welfare and improving their livelihood.

Factors Affecting Access to ICTs by Farm Women

Before the factors can be identified, it is important to see the relationship between ICT access and different socio-economic variables like farm size, caste, farm income per acre, livestock income, total farm income, total income, farm size category, highest education in family, female education, non-farm income, family type and number of children. For this purpose, access to different means of ICT within a household was quantified to single ICT access score. Access to each ICT tool is awarded a score of 10. Hence, if a farm woman has access to TV, radio, phone and mobile, net ICT access score for her would be 40. Table 7 presents the correlation analysis of various variables representing socio-economic aspects of the household with ICT access score.

The analysis showed that farm size, caste, farm income per acre, livestock income, total farm income, total income, highest education in family, female education and family size variables were observed as positively correlated with ICT score of the farm woman. Surprisingly education of the farm woman was not significantly correlated with the ICT access score. Non-farm income, number of children and family type (whether the family is nuclear or joint) were negatively correlated to the ICT access score of farm women. This may be because more children and joint family demands more time of the farm woman leaving less scope for ICT access. However, none of these variables were significantly correlated.

TABLE 7. CORRELATION ANALYSIS OF ICT SCORE WITH SOCIO-ECONOMIC VARIABLES

Variables (1)	Correlation coefficient (2)	Significance (3)
Farm size	0.56	0.00
Caste	0.28	0.00
Farm income	0.22	0.01
Livestock income	0.22	0.01
Total farm income	0.49	0.00
Total income	0.42	0.00
Highest education in the family	0.28	0.00
Non-farm income	-0.09	0.25
No of children	-0.07	0.39
Family type (0=Nuclear, 1 Joint)	-0.13	0.12

After examining the relationship of different variables with ICT access scores, some seemingly affecting variables were specified and multiple regression function

was fitted to identify the factors affecting access to ICT (Table 8). The variables highest education in the family, caste and total income were observed as positively affecting the access to ICT. Joint family system had significant negative effect on farm women's access to ICTs. Caste of the household also influences the farm women's access to ICTs. Farm women belonging to general caste were having higher probability of accessing ICTs.

TABLE 8. FACTORS AFFECTING ACCESS TO ICTS BY FARM WOMEN OF SAMPLE HOUSEHOLDS

Variables (1)	Coefficients (2)	Std. error (3)	t (4)	Sig. (5)
(Constant)	7.244	3.048	2.377	.019
Total income	8.905 E-6	.000	4.935	.000
Caste	3.147	1.493	2.107	.037
Family type	-4.493	1.506	-2.984	.003
Higher education	0.666	0.271	2.460	.015

Note: Dependent variable: ICT access score, N=120, R Square=0.281, F=14.186, Significance .000.

Impact of ICT

The ultimate objective of enhancing access and use of ICTs is to improve the livelihood and enhance empowerment of women especially the farm women. To understand the impact of ICT on empowerment and productivity, women farmers were categorised as adopter and non-adopter. Adopter category represents farm women who had access to at least a single ICT tool (ICT score>0) and non-adopter category represents those who did not have any access to ICT tool (ICT score=0). Agricultural farm income per acre, the total farm income including livestock per capita, total income (including non-farm) per capita were considered to study the impact of ICTs on productivity. To study the impact of ICTs on empowerment, a variable decision score was generated to represent average participation of woman farmer in decision making related to agriculture, animal husbandry, domestic, other social and economic activities. The analysis showed that adopters were able to enjoy significantly better participation in decision making and had better productivity (Table 9). The findings reaffirmed the crucial role being played by ICTs in improving the status of farm women and increasing their economic welfare.

Barriers of ICT Use

Various studies have pointed out that women have lesser resources and less income available to secure the use of ICTs. Illiteracy, lack of electricity and poor infrastructure are just some of the challenges that have been preventing rural women from gaining the benefits from ICTs (Amtul *et al.*, 2012). Also in the present study, it was observed that many farm women of the study area did not use ICT to its full

TABLE 9. ESTIMATES OF 'PARTICIPATION OF WOMEN FARMERS IN DECISION MAKING' AND PRODUCTIVITY FOR ADOPTERS AND NON-ADOPTERS OF ICT

Parameter (1)	Adopters (ICT score > 0) N=84		Non-adopters (ICT score = 0) N=36		Sig. (2 tailed) (6)
	Mean (2)	Std. Error Mean (3)	Mean (4)	Std. Error Mean (5)	
Decision score	0.487	0.009	0.453	0.009	0.010***
Agricultural farm income per acre (Rs.)	42793	2592	33570	3541	0.030**
Farm income including livestock per capita ('000 Rs.)	57200	7363	21633	2973	0.000***
Total Income (Farm+Non-farm) (Rs.)	350268	52942	164939	55822	0.017**

potential even though they had access to it. To find out the probable reasons for not using ICT even after having access to ICT tools, the opinions of the female respondents were solicited. The analysis revealed that shortage of time is the major limiting factor followed by language problem (Table 10). Social reasons and non-working of devices are some other reasons (even though not significant) affecting the use of ICT. This suggests that promotion of cheap, time saving domestic appliances can increase the use of ICT and help the farm women in improving their livelihood. The barrier of language can be crossed by promoting education and also by facilitating more programmes in local language.

TABLE 10. RESPONSE OF FARM WOMEN REGARDING REASONS FOR NOT USING ICTs

ICT (1)	Non availability of time		Language problem		Social reason		Radio not working	
	N (2)	Per cent (3)	N (4)	Per cent (5)	N (6)	Per cent (7)	N (8)	Per cent (9)
Radio	21	34	3	5	1	2	5	8
TV	19	24	12	15	5	6	1	1
Phone	20	53	3	8	1	3	5	13
Mobile	0	0	0	0	0	0	0	0
Computer	0	0	0	0	0	0	0	0

Note: Percentage are calculated with respect to the farm women having access to ICT tools.

IV

CONCLUSIONS AND POLICY IMPLICATIONS

The farm women's access to ICTs and their usage in the study area was observed to be less. However, the access to ICTs has been found to improve the income of farm women households and increase their participation in the decision-making. The study concluded that access of ICT to farm women is largely determined by the socio-economic status and educational status of the household. Women farmers reported use of ICT for treatment of sick animals as well as for getting knowledge of the latest prices of vegetable produce. Interestingly, many women farmers having access to ICT were also not able to use ICT because of lack of time and language

problem. The study suggested that ICT access and its use can be promoted by increasing (i) the total income of the household, (ii) education, (iii) promotion of simple and affordable tools for agriculture and household work that can save labour and time, (iv) IT support to rural infrastructure along with availability of electricity, (v) promoting local languages in ICT.

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ANNEXURE 1

DESCRIPTION OF VARIABLES

Variables (1)	Definition (2)
Dependent Variable:	
ICT Score	Access to each ICT means to the farm woman was provided with a score of 10. Thus, a farm woman having access to three ICT means would be characterised by a score of 30.
Independent Variables:	
Farm size (acres)	Size of the farm ranging from 0-25 acres
Caste dummy (1= general 0= others)	Others include schedule caste, schedule tribe and backward
Family type dummy (0 = nuclear, 1= joint).	Describes the family structure
Farm income (Rs. per acre)	Income from the agriculture
Livestock income (Rs.)	Income from livestock
Total farm income (Rs.)	Total Income from agriculture
Total income (Rs.)	Income from all sources including non-farm income
Highest education (years)	Highest number of years of education by any family member
Female education (years)	Number of years of education of woman farmer
Family size (number)	Number of members in the family