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PARTICIPATION OF RURAL WOMEN IN HOMESTEAD AGRICULTURAL ACTIVITIES AND ITS IMPACT ON FAMILY INCOME: EVIDENCE FROM SADAR UPAZILLA OF RANGPUR DISTRICT IN BANGLADESH

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ABSTRACT

The present study is undertaken to assess the profitability of homestead enterprises practiced by the rural women, to determine the factors that are contributing to income earned from homestead agricultural activities by the women, and to assess women's involvement on changing status in decision making of the selected farm households. Primary data were collected by direct interview from Rangpur Sadar Upazilla with a pretested survey questionnaire. Profitability analysis was performed on the basis of gross margin and net returns while a log-log regression model was run to estimate the factors that contribute to the income earned from the homestead farming activities by the women. Moreover, a three-point Likert scale was used to estimate the perception scores of women participations in the day to day household decision making process. The results from the research indicated that the net return for vegetables and fruits per household was estimated Tk. 8,721 while it was Tk. 18,237 for livestock and poultry rearing. It is also found that these enterprises are profitable in business. Log-log regression estimates indicate that income from homestead agricultural activities increases with the increases in the age of the respondent, education of the respondent, and experience of the respondent. The Perception Index showed that women were given priority not only in the decision-making process about farm activities but also on the decision making of other non-farm activities. Homestead activities create employment opportunity for rural women and they spent more times in the homestead activities. Participation of rural women in decision making process is increasing day by day by practicing homestead activities on regular basis. Thus, this study would help in understanding the profitability of homestead agricultural activities along with women empowerment, and women decision-making process at home.

Keywords: Family income, homestead activities, impact, rural women

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INTRODUCTION

In Bangladesh, women consist of about half of the total population and about 90 percent of the women live in rural areas (Khan et al. 2009). Majority of the rural women are excluded from the mainstream decision-making process such as decisions on selection of crops, utilization of labor on crop fields, whether the kids should go to school or not, and are confined to household activities and/or domestic work (White 1992; Balk 1997; Khan 2001; Bushamuka et al. 2005). Most of the rural women in Bangladesh grow up to be obedient wives, and rear children. Life, outside of homesteads and immediate surroundings, are unknown to many rural women due to the nature of patriarchal family, poverty, illiteracy and lack of information. For these reasons, women are hardly consulted on the majority of household decisions (Sebstad and Cohen 2000; NCBP 2000; Bushamuka et al. 2005; Begum 2007). Based on the indicators such as health, marriage, education, employment, and social equality, Bangladeshi women have ranked the lowest in the world (NCBP 2000). There are about 21 million households in Bangladesh (BPHC 2011). Although the average size of household is declining, the majority of the households, especially in rural regions, have a small piece of land next to their dwelling areas. This land can be used to produce fruits, vegetables, livestock and fish that provide households with access to foods rich in micronutrients that may not be readily available or within their economic reach (Talukder et al. 2000; Chakravarty 2000). Moreover, in a country like Bangladesh where poverty and malnutrition are so widespread, this homestead agricultural activities of producing fruits and vegetables can be beneficial to improve food security condition of the rural households (Bushamuka et al. 2005).

Bangladesh economy is still predominantly based on agriculture and other activities related to agriculture. Agriculture contributes about 18 percent to GDP and employs about 62 percent of the nation's labor force (BBS 2013). Among the 90 percent of the rural women, 59 percent are engaged in post-harvest agricultural activities and especially in homestead gardening (Khan et al. 2009). This homestead gardening provides the major share of livelihood resources for poor farmers. At present, homestead gardening is an example of multipurpose land use system. Plants are generally grown in the backyard, at the pond side, and around the cowshed. Vegetables from homestead are mostly consumed at home and only the surplus is sold. Homestead gardening improves the livelihood conditions the of poor farmers and also meets several socio-economic and ecological conditions which contribute to sustainability and better living (Bushamuka et al. 2005). According to FAO (1995) "The home garden is an important land unit for households as it is often the center of family life; a well-developed home garden is a complete farming system; the home garden is the most direct means of supplying families with most of the non-staple foods they need year-round". Multiple social benefits of homestead gardens include enhancing food and nutritional security in many socio-economic and political situations, improving family health and human capacity, empowering women, promoting social justice and equity, and preserving indigenous

knowledge and culture (Talukder et al. 2000; Chakravarty 2000; Bushamuka et al. 2005). The most fundamental benefit of homestead gardens stems from their direct contributions to household food security by increasing availability, accessibility, and utilization of food products. Homestead gardens are maintained for easy access to fresh plant and animal food sources in both rural and urban locales. Food items from homestead gardens add substantially to the family energy and nutritive requirements on a continuous basis (Bushamuka et al. 2005).

As stated above, homestead-based food production provides a great source of nutrition and income generating opportunity for the resource poor, unskilled labor especially for the rural women. Moreover, no previous studies are found that solely assessed the profitability of homestead agricultural activities. Thus, it is essential to understand the current homestead agricultural practices are performed by the rural women. It is also essential to assess the profitability of each enterprise and how these would help in women empowerment. With this end of view, the present study is designed to assess the profitability of each homestead enterprise such as profitability of fruits and vegetables production and profitability of livestock rearing. Moreover, this study also aims to estimate the factors that are contributing to total family income earned from homestead gardening by the respondents (Null hypothesis Ho: there is no impact of the factors in income earned from homestead agricultural activities that are considered in the model). Furthermore, this study also aims to assess women involvement on changing status in decision making of the selected farm households, that is, creation of employment for women by homestead gardening, and involvement of women in household decision making process. Hopefully, this study would contribute to understand the profitability of homestead agricultural activities along with its contribution to family income and women's changing status of household decision making.

MATERIALS AND METHODS

Study Area and Data Collection: Sadarupazilla of Rangpur district in Bangladesh was purposively selected for the present study based on concentration of large number of households consisting of homestead gardens, and ease of data collection. A total of 50 homestead garden households were selected randomly and interviewed through a pretested survey questionnaire over the period of December 2016 to February 2017. Before beginning the interview, each respondent was given a brief description about the aim and objectives of the study. The questions were asked in a systematic and simple manner with friendly environment as well as with proper explanations where necessary. The information supplied by the respondent was recorded directly on the interview schedule. In order to minimize error, data were collected in local units. These were consequently converted into appropriate standard international units. MS Excel software was used for data entry, coding, as well as descriptive analysis.

Analytical Techniques: Microsoft Excel and statistical analytical package SPSS are used to process all collected information. To accomplish the first objective mentioned in the introduction, that is, measuring profitability of each of the homestead enterprises fruits and vegetables, and rearing livestock, financial profitability is derived in terms of gross return, gross margin, and net return of different enterprises. Gross returns for crops, fish culture, and homestead enterprises are calculated by multiplying the total volume of output of an enterprise by the average price in the harvesting period. The following equation is used to estimate gross margin (GR).

$$GR_i = \sum_{i=1}^{n} Q_i P_i$$

Where,

GR_i= Gross return from i-th product (Tk./unit); Q_i = quantity of the i-th product (Tk./unit); P_i = average price of the ith product (Tk./unit); and i = 1, 2, 3,…,n. Here n indicates total number of homestead agricultural enterprises. Gross return of livestock was determined by adding income earned from sales of milk and cow dung, and changes in inventory. Calculation of gross margin is done to have an estimate of the difference between total return and total variable costs. The argument for using gross margin analysis is that the farmers are more interested to know their return over variable cost. The following equation was used to assess the gross margin

$$GM = TR - TVC$$

Where,

GM=Gross Margin (Tk./enterprise); TR=Total return (Tk./enterprise), and TVC= Total variable cost (Tk./enterprise)

Net return was obtained by deducting all cost (variable and fixed) from gross return.

$$\Pi = P_y Y - \sum_{j=1}^{m} P_{xj} X_j - TFC$$

Where,

Π = Net return (Tk./enterprise); P_y= Per unit price of the ith product (Tk./unit); Y = Quantity of the product produced per hectare (unit); P_{xj}= Per unit price of the j-th inputs (Tk.); X_j= Quantity of the j-th input per hectare (unit); TFC = Total fixed cost (Tk.); and j = 1,2,3,…,m. Here m indicates number of inputs used.

To accomplish objective 2- to assess the factors that are contributing to income earned from homestead agricultural activities by the women, a log-log multiple regression model is used as

$$ln\ _i = lna + b_1 lnX_1 + b_2 ln\ _2 + b_3 lnX_3 + b_4 lnX_4 + b_5 lnX_5 + u_i$$

Where,

Y_i = Total family income earned from homestead gardening (Tk./household); X_1 = Age of the respondent (years); X_2= Family size (number of family members); X_3= Level of education of the respondent (years); X_4= Homestead farming experience of the respondent (years); X_5= Homestead area of the respondent (acre); a = intercept; $b_1 \ldots b_5$ = Coefficients that are to be estimated; and u_i = Random error term.

To accomplish objective 3-understanding rural women role in employment and decision-making process, a 3-point Likert scale is used for the present study. Three-point Likert scale includes agreement, disagreement, and neutral. Likert scale is a proper way to arrange collective responses to a set of items in which the responses are scored along a range (Derrick and White, 2017). This method is widely used in assessing the respondent's agreement or disagreement for a series of statements and the range captures the intensity of the respondents' feelings (Burns and Burns, 2008). Perception score for each respondent is calculated by using Perception Index by using the following formula

Perception Index (PI) = 3xA + 1xDA + 2xN

Where,

A = Total number of respondents expressing their perception 'agree' for the statement; DA = Total number of respondents expressing their perception 'disagree' for the statement; and N = Total number of respondents expressing their perception 'neutral' for the statement

RESULTS AND DISCUSSION

Costs, Returns, and Profitability: There are mainly two seasons in Bangladesh namely Rabi season and Kharif season. The homestead gardeners produce different vegetables in these two seasons throughout the year. In Rabi season, the respondents cultivated different vegetables mainly bean, bottle gourd, etc. In Kharif season, the respondents produce gourd, okra, snake gourd, sweet gourd, and chili. They also plant different fruit trees including litchi, guava, jackfruit, mango, papaya, etc. in their homestead area.

Cost of vegetables and fruits are presented in Table 1. The vegetable and fruits production cost items include labor cost, seed or seedling cost, fertilizer cost, and pesticide/insecticides cost, etc. Total variable cost for vegetables and fruits production is estimated about Tk. 9,155 per household. Labor cost is Tk. 380 which is about 4 percent of total cost. Among the total variable cost seed/seedlings cost is the highest and it is about Tk. 4,269 which is about 41 percent of the total cost. Fertilizer and irrigation costs are about 28 percent and 8 percent of total cost, respectively. Total cost is obtained by summing up of total fixed cost and total variable cost. Total variable and total fixed cost for vegetables and fruits are estimated taka 9,155 and taka 1,098, respectively. So, the total cost is taka 10,254 per enterprise.

Gross returns are the monetary value of crop produced in the concerned plots. The gross return for vegetables and fruits from per household was estimated at Tk. 18,975 per

enterprise. Gross margin is the difference between the gross return and total variable costs. The gross margin for vegetables and fruits is Tk. 9,820 per household. Net return is the difference between gross return and total cost. In the study area, net return for fruits and vegetables from per household is estimated taka 8,721 per enterprise (Table 2).

Table 1. Costs of vegetables and fruits production

Items	Cost (Tk./household)	Percent (%)
Labor cost	380.00	3.70
Seed/seedlings	4269.51	41.63
Fertilizer	2915.16	28.42
Irrigation	812.36	7.92
Insecticides/Pesticides	778.59	7.59
Total variable cost	9155.64	89.28
Interest on operating capital	1098.67	10.71
Total cost	10254.32	100

Source: Field survey, 2016

Table 2. Returns from vegetables and fruits production

Items	Taka per Household
Gross return	18975.80
Variable cost	9155.64
Gross margin	9820.17
Fixed cost	1098.67
Net return	8721.48

Source: Field survey, 2016

Costs of livestock in a household were calculated considering all inputs both from home supplied and purchased from markets. Cost of livestock includes the cost of labor cost, feed cost, treatment and medicine cost, vitamin purchase cost, interest on operating capital and depreciation cost (depreciation was calculated using the straight-line method where salvage value was deducted from purchase price then divided by the total life span, years). Total variable cost of livestock includes the cost of labor cost, feed cost, treatment and medicine

cost and vitamin purchase cost, etc. In the study area most of the labor cost for livestock rearing were home supplied. Total labor cost for livestock rearing is Tk. 280 which is about 2 percent of total cost. Feed cost was one of the major cost items of livestock. Both purchased and home supplied feed included in livestock rearing. Feed cost is found to be the highest among the cost of total variable cost. Feed cost estimated Tk. 7,525 which was 52 percent of total cost. Treatment and medicine cost comprised doctor's fee and medicine cost for livestock and these were two major components of this cost. Treatment and medicine estimated Tk. 1,371 which is 9 percent of total cost. Vitamin purchased was another major cost for livestock production. Respondent purchased vitamin to earn profit in livestock estimated Tk.2,234 which was 15 percent of total cost (Table 3).

Table 3. Costs of production for livestock

Item	Cost (Taka/household)	Percent (%)
Variable cost		
Labor cost	280.00	1.93
Feed cost	7525.61	51.96
Treatment and medicine cost	1371.54	9.47
Vitamin purchase	2234.68	15.43
A. Total variable cost	11411.84	78.80
Interest on operating capital	1369.42	9.45
Depreciation cost	1700.65	11.74
B. Total fixed cost	3070.07	21.19
Total cost (A+B)	14481.91	100

Source: Field survey, 2016

Total fixed cost includes cost of interest on operating capital and depreciation cost. For livestock production interest on operating capital estimated Tk.1,369 and depreciation (calculated using straight line method) cost Tk. 1,700 that was 9 percent and 11 percent of total cost, respectively. Finally, total fixed cost estimated Tk. 3,070 that is about 21 percent of total cost. Total cost is the summation of total fixed cost and total variable cost. Total cost for the livestock enterprise estimated Tk. 14,481 (Table 3).

The returns from livestock farming includes value of milk, egg, change of inventory, and value of cow dung, etc. The return from milk was calculated on the basis of average

quantities of milk yield which is used for sold and consumption and average price received per liter of milk. Return from egg was estimated Tk. 854 from poultry rearing in the study area. Cow dung is an organic fertilizer used as manure to preserve land fertility, fuel for cooking, and in production of bio-gas for cooking in household. In the study area, return from cow dung was estimated from per household about Tk. 997 (Table 4). Gross return is the summation of monetary value of net change in inventory and the return from milk, egg and by product. The net change in inventory is the difference between closing stock and opening stock of livestock. Annual gross returns from livestock rearing was estimated Tk. 32,719. Gross margin for per household from livestock rearing was estimated Tk. 21,307. Net return for per household from livestock rearing was estimated Tk. 18,237 in the study area (Table 4).

Table 4. Returns from livestock enterprises for per household

Items	Return (Taka/household)
Milk	150
Egg	854.46
By product(cow dung)	997.62
Total	2002.08
A. Closing stock	86747.09
B. Opening stock	56029.60
Net change in inventory(A-B)	30717.49
Gross return	32719.57
Gross margin	21307.73
Net return	18237.66

Source: Field survey, 2016

Factors that are Contributing to Women's Income in Total Family Income: To determine the women's contribution to total family income earned from the homestead agricultural activities this study considered age (years), family size (number of persons), education level (years of schooling), experience (years of homestead farming) of homestead agricultural activities, and total homestead area (acre) as the most important factors. A simple log-log regression model was estimated and reported in Table 5. Co-efficient for age of the respondent estimated as 0.037 and significant at 5 percent level. It can be explained as age of

the respondent increases by 1 percent, other things remaining the same, the total family income would increase by 3.7 percent. Co-efficient for education of the respondent estimated as 0.062 and significant at 1 percent level. It can be explained as education of the respondent increases 1 percent, other things remaining the same, the total family income would increase by 6.2 percent. Co-efficient for experience of the respondent estimated as 0.086 and significant at 1 percent level. It can be explained as experience (years of homestead farming) of the respondent increases 1 percent, other things remaining the same, the total family income would increase by 8.6 percent (Table 5).

Table 5. Estimates and related statistics of the log-log regression model

Variables	Coefficients	StandardErrors	t-value
Dependent Variable=Log of Total Family Income Earned form Homestead Agricultural Activities			
Intercept (a)	11.728	1.426	8.22
Age of the respondent (X_1)	0.037**	0.017	2.17
Family size(X_2)	-.0.284	0.210	1.35
Education of the respondent (X_3)	0.062***	0.022	2.88
Experience of the respondent (X_4)	0.086***	0.016	5.35
Homestead area (X_5)	0.134	0.114	1.171
R^2		0.571	
F-stat		3.045***	

Source: Field survey, 2016

Note: *** Significant at 1 percent level; ** Significant at 5 percent level; and * Significant at 10 percent level

The coefficient of multiple determination (R^2) is an outline that specifies how well the sample regression line fits the data. It is evident that the values of the coefficient of multiple determination (R^2) was 0.571 which mean that the explanatory variables included in the model explained 57.1 percent of the variation of the total income of the family. F-ratio finds out whether explanatory variable does actually have any significant influence on the dependent variables. In this equation F-value was highly significant at 1 percent level giving evidence of data well fitted for the model (Table 5).

Role of Women in Employment and Decision-making Process

Women's participation in economic activities, an important issue is how many of them pursue these activities on a full-time basis. The duration of employment is also an important issue in the context of measuring the extent of under-employment. The labor hour spent by both men and women has increased in the research sites. Women's are mainly involved in homestead activities and they spent more times for homestead activities. Homestead activities creates more employment opportunity in the study areas.

Table 6 proves that in the study area, wage rate of women was comparatively lower than the man. The wage rate for women was Tk. 250 per day and wage rate for men was Tk. 280 per day. The average working hours/day for respondent, for husband, for son, for daughter and for others in the vegetables and fruits production was 2.12, 1.52, 1.22, 1 and 1 hours, respectively. On the other hand, for livestock farming, the average working hours/day for respondent, for husband, for son, for daughter and for others was 1.46, 1.26, 1.15, 0 and 0.5 hours, respectively. It is also evident that women spent more times in the homestead activities than their male counterparts.

Economic decisions could be concerning economic activity, while social decisions relate to life style of the family. The present study was thus planned to explore the role of rural women in decision making in various family decisions. In the study area homestead-based food production activities is mostly done by women. It is increasing day by day; it has many different positive impacts. One of the positive impacts is that women mostly the spouse of the household head plays an important role in decision making process in the household. In

Table 6. Employment creation for women by homestead gardening

Person involved in farming	Vegetables and fruits		Livestock farming	
	Working hours/day	Wage/day (Taka)	Working hours/day	Wage/day (Taka)
Self	2.12	250	1.46	250
Husband	1.516	280	1.265	280
Son	1.22	280	1.15	280
Daughter	1.00	250	-	250
Others	1.00	280	0.50	280

Source: Field survey, 2016

Table 7. Perception index of decision-making process of women

Sl. No.	Activities	Nature of opinion			Perception index	Rank
		Agree	Disagree	Neutral		
1.	Who takes decision about land preparation	36	2	12	134	1
2.	Who select variety ofhomestead gardening(vegetables ,fruits, fishes, livestock)	24	7	19	117	2
3	Collection and preservation of vegetable's seed	21	14	15	107	4
4.	Weeding decision	25	20	5	105	5
5.	Irrigation decision	16	25	9	91	11
6.	Fertilizer application decision	23	9	18	114	3
7.	Harvesting of household products decision	17	17	16	100	6
8	Marketing of output decision	1	32	17	69	13
9.	Daily expenditure decision	0	8	42	92	10
10.	Buying and selling of valuable things decision	6	12	32	94	9
11.	Decision about children's education	17	22	11	95	8
12	Family health care and treatment decision	4	8	38	96	7
13	Decision about marriage of children	5	15	30	90	12

Source: Field survey, 2016

decision making process there are many items such as land preparation, selection variety of fruits or vegetables, collection and preservation of vegetables seed, weeding, irrigation, fertilizer application, harvesting of household products, marketing of output. Another non-farm decision of the household includes daily expenditure, buying and selling of valuable things, decision about children's education, family health care and treatment decision, decision about marriage of children were considered. The decision about homestead activities taken by respondent herself, sometimes by her husband, and other family member in the household. In Table 7, "Agrees" define decision made by the women, "Disagrees" define decision made by the husband or other family members, and "Neutral" defines decision made by both of them. It was calculated by using the perception index (PI). The PI for each statement has been arranged in rank order according to their extent of agreement which appears in Table 7. It is evident that decision about homestead land preparation is mostly taken by women got the 1st rank with the total perception index 134. Selection of

different variety of homestead gardening products (vegetables, fruits, livestock) got the 2nd rank with the total perception index 117. Decision about fertilizer application got the 3rd with the total perception index 114. Collection and preservation of vegetables seed and weeding decision got the 4th and 5th rank with the total perception index 107 and 105, respectively. Women decision increases not only homestead activities but also other household decision. They also contribute other non-farm decision like daily expenditure decision got the 10th rank with the total perception index 92, buying and selling of valuable things got the 9thth rank with the total perception index 94. Decision about children's education got 8th rank with the total perception index 95. Family health care and treatment decision got 7th rank with the total perception index 96. Decision about marriage of children got 12th rank with the total perception index 90. Table reveals that women participation of women in decision about marketing of output got the lowest rank with total perception index 69. By practicing homestead activities women contribute to family income and women are now given priority in household decision making than before.

CONCLUSIONS

The present study is mainly focusing on examining the participation of rural women in homestead activities and its impact on family income. Mainly the present research emphasizes to determine profitability from different enterprise of households and its impact on total income to the respondents. A primary survey was conducted in RangpurSadarupazilla through a pretested questionnaire following a stratified random sampling procedure. A total of 50 samples were interviewed face-to-face covering the period of December 2016 to February 2017. It is evident that homestead garden farmers were benefited because they earned money particularly from homestead activities. This will bring great change in their life style and overall situation of their family. The factors that are included in the log-log regression model have great importance on the women contribution to household income. In the study area wage rate of women was comparatively lower than the man. Participation of women in decision making process is increasing day by day. Perception index shows in the study area decision about homestead activities are mostly done by women. They also have taken other family decision like daily expenditure, buying and selling of valuable things, decision about children's education, family health care and treatment decision, decision about marriage of children are taken by them. Homestead farming is found profitable considering different cost items. If the modern inputs, sufficient credit and other facilities involved in homestead activities can be available to the participants in time, production of these enterprises may increase which can help them in alleviating poverty. Homestead gardening system increased total family incomes of rural poor. Thus, the study recommended that homestead gardening system should be encouraged specially for small land holding farmers. It also provides an opportunity of employment for a large number

of labors specially for the women in Bangladesh. Livelihood and standard of living of respondent in homestead-based vegetable production increases by practicing homestead activities.

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