



## Gender Participation on Rice Post-harvest Activities in Bangladesh

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### Abstract

The study was undertaken to examine the extent of women along with men participated in post-harvest activities; to identify the problems and constraints faced by them and find suitable solution from their perception. The post-harvest activities were estimated at farm level in *Aman* rice at Rangpur, Nilphamari, Khulna, Satkhira and Jessore district of Bangladesh by using survey data collected randomly from 270 rice growing households for the year 2012-13. It employed participatory approaches to investigate farmers' perceptions on post-harvest management. The analyses shows women spends more time (591 hours ha<sup>-1</sup>) on PH activities than men (581 hours ha<sup>-1</sup>) but the ultimate decision maker of those activities are male indicating that women are very seldom given the opportunities to implement their ideas for execution although they are now gaining the right to give their opinion because of social awareness.

**Key words:** Decision making ability, Post-harvest activities, Post-harvest loss, Women

### Introduction

In Bangladesh though most of the farmers are male but a lot of women are now playing an important role in the improvement of agricultural sector as well as the economy of Bangladesh. Being a traditional Muslim society, women hardly participate in agricultural activities outside home (Hossain and Bayes, 2009). Women's agricultural activities were confined to homestead production and post-harvest operations, however, in recent years they are mostly involved in livestock and poultry rearing activities along with men besides crop production activities. Official statistics often underestimate the value of women's work and their overall contribution to national wealth. Women continue to provide a large proportion of the labor that goes into agriculture. Among the neighboring countries, only 59 per cent of Bangladeshi women, as compared to over 74 per cent of Indian, 64 per cent Pakistani and 85 per cent Nepali women, are employed in agriculture (Hossain and Jaim, 2011). Indeed, in most Asian countries the number of women employed in agriculture as a percentage of the economically active population is higher than that of men. However, women's contribution to agriculture, which is considered as unpaid family labor, is grossly underestimated. In fact, if unpaid work were included, the figures for female employment in agriculture would be even higher (FAO, 2003). The roles that women play in agriculture vary from region to region and country to country.

Women in Bangladesh are involved in more than half of all post-harvest processing activities. At the household level, they are almost entirely responsible for tasks such as par boiling, drying and storing seed for planting the following season and storing grain for household use or sale later. Keeping the above views in mind the research work was undertaken with following objectives are investigate the extent of women involvement at all

the level in post-harvest activities of rice and to identify the major problems and constraints faced by the farmers, especially women and to suggest policy implications for reducing losses as well as increasing farm productivity.

### Materials and Methods

In order to estimate the trends of female labor participation at the national level, data from Labor Force Surveys (LFS) conducted by the Bangladesh Bureau of Statistics (BBS) in 1995-96, 1999-2000, 2002-2003, 2005-2006 and 2010 were used. The post-harvest activities were observed at farm level in *Aman* rice by using survey data, collected randomly from 270 rice growing households for the year 2012-13. A participatory methodology was followed, to elicit information about post-harvest processes followed in the research Areas (Rangpur, Nilphamari, Satkhira, Khulna and Jessore). The method named Key Informants Interview (KII) was followed for the survey of post-harvest activities and constraints faced by women along with men. Purposive sampling procedure was followed to select the respondents of the research locations.

### Analytical technique

Averages and percentages were used to compute the participation of male and female labor in post-harvest activities. Information about post-harvest activities was obtained from the farmers during following operations: (i) harvesting, (ii) threshing, (iii) parboiling, (iv) drying, and (v) storage.

### Decision making index

Following the methodology used by Bose *et al.* (2009), 'Women decision making Index' (DMI) has been constructed in this article in consideration of women participation in household decision making process in carrying out PH activities. We assigned the lowest value (=0) when the decision is taken by male alone, in this case women being lowest 'empowered'. When decision is taken

jointly by husband/male and female we assigned value =1. The highest value (=2) is assigned when decision is taken by female alone, that is, when women are most empowered.

The following formula was used for DMI

$$DMI = \frac{F \times 0 + M \times 2 + B \times 1}{F + M + B}$$

Where,

F= Female Female decision = 2

M= Male Male decision = 0

B= Both Both = 1

The rating values of decision makers have been assigned according to the weight in favor of the female/wife for all the activities. Again, to assess the individual decision making status and position of all women respondents, two randomly defined ranges are arranged as given below:

Not decision maker  $DMI \leq 1$

Decision maker  $DMI > 1$

### Weighted average method

The weighted average formula was used to calculate the average value of a particular set of numbers with different levels of relevance. The relevance of each number is called its weight. The weights should be represented as a percentage of the total relevancy. Therefore, all weights should be equal to 100%, or 1. The most common formula used to determine an average is the arithmetic mean formula. This formula adds all of the numbers and divides by the amount of numbers. The formula of weighted average =  $w_1x_1 + w_2x_2 + w_3x_3 + \dots + w_nx_n$

## Results and Discussion

### Gender involvement in agricultural activities

From 1995-96 the size of adult labor force (15 years and above) has increased from 36.1 million to 40.7 million at the end of the year 1999-2000 with growth rate of 3.2%. However, the growth of female labor force is increasing day by day. During the above period the growth of female labor force was 14.4% put side by side with male 1.2%. From the Labor Force Surveys (LFS) in between 2002-2003, 2005-2006 and 2010 (Table1) the same trend was observed.

**Table 1.** Annual average labor force growth rate over time by gender: Bangladesh

Periods	Both sexes	Male	Female
1995-96 to 1999-2000	3.2	1.2	14.4
1999-2000 to 2002-2003	4.4	3.8	6.5
2002-2003 to 2005-2006	2.21	1.23	5.45
2005-06 to 2010	3.39	1.40	8.69

Source: Labor Force Survey (LFS) 1999-2000, 2002-2003, 2005-2006 and 2010

Again, participation of female labor in agriculture compared to male also increased over time. With an increase of 21.53% from 1999-2000 to 2005-2006 adult labor force has increased from 39.0 million to 47.4 million (Table 2).

**Table 2.** Sector wise gender labor contribution

Year	Sector	Male	Female	Total
1999-2000	Agriculture	16.2	3.8	20
	Non-Agriculture	14.9	4.1	19
	Total	31.1	7.9	39
2002-2003	Agriculture	17.2	5.8	22.9
	Non-Agriculture	17.3	4.1	21.3
	Total	34.5	9.8	44.3
2005-2006	Agriculture	15.1	7.7	22.8
	Non-Agriculture	21	3.6	24.6
	Total	36.1	11.3	47.4
2010	Agriculture	15.2	10.50	25.72
	Non-Agriculture	23	5.7	28.70
	Total	38.2	16.20	54.42

Source: Labor Force Survey (LFS) 1999-2000, 2002-2003, 2005-2006, and 2010

While female labor force has increased by 43%, compare to 16% of men. Particularly, in agricultural sector the trend of absolute decrease in male labor force had been seen. With a decrease by 7% agricultural male labor force decreased from 16.2 million to 15.1 million from the year 1999-2000 to 2005-2006. On the other hand, during the same period, female labor force in agriculture has increased from 3.8 million to 10.5 million. Comparative positions of men and women participation in agriculture in the year 2010 can be seen clearly from Table 2.

Participation of male labor force in non-agricultural activities, on the other hand, has increased from 14.9 million to 23.0 million from 1999-2000 to 2010. Changing the trend of participation of male laborers from agriculture to non-farm activities has created a tremendous labor shortage in the agricultural sector of Bangladesh. The findings of the researcher also indicate that, in the non-farm sector the opportunities for employment of the male labor force has increased over time while for female labor force it has decreased to some extent. For male labor force the percentage of adult participation in agriculture has decreased from 51.9%, to 41.4% and 31.9% according to the LFS of 1999-2000, 2002-2003 and 2005-2006, respectively. On the other hand percentages of women in agriculture increased gradually from 48.1% to 68.1% according to LFS of 1999-2000 and 2005-2006, respectively showed in Table 3. But in 2010 male labor force increased and female labors decreased compare to previous year of studies.

**Table 3.** Percentage contribution of gender labor in agricultural sector: Bangladesh

Year	Male	Female
1990-2000	51.9	48.1
2002-2003	41.4	58.6
2005-2006	31.9	68.1
2010	39.8	64.8

Source: Labor Force Survey (LFS) 1999-2000, 2002-2003, 2005-2006, and 2010

**Gender contribution to post harvest activities**

At the time of harvesting male labor spent more time to harvest than female and there is a considerable participation of hired labor. But at Khulna, women participation at harvesting is noticeable, this is because in the Hindu colonized area women go outside home of doing harvesting along with their male family member which is restricted at Muslim areas. Total time allocation for harvesting per hectare is 532 hour for Jessore, 479 hour for Khulna and 389 hour for Rangpur as harvesting is done manually. Farmers always try to

harvest in a short possible time being afraid of different natural calamities and also over ripening, for which they have to hire more labor to finish, which in turn increases their cost of production. There are not so differences in threshing between Jessore (215 hour) and Khulna (223 hour) as mechanized threshing is practicing there because of its widely availability. Male participants of Jessore on threshing are much higher than female as technology is mainly handled by males. But at Khulna females involved more on threshing although different mechanization is observed there. On the other hand at Rangpur where threshing is manually done takes more time (314 hour) than others, as threshers are not very popular here at the time of *Aman* season because of its small-scale production. Here it is noticed that generally males do manual threshing than females, as it requires heavy working ability which sometime is not affordable by female.

**Table 4.** Time (hour) allocation for post-harvest activities per hectare for *Aman* season

Activities	Jessore			Khulna			Rangpur			Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Avg. time ha <sup>-1</sup>
Harvesting	350	182	532	262	217	479	226	163	389	467
Threshing	123	92	215	107	116	223	185	129	314	251
Parboiling	10	54	64	16	28	44	2	11	13	40
Drying	196	411	607	145	181	326	57	112	169	367
Storage	21	35	56	24	28	52	19	15	34	47
Total	700	774	1474	554	569	1123	490	431	921	1173
Avg. Labor (no. of labor ha <sup>-1</sup> )	88	97	185	69	71	140	61	53	114	146
Avg. wage (Taka)	204	151		284	180		223	88.9		

The above Table 4 shows the time allocation at different post harvest activities of *Aman* rice per ha of land. But almost all the females in the study areas who take the risk of doing hand threshing make them suffer from different pain related diseases. So persuading farmers for using threshers by personal / community purchasing or the Govt. subsidy should be a great solution to them which in turn reduces labor cost as well as human work stress. Parboiling is done mainly by the females of the family; sometimes males help them in carry out such activities which is not so negligible. The overall average time allocation for parboiling is 40 hour per hectare.

In case of drying the female participation is higher than men as almost all the respondent farmers use sun drying or solar drying at their homestead areas or roads adjacent to their homes. Manual drying which takes long time duration to cover, women have highest involvement along with their homestead chores. So to remove this type of

drudgery different type of dryer (i.e. collapsible dryer, flatbed dryer) has been introduced only by IRRI, which took only few hours to complete drying and also keeps proper moisture. Farmers of the study areas especially women very interested with these dryers but having a large costing figure most of them lagged behind.

Women spent more time for storage activities than men and total time allocation for storage is 47 hour. Average labor required to conduct post-harvest activities per household per ha is lower at Rangpur 114 person as the labor scarcity is severe due to migration. As Because of labor is very cheap at Rangpur compare to other region migration to south from north of Bengal prevails. The wage rate of hired male labor is higher at Khulna 284 Tk. followed by Jessore 204 Tk. and Rangpur 223 Tk. Women wage rate is apparently very lower at all the region. The burden of almost all post-harvest activities is lies on women and technology reduces the workload by saving time. That's why

technology intervention should be widely exposed to the farmers to understand its importance and value, how much it is important for women health.

**Women empowerment in decision making process**  
 Women's participation in decision making process indicates their level of social development. The economic independence of women and their share of contribution to the family are considered major

factors, which influence the participation of women in family decision making process. However, there are other social factors that influence the participation of women in household decision making. To assess the extent of participation of women in household decision making process on different improved post-harvest related activities can be seen from the Table 5.

**Table 5.** DMI on the average responses of the respondent on different post harvest activities

Activities	Respondent	Jessore		Khulna		Rangpur	
		Decision of adopting technology	Technology used by	Decision of adopting technology	Technology used by	Decision of adopting technology	Technology used by
Threshing	Male	22	20	21	22		1
	Female	5	3	2	3		
	Both	37	40	20	18	4	3
	<b>DMI</b>	<b>0.73</b>	<b>0.73</b>	<b>0.56</b>	<b>0.56</b>	<b>1</b>	<b>0.75</b>
Storage	Male	9	5	10	5	1	
	Female	5	4	2	3	2	
	Both	37	41	22	26	7	9
	<b>DMI</b>	<b>0.92</b>	<b>0.98</b>	<b>0.76</b>	<b>0.95</b>	<b>1.1</b>	<b>1</b>

Decision making status: Not decision maker if  $DMI \leq 1$  and decision maker if  $DMI > 1$

To assess the extent of participation of women in household decision making process on different improved post-harvest related activities can be seen from above Table. The degree of participation has been assessed through asking question to the respondents whether the decision is taken by male alone or male and female jointly or female alone with respect to each of the activities as presented in the Table. According to weight in favor of women rating values of decision makers have been assigned (i.e., 0 = decision is taken by male alone, 1=decision is taken jointly by male and female and 2=decision is taken by female alone). Finally, decision making Index (DMI) has been estimated following the methods as described in details in the Methodology. The findings showed that respondents used or adopt technology only in two cases (threshing and storage). Almost in two cases Decision is taken jointly by male and female. That means the trends of taking decision mainly by males are changing, now females' decision on households are also expected. The research found that as joint decision take place but the ultimate decision is taken by the male. We see that only at Rangpur region females are decision maker in both cases of adopting technology and technology used in case of storage. Findings showed that the value of the Decision making index for women is generally low, indicating that women are very seldom given the opportunities to implement their ideas for execution.

**Post-harvest related problems and reduction from farmer perception**

Farmers suggested a number of measures towards reducing harvest and post-harvest losses of rice. They suggested various measures such as timely

cutting and carefully handling with efficient harvest machines. They suggested threshing rice on protected paved floor and collecting rice panicles only for reducing carrying losses. Table 6 shows different suggestions with rank to reduce post-harvest loss from farmers' point of view. To reduce storage losses they suggested training and capacity building and awareness creation and also asked for credit facilities to set up durable and functional storage structure or containers. They suggested the need for implementing definite intervention policy for reducing marketing loss and offsetting the deception in weight and market price.

Harvesting should be done at proper way with carefulness about natural disaster will some extent reduce harvesting loss is suggested by most of the respondents. Medicine using is very important for the prevention from grain shedding. In order to reduce threshing loss concrete floor is the first requirements. Shifting from the manual to the proven efficient mechanical method of threshing will greatly reduce losses. Pedal-operated threshers have been very popular because of their portability and affordable costs, especially if made locally. Careful during threshing from domestic animals are also very important.

The reduction of field losses in harvesting and threshing can increase the profits of the small holder. To reduce parboiling loss overall carefulness about parboiling is required. At the time of drying farmers use poly sheet for easily collection of grains. Keeping away birds by using net is also very effective for wastage. The place used for drying should be cleaned around and sometimes it should be wrapped by cow dung

instead of using poly sheet is an ongoing traditional practice. At the time of storage farmers should be careful about the cleaning of the store place. Proper drying is the utmost requirements of seed for expecting good storage. Technical knowledge of

storing seed like using IRRI super bag, Margo leaf, keeping bag far from the edge of the store room (above the floor) are effective for keeping away insects.

**Table 6.** Farmers suggestion of reducing post-harvest losses

	Farmers suggestion in weighted average method								
	Suggestion	Jessore	Rank	Khulna	Rank	Rangpur	Rank	Total	Rank
Harvesting	Done at proper way	2.43	1	4.71	2	3.29	2	10.43	1
	Careful about natural disaster	1.14	3	6.86	1	1.14	3	9.14	2
	Use medicine	1.90	2	1.19	3	5.95	1	9.05	3
Threshing	Paved floor used during threshing	5.62	2	5.05	2	4.10	1	14.76	1
	Technology required	8.00	1	3.43	3	1.43	2	12.86	2
	Careful during threshing	3.10	3	6.43	1	1.43	2	10.95	3
Parboiling	Large pot required	0.86	3	3.71	1	6.86	2	11.43	1
	Use enough water	1.71	2	0.76	3	8.19	1	10.67	2
	Avoid over boiling	3.86	1	2.43	2	4.29	3	10.57	3
Drying	Keeping away birds & poultry	3.62	1	5.05	1	4.67	3	13.33	1
	Polythene/plastic sheet used	0.71	3	2.14	3	9.52	1	12.38	3
	Clean around the drying floor	2.29	2	4.57	2	5.71	2	12.57	2
Grain storage	Technology used	4.29	1	1.71	3	8.00	2	14.00	1
	Well cleaned store room	0.24	3	2.14	2	10.00	1	12.38	2
	Well drying	1.52	2	2.48	1	8.00	2	12.00	3
Seed storage	Protects from insecticide	3.43	1	4.76	1	7.81	3	16.00	1
	Well drying	2.14	2	2.14	2	7.86	2	12.14	2
	Well cleaned store room	1.14	3	1.14	3	8.29	1	10.57	3

At harvesting, parboiling and drying respondents does not give any improved solutions to PH loss as most all of them are not familiar with mechanized harvesting, parboiling and drying. In post-harvest activities the quality of the harvested crop, the degree of losses incurred and the efficiency of the operations and hence, overall costs are affected by factors related to the weather, the way of handling and the technology used. So to earn maximum profit and reducing loss farmers have to be conscious about post-harvest handling very carefully.

**Conclusions**

Women could achieve much more skill in agriculture sector if policy makers could provide a conducive environment for their effective participation along with men in the relevant activities. More support to women in income generating activities (IGAs) through agro-based activities should be an important part of the government's strategic plan. Establishment of agro-based industries must be linked with incentives to involve more women folk from the rural areas as well as men folk. Otherwise a great portion of the

population will remain under- or un-utilized by not being mainstreamed in rural development. Moreover, year-round supply of processed food items, supply of nutritious food, value addition to agricultural products and enhanced family income cannot be attained if the rural women do not have access to necessary scope to demonstrate their contribution in PHAs as female contribution in Agriculture especially in PHAs increasing day by day. This is crystal clear from the above discussion; women play an indispensable role after the harvesting of the rice production for post-harvesting processes/activities as most of the rural men become sluggish when they bring their harvest in home. These all post-harvest processes/activities are in addition to their usual daily domestic routine work. Men and women participated at various levels in the rice-based PH processes and the research shows women spent more time (591 hours) than men (581 hours). Massive training and other supportive measures are required to scale up capacity strengthening of women in conducting PHAs of rice for food security at household and national levels.

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