Policy Brief
October 2019

Female Employment in Agriculture: Women as Farm Managers[1]

Executive summary

The role of women as farm managers in India has been veiled behind the image of men as primary decision-makers on farms. Data show that approximately 8% of farm households had female farm-managers in 2004, and this number increased to 11% in 2011. This trend begets an in-depth understanding of female-managed farms, including productivity differentials across women and men. This study shows that total farm production and profits are lower by about 11% in households where women manage farms. This falls to 7% when controls for crop choice, input usage, location, and farmer characteristics are included. The main mediating factors explaining the productivity gaps are crop choice and input usage, explaining almost 45% of the productivity gap. The study also provides suggestive evidence that inadequate experience of women farm managers in agricultural production processes can be an important explanation for the remaining productivity difference.

Introduction – context and rationale

About 80% of the female workforce in rural India is engaged in the agricultural sector – 55% are agricultural labourers and the remainder are mostly self-employed on family farms either as unpaid labourers or operators (Census, 2011). The Economic Survey of India 2017-18 recognises that 'feminisation' of the agriculture sector is taking place in India, with increasing number of women in multiple roles as cultivators and entrepreneurs. It also recognises that in general women farmers lack access to resources such as land, water, credit, technology, and training. These observations noted in the Economic Survey are based on research by the Food and Agriculture Organization (FAO, 2011) across different countries but have not been quantified till date in the literature on Indian agriculture.

The role of women as farm managers in the country has been veiled behind the image of men as primary decision-makers on farms. As per the Indian Agriculture Census 2010-11, women farmers operate 12.78% of operational land holdings and 10.34% of the operational area in the country; in 1995-96, these figures stood at 9.5% and 7.2%. According to the Indian Human Development Survey (IHDS), the proportion of households where women manage farms increased from 8.3% in 2004 to 11% in 2011.

While the levels are low, it is clear that women are gaining ground in farm management. Increasing access to non-farm employment and consequent migration by men from rural areas (Tumbe 2015)

[1] This Policy Brief is based on Mahajan, Kanika (2019), "Back to the Plough: Women Managers and Farm Productivity in India", World Development, 124 (2019) 104633.

and structural changes in the rural economy over time (Chandrasekhar, Sahoo, and Swaminathan 2017) are key factors driving the observed growth in the number of female farm managers over time.

The importance of farm management in the Indian context cannot be disputed since at least 50% of households in rural areas cultivate some land. The trend of increasing numbers of female farm-managers begets an in-depth understanding of farms with female managers, including differentials in productivity levels across women and men managers. This question assumes importance from the perspective of both gender and food security. No study has looked at women as farm managers and its implications for farm productivity in India so far. This study provides estimates for gender differences in agricultural farm productivity, and examines to what extent these gaps can be explained by observed differences in characteristics between households where women and men manage farms.

Brief description of the study

An extensive literature – mostly based on Africa, especially sub-Saharan Africa – looks at the difference in female and male productivity in agriculture.[2] There are two strands within this literature: one looks at the gender difference in labour productivity in cultivation of a crop, and the second looks at the crop productivity of land either owned or managed by female and male farmers. Most studies find that productivity of female-managed plots is lower than those controlled by males, and this difference either becomes very small or vanishes when controls for access to productive resources are included.

The contribution of women to agriculture in India has mostly been studied along the dimensions of unpaid farm labourers and agricultural labourers. Research on the phenomenon of rise in farm management by women has been limited largely because few datasets in India capture whether farms are operated or managed by women; Agricultural Census, National Sample Survey Organization's (NSSO) survey on Land and Livestock Holdings and IHDS are the only ones recording this information.

The study uses three measures to capture productivity – production value, profit value, and crop-specific yields. It makes two important contributions to the literature – one, it is the first quantitative study in the Indian context on gender differentials in farm productivity and second, it applies semi-parametric decomposition techniques to look at the productivity differentials along the entire distribution and not only at the mean levels of productivity.

[2] A detailed review of the studies has been provided by Doss (2015) and Quisumbing (1996).

Apart from productivity, it also looks at differences in farm profits since input decisions are taken to maximise profits and not production value. Efficiency requirements on farm should then relate to profitability and not value of output only.

To assess the effect of the gender of the farm manager on the outcomes of interest, the analysis controls for the following factors:

(a) *Crop choice*: An important mediator in most studies on gender differentials in agricultural productivity is the type of crop cultivated on a particular land. Table 1 shows the difference between men- and women-managed farm households in cultivated area and crop choice. The cultivated area is smaller in women-managed farm households. Women grow more cereals whereas men grow more non-food crops in India.

Table 1. Difference between households by gender of farm manager: Output and crop choice

Variable	Definition	Men (N=13105)	Women (N=971)	Difference	
Production	Ln(production value per acre)	8.378	8.332	-0.046	
Profit	Ln(profit value per acre)	7.873	7.826	-0.047	
Area	Ln(gross cultivated area)	0.987	0.482	-0.506	***
Cereal	Proportion of area under Cereals	0.671	0.73	0.059	***
Pulses	Proportion of area under Pulses	0.079	0.071	-0.008	***
Oilseeds	Proportion of area under Oilseeds	0.092	0.06	-0.032	
Spice	Proportion of area under Spices	0.017	0.017	0	
Fruits & Veggies	Proportion of area under F&V	0.07	0.081	0.011	
Non-food	Proportion of area under Non-food crops	0.067	0.039	-0.028	***
Others	Proportion of area of cultivation under others	0.004	0.003	-0.002	*

*Notes: (i) The sample includes all households that report a positive value of production in the last year. For calculation of profits, households that reported negative values were treated as missing and the effective number of observations was 11,255 for men and 804 for women managers. (ii) ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.*
Source: Author's calculations, IHDS-I (2004).

(b) *Input usage*: The mean level of input usage in households where men and women manage farms is shown in Table 2. Women farm-managers have significantly lower access to all inputs except hired equipment. Women-managed farm households hire more equipment largely because their ownership of equipment is significantly lower than that of men-managed farm households.

Table 2. Difference between households by gender of farm manager: Input usage

Variable	Definition	Men (N=13105)	Women (N=971)	Difference	
Production	Ln(production value per acre)	8.378	8.332	-0.046	
Profit	Ln(profit value per acre)	7.873	7.826	-0.047	
Area	Ln(gross cultivated area)	0.987	0.482	-0.506	***
Cereal	Proportion of area under Cereals	0.671	0.73	0.059	***
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Spice	Proportion of area under Spices	0.017	0.017	0	
Fruits & Veggies	Proportion of area under F&V	0.07	0.081	0.011	
Non-food	Proportion of area under Non-food crops	0.067	0.039	-0.028	***
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*Notes: (i) The sample includes all households that report a positive value of production in the last year. (ii) ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.*
Source: Author's calculations, IHDS-I (2004).

(c) *Other controls*: A description of other individual and household-level control variables included in the analysis is given in Table 3. Women farm-managers, on average, have lower education levels than men farm-managers, which is largely due to overall lower schooling levels of women in rural India. There is a stark difference across farm households in marital status of the farm manager: men farm-managers are likely to be currently married and living with their spouse, whereas women farm-managers are more likely to be widowed. Around 13% of women farm-managers have migrant husbands. In terms of wealth deciles, there is no consistent difference across men- and women-managed farm households; if anything, women managers are over-represented in the upper deciles.

Table 3. Difference between households by gender of farm manager: Demographic characteristics

Variable	Definition	Men (N=13105)	Women (N=971)	Difference	
Production	Ln(production value per acre)	8.378	8.332	-0.046	
Profit	Ln(profit value per acre)	7.873	7.826	-0.047	
Area	Ln(gross cultivated area)	0.987	0.482	-0.506	***
Cereal	Proportion of area under Cereals	0.671	0.73	0.059	***
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Non-food	Proportion of area under Non-food crops	0.067	0.039	-0.028	***
Others	Proportion of area of cultivation under others	0.004	0.003	-0.002	*

*Notes: (i) The sample includes all households that report a positive value of production in the last year. The number of observations may differ for each variable if a particular question used to generate it has missing data. This is especially true for asset deciles since a few households do not report owned assets. (ii) ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.*
Source: Author's calculations, IHDS-I (2004).

The study also provides suggestive evidence to ascertain whether inadequate knowledge and experience of women farm managers is a mechanism behind residual effects, which cannot be explained by observed characteristics. While experience or training levels of the farm managers in the study cannot be directly measured, the Indian context is helpful due to existing evidence on gender roles across crops. Women have been traditionally more involved in rice cultivation in India and wheat has been predominantly regarded as a male crop. It has been well-documented in the agriculture literature that rice cultivation involves greater demand for women's labour (Boserup 1970). Agricultural tasks like transplanting and weeding are predominantly performed by women in rice-growing areas. On the other hand, wheat has traditionally involved more male labour due to ploughing and sowing being the main agricultural tasks in wheat production (Bardhan 1974). The yield differences are examined across rice and wheat to see whether women's lack of experience and adequate knowledge in wheat production plays a role.

The channel of knowledge and experience driving productivity can also be explored by using variation across regions in gender norms in India. The north-south divide in gender equity in India has been a focal point of many studies that find that women have less autonomy in the north (Dyson and Moorem 1983, Basum 1992, Jejeebhoym 2000). The pattern of lower female workforce participation rates in north India relative to south India and its persistence over many decades has been well-noted (Boserup 1970, Chen 1995, Mahajan and Ramaswami 2017).

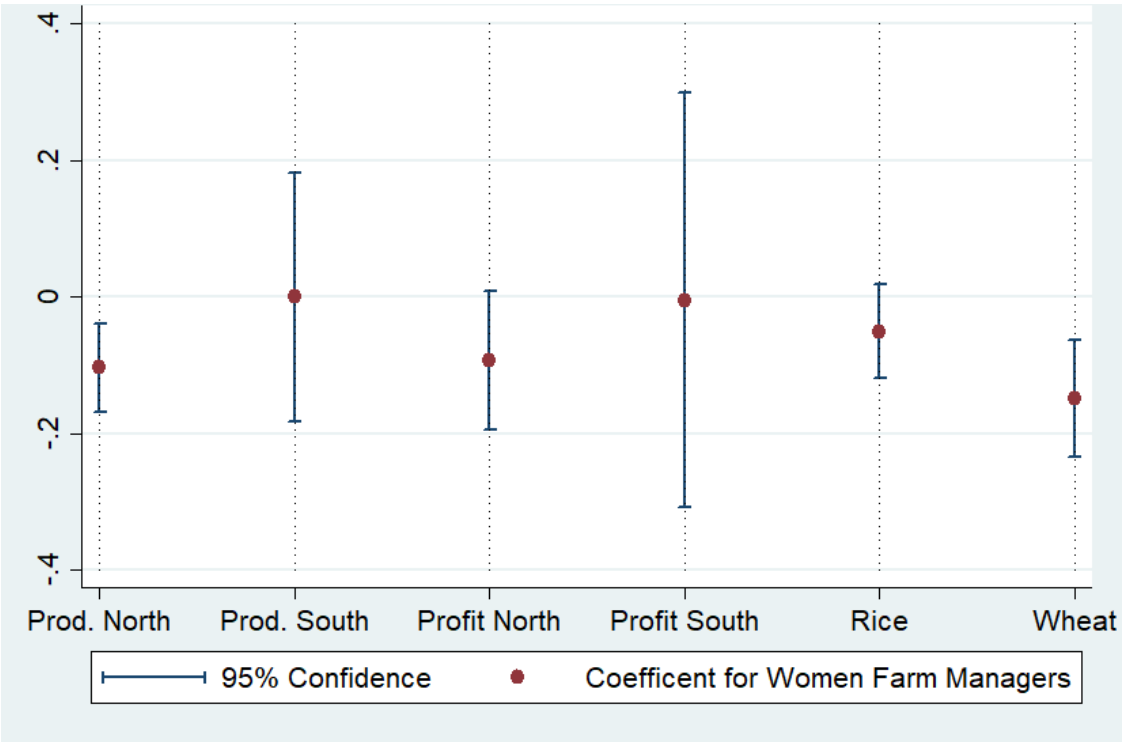
This study analyses data from IHDS, which is a nationally representative survey conducted by the University of Maryland and the National Council of Applied Economic Research (NCAER) in 2004-05. It covers 41,554 households across 382 districts of India. It covers all states and union territories except Andaman and Nicobar Islands and Lakshadweep. The primary sampling units are villages in rural areas (1,503 villages) and the number of rural households surveyed is 27,010. The IHDS is the only survey in India that captures information both on gender of the farm manager and farm production.

Major findings

- The production value and profits are lower on women-managed farms by 11% as compared to farms managed by men, on average. This figure falls to 7% when controls for crop choice,

input usage, location, and farmer characteristics (for example, age, education, marital status) are included.

Figure 1. Difference in outcomes of farms managed by women



Note: The figure shows the differences between production and profits – separately for North and South India, and rice and wheat yields, of farms managed by women compared to those managed by men.

- The main mediating factors in explaining the productivity gap are crop choice (33%) and input usage (13%). Women tend to cultivate more cereals and food crops than non-food crops, which leads to a lower value of production on the same farm size. Also, lower usage of inputs like irrigation, credit, fertilisers, pesticides, and other machine equipment on women-managed farms leads to lower productivity obtained for the same crop. Lack of purchasing power is unlikely to be a reason for the lower input usage as the households where women manage farms and those where men manage farms are observed to be similar in wealth.
- Women at the lower end of the production and profit value distributions have lower productivity measures than men. At higher values of the productivity distributions, there is no significant gender gap in productivities, once all the controls have been included.
- The study provides suggestive evidence on the mechanisms contributing to the remaining productivity difference that cannot be explained by differences in observed characteristics. It

is seen that inadequate experience of women farm-managers in agricultural production processes can be an important factor behind the remaining gap.

- The study tests for the possibility that differential prices are received by women and men for their agricultural produce due to discrimination or differences in bargaining power in the sale market. It is found that if anything women are able to get a better bargain in terms of price for their produce – both rice and wheat. Thus, lower production values on women managed farms in India, are due to lower farm productivities and not lower price received for produce, in comparison to men managed farms.
- The study also tests for the possibility that the differences in farm productivity are driven by women farm-managers who are more time constrained or physically infirm, rather than inexperienced. This may be on account of being widowed, having a husband who has migrated away, presence of small children in the household, or old age. However, no significant effects of these of these factors are found.

Policy recommendations

- Women's role in farm management is increasing and improving crop productivity on these farms must be an active ingredient of agricultural policymaking in India. Indian agricultural policy needs to be reshaped to cater to women farmers, based on an in-depth understanding of their emerging needs.
- Currently there is little space in the policy to make provision for differential needs of women who manage their farms. This is largely because of invisibility of these women as primary decision-makers on farm matters from the discourse. A part of it is attributable to paucity of data regarding this facet of cultivator households in India.
- Recent government initiatives like *Mahila Kisan Swashaktikaran Pariyojna* (MKSP), started in 2010 and covering 20% of Indian districts, aim to build knowledge, skills and capacities of women farmers. These programmes need to be strengthened and the extent of reach and scale of these programmes should be increased for women farm-operators to reap their full benefits through higher farm productivity.
- Given that managerial ability on agricultural farms differs by gender due to inexperience, and lack of access to training and information, provision of extension services to women farm operators can be useful.
    - Cultural barriers in access to services, rooted in pre-existing gender norms, will also have to be taken into account. There is a greater need for these programmes in the northern states where women have traditionally been excluded from agricultural work.

- Using primary data on group-based women farmers in India, Agarwal (2003) finds that gender biases in extension services are a key constraint for them. Extension service programmes need to have a special component which explicitly caters to the needs of women farm-operators.
- There exists an economic rationale behind such targeting because returns to these efforts are likely to be greater for women managers. An increase in productivity on women-managed farms will lead to an overall increase in income generation for women.

- Along with extension services, greater access to credit must be provided on more favourable terms to help women farm operators purchase agricultural inputs which they are otherwise not able to use on their land.
- Future surveys should collect information on health status of farmers to fully explore the possibility of differential health status between women and men driving the residual productivity gap.

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Within the initiative, four projects are being led by Prof. Farzana Afridi at the Indian Statistical Institute. This research has been conducted under one of the projects.