



# An Empirical Investigation of Men's Views of Women's Contribution to Farming in Northwest Bangladesh

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Abstract: This paper verifies the statement that "women contribute greatly to growing crops year-round, but their work is not recognized" through in-depth empirical investigation of their participation in rice and vegetable production and farm decision-making processes in Northwest Bangladesh. Interviews were held with 240 randomly selected couples (husband and wife interviewed separately) to document their views of the female's participation in crop farming activities and farm and household decision-making. The findings reveal that women play a substantial role in farming and are increasingly involved in farm management, but they are generally overlooked or under-valued by their male counterparts. Looking at crop-specific participation, among 18 different activities of the rice production cycle, men recognized that their spouse had "high" participation in three activities, "strong" in one, "moderate" in five, and "weak" in nine. A similar result was found for activities in vegetable production. In both cases, men's recognition differed from that reported by their spouses. Logistic regression modeling against eleven variables (selected from the intersectionality and patriarchy literature) revealed six statistically significant variables that influence men to consult with their wives regarding farm decisions. The dominant variables were spouse education (years of schooling), spouse Non-governmental organization (NGO) membership, and the number of hours per day that the spouse spent working on the farm. The article provides a new insight into family dynamics in household and farm decision-making processes. The collection and analysis of both counterparts' (husband and wife) views provides empirical evidence that not only is women's participation in agricultural activities and decision-making under-recognized, but that higher education and being involved in NGO activities have a positive influence on male perceptions of women's contributions. While these findings may not be universally applicable, the framework (using intersectionality and patriarchy indicators together with logistic regression modeling) is highly adaptable. Application in other parts of Bangladesh would reveal perceptions in those regions, and would support a more comprehensive approach to future policy intervention towards gender integration into crop farming in line with promoting women's education and NGO participation.

Keywords: gender; extent of participation; decision-making process and recognition



#### 1. Introduction

Bangladesh has made remarkable progress in its agriculture sector despite decreasing arable land, population growth, and adverse climatic effects [1]. The agriculture sector contributes 13.31% of GDP (Gross Domestic Product), provides employment for around 40% of the total labor force, and feeds about 164.6 million of its population [2,3]. In fact, the country has one of the lowest land-person ratios in the world, estimated at 0.088 ha per person [3]. The number of agricultural farm households is estimated at 1.66 million, which accounts for 46.61% of total households [4]. There is huge pressure on the land to produce more crops to ensure self-sufficiency in food. To attain this self-sufficiency, the government has designed and implemented various agricultural policies for expansion of irrigation facilities, production and distribution of high-yielding-variety seeds, and other inputs [1,5,6]. Availability of irrigation has been the most significant contributor to being able to grow crops year-round and increase crop productivity in the northwest region [7], where over 97% of the total area uses groundwater irrigation [8]. The Barind Multipurpose Development Authority has been operating 15,553 deep tubewells (DTWs) and 519 Low Lift Pumps (LLPs) in the northwest region [9]. The Bangladesh Agriculture Development Corporation (BADC) and Rural Development Academy (RDA) have also installed a good number of DTWs. In addition, quite a large number of shallow tubewells (STWs) are being operated by individuals [10,11] to assist in growing dry-season crops. The northwest region had the highest percentage (85%) of net cultivable area irrigated during 2012–2013, followed by the northcentral region (73%) and southeast and southwest regions (45%) [12]. The northwest region is one of the major crop production areas, and supplies about 35% of the irrigated Boro rice and about 60% of the wheat of the whole country [8,13]. Dry-season crops, such as Boro rice, wheat, maize, potato, pulses, and winter vegetables, are the main contributors to ensuring food security at household, regional, and national levels. Like men, women are involved in crop production as farmers, co-farmers, farm managers, and wage laborers. Labour Force Survey [2] estimated that, by 2016–2017, female-headed households in rural Bangladesh had increased by 13.8%, implying that women are taking more responsibility in farming and household activities. By 2015, women's participation as agriculture wage laborers had also increased by 11.02% from 3.1% in 2000 due to male out-migration and male participation in non-farm activities [2]. In the absence of male members, the women's role is changing from unpaid family worker to farm manager, a phenomenon termed as the "feminization of agriculture" [14].

Nevertheless, there are significant variations in the roles of men and women and their statuses in agriculture. Women comprise about 43% of the agricultural labor force in developing countries, ranging from around 20% in Latin America to 50% in parts of Africa and Asia, and exceed 60% in a few countries [15]. In Bangladesh, about 49% of women were engaged in the agricultural sector (including forestry and fisheries) in 2016–2017 [2]. Despite their substantial role in agronomic activities, women are not addressed by agricultural research and extension services [16]. Generally, women are extensively involved but "largely unrecognized" [17]. They are more likely to be in agricultural employment than men [18], but are associated with specific operations and crops. Women usually work on a smaller scale, employing traditional tools and techniques to grow food for their families and the local market. For example, whereas rice cultivation is male-dominated, women play an important role in the production of high-value crops, such as vegetables [19]. With respect to "male" crops and "female" crops, there are many settings where such distinctive gendered cropping patterns do not apply. In Ghana, women are involved in the production of all major crops [20]. Crop preference depends on the socioeconomic situation and livelihood strategy of the household, rather than a mere distinction based on the gender of the farmer or household head [21]. Evidence from Mozambique and Kenya shows that women plot managers grow fewer crops and fewer cash crops (than male plot managers) [22,23].

It is argued that women often provide all of the farm labor when their spouse/partner is away from the farm, they feed farm laborers, and frequently provide managerial input and advice. However, statistics do not tend to record the full range of farm work undertaken by women, and for this

reason, women's involvement in farming is systematically under-reported [24]. In fact, it is difficult to disaggregate men's and women's contributions either in terms of labor supplied or in terms of output produced; however, where women farmers have equal access to the same resources, their farms are as productive as those run by men [25]. An empirical study in Ethiopia reported that maize productivity of male-headed households was overall 44.3% higher than that of female-headed households, but it was almost equal at 42.3% (gap only 2.0%) when they received the same productive resources, such as secure tenure, livestock, and agricultural machinery [26]. Similarly, FAO [27] report that "if women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent." In fact, women farmers do not have equal access to productive resources, and this significantly limits their potential to enhance productivity [28].

Previous studies on gender and agriculture tend to focus on documenting the efficiency and productivity differences between male- and female-headed households and empowerment (e.g., [29–35]). Other literature looked into gender norms that are embedded in existing structural and institutional conditions, noting that women and men use their agency to assert, resist, and renegotiate gender norms to varying degrees in their everyday lives [36–39]. In practice, women and men can and often do behave in ways that stretch and reshape prevailing cultural norms about gender [40,41]. Encouragingly, gender roles and norms in agriculture are changing [42,43], and enhancing women's involvement in agriculture is an important strategy for reducing poverty and improving food security. The National Agricultural Policy [44] and the National Strategy for Accelerated Poverty Reduction (2009–2011) outline commitments to ensuring that women have access to agricultural extension, productive resources, inputs, and services to achieve sustainable farming [45]. Failure to recognize the roles, differences, and inequalities poses a serious threat to the effectiveness of the agricultural development agenda [16]. In fact, secure tenure, information, and other complementary resources are needed for both men and women to achieve sustainable food security [46]. High levels of inequality make it harder to increase productivity and reduce poverty and hunger [47]. Addressing gender relations in farming is essential to achieving sustainability in agriculture [48]. Hence, documentation of women's involvement in farming and their participation in on-farm decision-making is crucial for future policy interventions. However, there has been scant attention given to documenting intra-household participation in farm activities and men's views of women's contribution to farming. The few studies reported in the literature show that women are extensively involved in farming, but are not recognized equally [17,49]. To date, there are no similar empirical studies in Bangladesh. Therefore, this paper aims to address two research questions: (i) Do men in Bangladesh recognize the contributions of women and men in farm activities equally? (ii) What are the factors that influence men to consult with their spouses/partners in farm decisions?

The article begins with the conceptual and methodological framework used to evaluate the growing participation of women in farming activities in dominantly masculine roles in rural Bangladesh. It presents the different perceptions of women's contribution to rice and vegetable production cycles, decision-making status and determinants of consultation, decision-making status in farming, and, finally, intra-household division of daily working hours. The article provides a new insight into how family dynamics are changing in recognizing women's contributions in crop farming. This knowledge can then be translated directly into more equitable policy interventions.

#### 2. Conceptual Framework for Recognizing Women's Participation

The study incorporates concepts of patriarchy and masculinity [50] with an intersectional perspective [51] to analyze men's views of women's involvement in farming and on-farm decision-making. According to the assumptions of patriarchy and patriarchal masculinity, men may dominate and abuse their wives to maintain their "standard masculine supremacy", as reflected in male guardianship endorsed by patriarchal norms/ideologies [52]. As a sociocultural theory, the concept of patriarchy helps elucidate how patriarchal social order constructs a dominant masculinity that is reflected in men's views of women's involvement in farming. Similarly, the intersectionality lens

focuses on how masculine identities perform inside the households and express themselves to outsiders. Intersectional perspectives use an analytical and methodological framework to examine the multiple interacting effects (shown in Figure 1) of identity and historical oppression in institutional structures. For example, a man may feel discomfort in disclosing his attitude/behavior towards his wife to outsiders due to social structures and institutional norms. Both patriarchal and an intersectional perspectives have been integrated to address the perceptions of men and women in women's involvement in farming and decisions at farm and household cohorts, as portrayed in Figure 1. In fact, patriarchal and intersectional perspectives offer methodological tools that support the development of gender research through in-depth attention to both the heterogeneity of effects and causal processes producing gender inequalities.



**Figure 1.** Conceptual framework for recognizing women's participation in farming and decision-making.

Gender norms in Bangladesh are rooted in its patrilineal norms, which impose restrictions on women's access to productive resources (land ownership—farm size is used due to the lack of gender-specific land ownership data), making decisions (household headship), and mobility (outside households), which is crucial for engagement in crop farming [53]. Despite societal norms, a significant portion of women are involved in farming as unpaid family workers [54]. The intersectional perspective varies based on masculine identities, including age, education (years of schooling of wife), farming experience, occupation, income, and resources (see Figure 1). As shown in the diagram, both patriarchal (household headship, mobility, wife working hour, farm size, working member) and intersectional perspectives influence men's views in recognizing women's contributions in farming, which leads to consultation between them. Taking these factors into account, the framework conceptualizes that including women in consultation processes may result in women having influence in the decision-making. This concept is tested by adopting an econometric logistic regression model.

## 3. Materials and Methods

The strategic objective of the Bangladesh Second Country Investment Plan (2016–2020) is to ensure availability, affordability, and nutritional quality of foods and that all people have access to a variety of safe and nutritious foods, as well as knowledge to be able to make healthy diet choices [55]. To attain the objective, proper attention is required for the agriculture sector, particularly for smallholder agriculture. Like other parts of the country, the northwest region is dominated by a large number

of smallholders traditionally engaged in rice and vegetable cultivation [56]. In fact, the region has comparatively limited employment opportunities from other economic sectors, such as trade, services, and industries. Hence, a second crop diversification initiative (introduction of high-value crops, including vegetables) has been widely adopted by the farming community [56]. Among crop diversification project beneficiaries, 57% (141,462 women) were women who received training for cultivation and marketing of high-value crops in groups using modern technologies [57]. Women in the northwest region are much more involved and visible in agriculture than those in the southeast regions of Bangladesh [58]. Thus, assessment of gender-specific participation in crop and vegetable production cycles is important for ensuring availability, affordability, and nutritional quality of foods.

In this circumstance, data were collected from five districts, namely Rajshahi, Chapainawabganj, Bogura, Dinajpur, and Nilphamari of the northwest region of Bangladesh. The selected districts represent northwest Bangladesh, as they are dispersed across the region and represent the areas with high, medium, and low available groundwater. Both qualitative and quantitative approaches were adopted for generating the evidence. A randomly selected sample of 240 farming community households were interviewed, with the man (husband) and the woman (wife) interviewed separately. However, all respondents were selected from the farming community as a prerequisite, considering the nature of the study. A pre-tested questionnaire was used to collect data by the trained enumerators in 2018 with strong supervision by the researcher. Most of the recruited enumerators were female graduate students of Bangladesh Agricultural University in order to enable greater accessibility to the women participants (females interviewing females). Before beginning the interview, enumerators provided a brief description about the nature and purpose of the study to the participants. After taking consent, questions were asked in a simple manner, and explanations provided wherever necessary. The information supplied by the interviewees was recorded directly in the interview schedule. Interviewees were requested to provide reliable information as much as possible. The information was checked carefully (for omissions) before leaving the study area.

For qualitative surveys, it is important to triangulate the results and clarify where different responses were obtained—for this, focus group discussions (FGDs) were conducted until new information was generated, i.e., information was saturated in all selected areas. After collection, necessary and relevant data and information were digitized (into spreadsheets), scrutinized, and analyzed based on the research questions set for this study. Data were analyzed using IBM SPSS Version 20. Its tabular method was applied because it is simple in calculation, widely used, and easy to understand. Independent t-tests were performed to document the different views of the respondents. The independent sample t-test compares two independent groups of observations or measurements on a single characteristic. Five categories—strong, high, moderate, weak, and none—were used to measure the extent of participation for each activity, where strong implies the highest level (100%) of participation, and none implies no involvement (0%). These data were collected based on the percentage of men and women involved in each activity in the crop production cycles. The percentage data are further explained in Table 1.

Level	Explanation	Score
Strong	Only the woman (wife) participates in farm activities	100%
High	Both husband and wife participate together in farm activities, with the wife being dominant	70–99%
Moderate	Both husband and wife participate together in farm activities, but the wife plays a significant but less dominant role	50–69%
Weak	Wife has limited input	Below 50%
None	Wife has no involvement	0%

Table 1. Extent of participation in farm activities based on category

#### 4. Specification of Econometric Analysis

Based on the patriarchal and intersectional perspectives, several determinants have been identified (through literature reviews) that might influence men to discuss or consult with their counterparts before making final farm decisions. To identify which (and how many) of these determinants are relevant in the context of northwest Bangladesh, a logistic regression econometric model has been adopted. Logistic regression is used widely to examine and describe the relationship between a binary response variable (jointly decided or alone) and a set of predictor variables [59]. In order to explain the behavior of a binary (dichotomous) dependent variable, two scenarios were used—(i) husband decides alone, and (ii) husband decides jointly with the wife. The response variable  $T_i$  is *binary*; that is, it can have only one of two possible outcomes, denoted as 1 (joint decision) and 0 (alone decision) based on the quantitative survey results. The outcome variable  $(T_i)$  was thought to be influenced by the independent variables  $(X_i)$ . It was assumed that the model takes the form

$$Pr(Z=1|B) = \varphi(B^1\delta) \tag{1}$$

where *Pr* denotes the probability, and  $\varphi$  is the function of the standard normal distribution. The parameter  $\delta$  is typically estimated by maximum likelihood. It is also possible to motivate the logit model as a latent variable model. Suppose there exists an auxiliary random variable,

$$Z_i^* = \delta_k + \delta_k b_{ki} + w_i \tag{2}$$

where  $w_i \sim N(0, 1)$ . Then, Z can be viewed as an indicator of whether it is a latent variable and positive:

$$Z = 1_{\{Z^* > 0\}} = \{1 \text{ if } Z^* > 0\} \text{ i.e., } w_i < B^i \delta, 0 \text{ otherwise.}$$
(3)

The main difference between logit and probit regression models is that the logit has slightly flatter tails, i.e., the normal or probit curve approaches the axes more quickly than the logit curve. Qualitatively, while logit and probit regression models give similar results, their parameter estimates are not directly comparable. The choice between the logit and probit models is largely one of convenience and convention, since the substantive results are generally indistinguishable. Hence, an empirical logit model was developed to determine the factors that significantly increase the probability that a husband will consult with his wife:

$$T_i = \alpha_0 + \beta_i X_i + \ldots + e_i \tag{4}$$

where  $T_i$  = Husband consults with wife, or not, in farming decision,  $\alpha$  = Intercept,  $X_i$  = Explanatory variables,  $\beta_i$  = Coefficient of determinants, and  $e_i$  = Error term.

The explanatory variables considered in the logit model are as set out in the framework described in Figure 1:

 $X_1$  = Age of respondent (years),  $X_2$  = Wife's education (years of schooling),  $X_3$  = Farming experience (years),  $X_4$  = Main occupation (farming = 1; otherwise =0),  $X_5$  = Family income (Tk/year),  $X_6$  = Number of livestock and poultry,  $X_7$  = Household headship (female = 1; otherwise = 0),  $X_8$  = Non-governmental Organization membership (female = 1; otherwise =0),  $X_9$  = Wife's time allocation in farming (hours),  $X_{10}$  = Farm size (decimal), and  $X_{11}$  = Number of working members in the family.

#### 5. Results and Discussion

#### 5.1. Different Perceptions of Female Involvement in Rice Production

In response to the stereotypical assumption that "men farm" and "women only help", this study found that the male respondents held diverse opinions about the involvement of women in agriculture, though they generally perceived that they do most of the farming activities. Looking at crop-specific high participation in three activities—preparing the threshing floor (65%), drying (69%), and storage (49%). Importantly, females were recognized by males as being involved in all tasks, though at very low (below 15%) levels of participation for 12 of the activities, and moderate levels of participation for selection of seeds (37%), threshing (21%), and by-products (34%) (Figure 2). Similarly, Akter et al. [60] found that, in rice production, transplanting, weeding, manual harvesting, and post-harvest activities are shared by males and females, while specific tasks are undertaken mostly by men, including seedbed and land preparation, fertilizer spraying, and pesticide application. Likewise, Luqman et al. [61] found higher participation of women in harvesting and low participation in broadcasting of seed/fertilizer across different crop-production- and management-related activities. In contrast, women reported that they participate at slightly higher levels than what their counterparts reported (Figure 2). For example, females reported about 77% participation in drying rice, while husbands reported 69%. Variations between male and female responses were, on average, 10%, i.e., women reported their participation on average 10% higher than did men. One reason for this difference in perception could be related to self-presentation, which, in the farm context, is affected by hegemonic and gendered discourses shaping the identity of "a farmer", as reported by Michael [62].



Figure 2. Male and female responses on females' participation in 18 activities in the rice production cycle.

The information presented in Figure 2 is broken down in Table 2 into the strong, high, moderate, weak, and no(ne) categories described in Table 1. While men and women perceived women to have involvement in all activities, the dominant male response for their spouses, averaged across all activities, was no (participation) (50%), followed by weak (27%), moderate (12%), high (7%), and strong (5%). In contrast, the women recognized their participation as strong (14%), high (18%), moderate (19%), and weak (13%). It is apparent that, on average, the men recognized lower levels of their wives' participation than those recognized by the women themselves. This might have a strong connection with gender norms, i.e., that the husband may feel discomfort in recognizing his wife's strong level of contribution publicly. Similar findings are also reported in a case study carried out in Syria, where, despite the women's increasing involvement in agricultural work and management, their role as farmers is underplayed or denied, and where various social determinants affect the ability and readiness of the women themselves to assert an identity as farmers [63]. In Bangladesh, men view that

women have no ability to participate in agricultural work in the field or outside of the home, but they think that wives are good for nursing and caring, preparing and serving food, making beds, taking care of children and cattle or poultry, and homestead agricultural work that requires less energy [64]. While this view may be slowly changing in Bangladesh, these perceptions clearly convey the intersectional and patriarchal perspectives, as discussed in the theoretical framework section.

Table 2.	Husbands'	and wives'	perceptions of	the women's l	evel of p	articipation i	n 18 activities in
the rice j	production of	cycle.					

Activities	Male Response (%)					Female Response (%)				
i ictivities	Strong	High	Moderate	Weak	No	Strong	High	Moderate	Weak	No
Seedbed preparation	-	3	4	34	59	-	-	-	25	75
Growing seedlings	1	3	6	30	60	-	-	-	24	76
Collection of seedling	1	1	3	29	66	-	-	-	12	88
Preparation of land	-	-	1	26	72	-	-	2	7	92
Tillage	-	-	-	26	74	2	-	-	5	93
Planting	5	4	3	28	61	13	-	-	9	78
Weeding	1	3	8	29	59	-	-	11	9	80
Fertilizing	-	-	-	30	69	-	-	-	10	90
Spraying	-	-	-	26	74	-	-	-	8	93
Irrigation	-	-	-	28	72	2	-	-	13	85
Harvesting	-	1	7	34	58	3	3	8	10	76
Preparation of threshing floor	31	20	19	23	8	40	30	13	8	9
Threshing	2	6	25	34	34	2	7	22	27	43
Selection of seeds	5	19	26	29	20	18	14	39	14	14
Drying	26	32	24	11	6	38	39	10	8	6
Storage	8	20	42	19	11	18	19	38	18	8
By-Products	5	10	38	22	26	8	11	40	10	32
Selling product	-	1	1	28	70	-	-	8	9	83
Average	5	7	12	27	50	14	18	19	13	62

Note: This average is calculated based on who reported/responded. As a result, the total can be >100%.

As part of the method, independent t-tests were performed to justify the level of statistical significance of mean difference (Table 3). Estimation shows that out of 18 activities related to rice production, 11 were found to be statistically significant at the 1%, 5%, and 10% levels. Since most of the activities' mean differences showed that the mean value was found to be a positive or greater value, it can be concluded that the male (husband) gave a lower score than that of female spouse, which is statistically significant at different levels. For example, weeding, irrigation, harvesting, and selection of seeds were found to be statistically significant at less than 1% level. However, a few cases, including preparation of land, fertilizer application, and spraying, revealed a negative value, implying that the male gave a higher rate (score) than that of female spouse.

Activities	t-test for Equality of Means				
Activities	t	Mean Difference			
Seedbed preparation	1.03	2.542			
Growing seedlings	(0.18)	0.542			
Collection of seedlings	1.35	3.125			
Preparation of land	(2.80) ***	3.000			
Tillage	(0.808)	(1.083)			
Planting	0.07	0.292			
Weeding	3.84 ***	(12.41)			
Fertilizer application	(3.12) ***	(2.875)			
Spraying	(3.84) ***	2.583			
Irrigation	0.40 ***	0.66			
Harvesting	5.98 ***	19.91			
Preparation of threshing floor	2.02 **	8.83			
Threshing	0.26	0.83			
Selection of seeds	3.97 ***	15.41			
Drying	1.80 *	7.16			
Storage	1.91 *	7.33			
By-Products	1.13	4.41			
Selling product	1.73 *	2.50			

Table 3. Results of the independent t-test for 18 activities in the rice production cycle.

Note: Parenthesis indicates the negative value; \* p < 0.10; \*\* p < 0.05; \*\*\* p < 0.01.

## 5.2. Different Perceptions of Female Involvement in Vegetable Production

Similarly, to rice production, data were collected for 12 activities related to the vegetable production cycle. It is apparent from Figure 3 that women are largely involved in seed selection (57%), followed by storage (51%), harvesting (44%), selling by-products (35%), planting (25%), and weeding (22%). Kumari and Laxmikant [65] found that women's participation in vegetable cultivation was greatest in processing (90%), followed by storage of seeds (62%), sale of vegetable (33%), choice of irrigation (27%), selection of crops to be grown (21%), and land selection (18%). However, in most of the cases, men's recognition of their wife's participation in the vegetable production cycle was lower than that of the women. Interestingly, although there is a variation between the two groups (male and female spouses), these show an orderly pattern. The greatest variation was observed for the seed selection task (where women's participation was the highest), with males recognizing 39% participation by their counterpart (wives), while their female spouses (wives) reported 57%. In contrast, men (husbands) gave a higher score than their spouses for storage. Two cases—tillage and spraying—depicted similar scores from both respondents. It is apparent that men recognized their counterparts' involvement, but this varied for different tasks. In general, women are more involved in vegetable production, as vegetables are usually grown close to the house [66].





**Figure 3.** Male and female responses on females' participation in 12 activities in the vegetable production cycle.

On average and as reported in Table 4, men perceived a weaker level of participation of their counterparts, similarly to in the rice production cycle. For seed selection, female spouses reported a strong level of participation (24%) compared to the 3% reported by the males (husbands). Similarly, for the storage task, female spouses reported a strong level of participation (19%) compared to the 3% reported by the males (husbands). In contrast, in some activities, the males recognized a higher level of participation at the aggregate level than did their female spouses. For example, 92% of female spouses reported no involvement in land preparation, while the males (husbands) reported 80%. In fact, women are predominantly involved in cultivation activities as well as post-harvest activities with the exception of pre-planting activities, such as land preparation [27,60]. In the same vein, a recent study in Nepal found that women were typically responsible for most vegetation production and processing activities, such as fence construction, transplanting, fertilizer use, harvesting, cleaning, and grading, but men were dominant in land preparation tasks [67]. Galie et al. [63] reported that women in Syria are in charge of vegetable production and processing and seed selection. In general, women are more involved in vegetable production than with other field crops.

Activities	Male Response (%)					Female Response (%)				
i cuvines	Strong	High	Moderate	Weak	No	Strong	; High	Moderate	Weak	No
Preparation land	1	1	6	14	80	3	-	5	-	92
Tillage	1		2	12	86		-	8		92
Planting	1	1	12	25	62	6	-	3	17	74
Weeding	2	1	6	21	72	10	-	-	8	82
Fertilizing	1		2	16	82	11	-	-	5	84
Spraying	1		1	14	85	11	-	1	16	73
Irrigation			4	19	77	8	-		12	80
Harvesting	2	5	28	23	44	8	-	15	5	72
Seed Selection	3	6	29	22	42	24	24	28	1	23
Storage	3	9	51	14	25	19	12	31	4	35
By-Products	6	5	15	5	70	8	-	12		80
Selling product	1		6	15	79	8	-	10	1	81
Average	2	3	12	15	71	11	18	13	9	78

**Table 4.** Males and wives' perceptions of females' level of engagement in 12 activities in the vegetable production cycle.

Note: This average is calculated based on who reported/responded. As a result, the total can be >100%.

Out of twelve activities, six were found to be statistically significant different at the 1% and 5% levels of significance (Table 5). Out of six significant variables, three of them—spraying, seed selection, and product selling—were statistically significant at the 1% level, and the remaining three activities—fertilizing, irrigation, and harvesting—were statistically significant at the 5% level. The highest and positive mean differences were observed for seed selection (26.25), followed by harvesting (10.66), spraying (8.50), selling products (7.63), and fertilizing (6.42). These results indicate very little change in attitude from the earlier findings that, unfortunately, the role of women and their contributions in vegetable production are yet to be recognized [65].

Table 5. Results of the independent t-test for the rice production cycle.

Activities	t	Mean Difference
Preparation of land	0.725	1.75
Tillage	0.484	0.79
Planting	0.160	0.55
Weeding	0.108	0.42
Fertilizing	2.407 **	6.42
Spraying	3.329 ***	8.50
Irrigation	2.047 **	5.50
Harvesting	2.423 **	10.66
Seed selection	6.349 ***	26.25
Storage	0.706	3.18
By-Products	0.787	3.75
Selling product	2.779 ***	7.63

Note: \* *p* < 0.10; \*\* *p* < 0.05; \*\*\* *p* < 0.01.

Most decisions on farm activities are made by men, as reported by both men and their wives as respondents. It is also true that in the neighboring country of India, women play only a supportive role in the farm decision-making process [65]. According to the male respondents, the knowledge about suitability of land for particular crops, time of tillage, time of planting and harvesting, fertilizer selection, irrigation, etc. are not well known by the females, and, as a result, decisions about these activities are mainly made by men. In the cases of seed storage, selling of products, by-products, selection of land, and selection of crops, both the husband and wife jointly decide. For example, males (husbands) report that they make the product selling decisions jointly (49%), while wives (females) report at 40%—there is about 10% variation. The differentiated results in our study clearly indicate that men dominate in making farm decisions, but express a higher level of joint decision-making than do the women (Figure 4). These results provide differentiated perceptions of males and females on who makes the decisions within the rice production cycle. It is clear from these results that, with a few exceptions, decisions related to rice production are made by males, as determined by patriarchal norms. However, focus group discussions revealed that social norms make men reluctant to publicly acknowledge their wives' influence on farm decisions and the contributions they make. For example, women prefer to grow special varieties of rice that are used for making rice powder to prepare rice cake, which is usually taken care of by their husbands (allocating small plots), but they do not disclose this to outsiders. Similarly, qualitative findings reported that a husband should be "all in all" and the main decision maker in the family, and men should not take any advice from the wife. This is driven by fear of losing male authority [52]. In fact, women's decision-making power in rice farming varies across and within countries. In Indonesia and Myanmar, men listen to women's opinions and make decisions jointly [60]. The highest amount of women's involvement in decision-making in rice farming is observed in Thailand and in the Philippines [60]. Galie et al. [63] suggest that change in the identity of women as farmers would need to be coupled to wider roles for women as farmers in social spaces currently dominated by men.



**Figure 4.** Male and female responses on females' participation in decision-making for activities in the rice production cycle.

Similarly, to how decisions are made in the rice production cycle, males dominate decision-making in farm activities related to vegetable production (Figure 5). Some males reported that decisions in relation to time of weeding and number of irrigations were made jointly; however, their female spouses reported that this is not the case. In all activities, males gave a higher score for jointly made decisions than their female spouses (expect for decisions in relation to seed storage, where females (spouses) gave a higher score than that of their male counterparts). Despite women playing a greater role in vegetable cultivation, males continue to have a dominative role because of their greater decision-making power and land ownership [67]. The lower participation of women in decision-making could be attributed to many things, including customs, tradition, social barriers, illiteracy, ignorance, and less participation in (and access to) agricultural extension programs [65].



**Figure 5.** Male and female responses on females' participation in the decision-making process for activities in the vegetable production cycle.

## 5.4. Interpretation of Binary Logistic Regression Results

A binary logistic regression was performed to assess the impact of several factors on the likelihood of husbands consulting with their wives for making decisions. The model contains 11 independent variables, as listed in Table 6 (and as described in the framework and Figure 1). The full model containing all predictors was statistically significant—Chi-square (5, N = 120) = 83.325, p < 0.001—indicating that the model was able to distinguish between the husbands who consult with their wives and those who do not. The model as a whole explained between 50% (Cox and Snell R square) and 72.3% (Nagelkerke R square) of the variance in consultation, and correctly classified 90.80% of cases. Furthermore, the log likelihood function (57.925) and the proportions of samples correctly predicted for their likely status in consultation for farm decisions both indicate a good fit of the equation.

Explanatory Variables	В	S.E.	Wald	Sig.	OR
Age of the respondent	-0.107 *	0.061	3.010	0.083	0.899
Wife's education (years of schooling)	0.555 **	0.225	6.086	0.014	1.741
Farming experience (years)	0.145	0.093	2.441	0.118	1.156
Main occupation (farming = 1; otherwise 0)	-0.038	1.403	0.001	0.979	0.963
Family income (Tk.)	0.000 *	0.000	3.180	0.075	1.000
Livestock number	0.256 **	0.085	9.145	0.002	1.292
Household headship (female = 1; 0 = otherwise)	0.778	1.438	0.293	0.589	2.176
NGO Membership (female = 1; 0 = otherwise)	2.559 ***	0.675	14.376	0.000	12.926
Wife's time allocation in farming (hours)	0.368 *	0.192	3.685	0.055	1.445
Farm size (decimal)	-0.001	0.003	0.107	0.744	0.999
Working member in the family	-0.088	0.278	0.100	0.752	0.916
Constant	-9.040	4.033	5.026	0.025	0.000
	Mod	el Summary			
Log Likelihood	57.925				
Cox and Snell R Square	0.500				
Nagelkerke R Square	0.723				
Chi-Square	83.235 ***			0.000	
Overall Model Predicted (%)	90.8				

Table 6. Results of logistic regression against the 11 intersectionality and patriarchy variables.

Dependent Variable: Consultation on decision-making process of farm. Note: S.E. = Standard Error; OR = Odds Ratio; \* p < 0.10; \*\* p < 0.05; \*\*\* p < 0.01.

It can be seen from Table 6 that six explanatory variables, i.e., age, wife's education, Non-governmental Organization (NGO) membership, livestock number, family income, and wife's time allocation in farming, were statistically significant positive influences regarding consultation on farm decisions. By far, the strongest predictor of consultation with the wife is the "NGO membership"—its odds ratio of 12.926 indicates that, in households with NGO membership (mostly female), the likelihood of males consulting with their wives is about 13 times more than those with no NGO membership, controlling for all other factors in the model. In fact, NGOs like Grameen Bank, BRAC, and ASA offer micro-credit, savings, and social services to rural women, and they have been able to demonstrate the effectiveness of their programs toward greater participation of women in income-generating activities and, thereby, decision-making processes in Bangladesh [68]. The odds ratio of 1.74 for "wife's education" indicates that the likelihood of consulting is 1.74 times more when the female (spouse) is educated, keeping all other factors the same in the model. Similarly, based on the odds ratio, there is a likelihood to consult 1.445 times more with a wife who spends more working hours in farming. The odds ratios for livestock number (1.292) and family income (1.00) imply that there is a likelihood to consult more in households that possess more livestock and have more family income. In contrast, the odds ratio for age of the respondents resulted in less than one (0.899), which implies that the older farmers are less likely than young farmers to consult with their spouses regarding farm decisions. Using a logistic regression analysis, Anderson et al. [49] reported similar results; looking across 13 farm and household decisions simultaneously, more educated wives and wives with

better health were associated with a higher likelihood of accord over household decisions, such as children's schooling and general farm decisions. However, the positive association with more acres of landholdings reported in Anderson et al. [49] was not found in this present study. In summary, it can be concluded that women's participation in NGOs, educational status, and more time in farming report positive associations for husbands consulting with them on farm decisions. These findings match with the theoretical framework established for this study.

# 5.5. Household Decision-Making Status

Generally, males are responsible for crop production and protection of family assets, as well as for making all household and family decisions, while females manage the household, take care of the family members, and manage the homestead garden. Both husbands and wives reported that most household decisions are made jointly, which accounted for 89.1% (male response) and 87.7% (female response). For some activities, e.g., buying food items (15.4%), children's education (4.5%), and choosing credit institutions (5.3%), some females reported that they made the decisions alone (Table 7). Almost similar findings were reported in six southeast Asian countries, with day-to-day household management decisions (such as the purchase of groceries or clothes and expenditure on school fees) commonly made by the wife alone, and decisions about credit made in mutual agreement [60]. An empirical study in Pakistan reported that about 23% of women are involved in household decisions, though few of them could exercise independent decision-making, as most decisions are made by the male members due to the strong patriarchal norms and values in that country [69]. In contrast, in Tanzania, husbands report more authority for their wives than wives report in all activities (12 out of 13), except with which foods to feed the family [49]. Encouragingly, women are comparatively more involved in household decision-making than in farm decision-making, as reported by both men and women.

Activities	Male Alone		Female	e Alone	Jointly		
Activities	Male Response	Wife Response	Male Response	Wife Response	Male Response	Wife Response	
Buying household assets up to Tk. 50,000	8.9	21.1	1.9	1.9	89.3	77	
Buying household assets above Tk. 50,000	7.6	9	2	2	90.4	89	
Buying food items	6.7	6.3	6.8	15.4	86.5	78.3	
Buying non-food items	7	7	3.9	3.9	89.1	89.1	
Buying land	10.9	11.1	1.2	0	87.9	88.9	
Buying farm assets	24	25.2	1.2	0	74.8	74.8	
Family planning	4.7	4.4	1.7	0	93.6	95.6	
Children's education	4.2	2.2	1.9	4.5	93.9	93.3	
Medical treatment	4.5	4.5	1.2	0	94.2	95.5	
Marriage of children/siblings	4.4	4.4	1.1	0	94.6	95.6	
Choosing credit institution	10	9.2	1.6	5.3	88.5	85.5	
Join social club/community	14	14.1	1.1	1.1	84.8	84.8	
Voting in the election	13.2	13.3	1.2	1.2	85.5	85.5	
Migration	5.4	5.8	0.8	0	93.8	94.2	
Overall average	9.0	9.8	2.0	2.5	89.1	87.7	

Table 7. Male and female responses on household decision-making.

#### 5.6. Daily Working Hours

In this section, the hours spent both by males and females in household tasks like cooking, cleaning, child caring, livestock rearing, and leisure periods are unearthed. To do this, the daily hours spent on household tasks of every respondent (male and female spouses) were measured (Table 8). The results are predictable and as presumed, i.e., females spent more time (average of 5.39 hours/day) than their male counterparts (average of 0.63 hours/day) in household work, with males spending more time undertaking agricultural operations in the field. The males enjoyed more leisure time than females, and also spent more time participating in social/community work. Similarly, Luqman et al. [61] reported that women devote more than eight hours to agricultural activities (crop and livestock) in a day in addition to household activities. Another study in Pakistan reported that about 43.47% of the women spent 6–10 hours a day on domestic tasks, such as cooking, fetching water, cleaning, and washing as unpaid productive activities. The woman spends more than half of the day, on average, working and taking care of children and old-age dependents [69]. This finding reinforces the general notion that in developing countries like Bangladesh, women are mostly confined to the household activities, while men are responsible for all outside tasks (including farming). Many of these activities undertaken by women are not considered as economically active employment, yet they are all critical to the well-being of rural households [70].

Work type	Man	Woman	Girl	Boy
Household work (cooking, cleaning, taking care of children and elderly people)	0.63	5.39	0.24	0.07
Collection of drinking water	0.15	0.62	0.07	0.03
In-field agricultural work	4.84	0.65	0.02	0.22
Home-based agricultural work	0.58	0.95	0.04	0.05
Livestock management	0.98	1.65	0.05	0.07
Social and community work	0.62	0.22	0.01	0.01
Recreation or leisure time	1.88	1.87	1.26	0.95
Total working hours	9.67	11.35	1.69	1.39

Table 8. Hours spent in household-related work in an average day.

## 6. Conclusions

This paper verifies the statement that "women contribute greatly to growing crops year-round, but are not recognized" through in-depth empirical investigation in Northwest Bangladesh. The responses were collected from husbands and wives regarding their participation in farm and household activities and decision-making. In some tasks, the results report statistically significant disagreement between husbands and wives on the females' participation in activities in rice and vegetable production cycles. Despite the growing involvement of women in farm activities, rural women get recognition for their household activities, but not for their agricultural activities. In fact, men felt discomfort in admitting their wives' influence on farm decisions due to social norms. The assertion that women's growing involvement in farming is not equally recognized by husbands is validated through independent t-tests in the study areas. This finding can be interpreted in that society will take a longer time to recognize women's contributions in farming if husbands do not come forward to recognize their wives' roles in farming.

Usually, males are responsible for crop production and protection of family assets, and also for making all household and family decisions, while females manage the household, take care of the family members, and manage the homestead garden. Both husbands and wives reported that most household decisions are made jointly, which is similar to results in other south and east Asian countries. While both make decisions on household matters, females spent more hours for cooking, cleaning, child caring, livestock rearing, and leisure periods. Females spent an average of 5.39 hours/day, while their male counterparts spent an average of 0.63 hours/day in household work. The males enjoyed

more leisure time than females, and also spent more time participating in social/community work. This finding reinforces the general notion that in developing countries like Bangladesh, women are mostly confined to the household activities, while men are responsible for all outside tasks.

Decision-making processes are not uniform across households—rather, they depend on the patriarchal and intersectional perspectives perceived by the household. Explicitly, four intersectional (age, wife education, income, and livestock number) and two patriarchal (NGO membership and time allocation in farming) factors report significant likelihood that the husband would consult with his spouse (wife) when making decisions. Women who spend more hours in farm activities are associated with more involvement in farm-related decision-making processes. More importantly, women who are educated and have NGO membership have a higher opportunity to participate in the decision-making process and to be able to influence the decisions. Bangladeshi NGOs offer diverse programs (credit, savings, and social services) for women (mostly) that encourage women to participate in income-generating activities and to contribute to their families. Hence, participation in NGO activities and education (years of schooling) might create a provision for women to contribute in farm and household decisions.

The article provides a new insight of family dynamics in recognizing women's contributions in farming. The use of intersectional and patriarchal perspectives to identify factors that impact the likelihood of women participating in farm and household decision-making processes can be regarded as a unique contribution to future gender research. The incorporation of both husbands' and wives' perspectives in the analysis and interpretation of results is not common practice and has provided great insight. This has greater policy implications. This evidence can inform future agricultural policy interventions designed to recognize the role that women play in agricultural production, and can effect gender integration into crop farming in Bangladesh in line with promoting women's education and NGO membership.

# 7. Limitations of the Study and Suggestions for Future Research

Farmers usually grow many crops, but this study only uses data for rice and vegetable production cycles for validating men's views about women's (wives') participation in the decision making process. This could have different results for other crops. The present study was carried out in five districts of northwest Bangladesh, and the findings were generated based on 240 randomly selected samples and focus group discussions. These findings may not be generalized for the entire population of the country. While these findings may not be universally applicable, the framework (using intersectional and patriarchal indicators together with logistic regression modeling) is highly adaptable. Application in other parts of Bangladesh would reveal perceptions in those regions, and would support a more comprehensive approach to future policy intervention towards gender integration into crop farming in line with promoting women's education and NGO participation.

Future research can be carried out on a large scale by covering many crops and many locations and adopting a similar methodological approach. The research can be extended further by comparing the productivity between households who consult with wives and those who do not. Finally, a cross-country comparative study can be done to document the diversity.

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