Female Labour Force Participation in Agricultural Activities: An Analysis of Socio-Economic Survey of wetlands of Assam

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Abstract

Globally there are millions of women who are engage in farming activities. However, the issue of recognition, absence of land rights, lack of information, and other socio-economic causes have always been acting as hurdles in women's workforce engagement. This paper is an attempt to explore the women's participation pattern in wetland-based activities and also to analyse the factors influencing their workforce participation decision. A comparative scenario of female's agriculture participation in two major wetlands of lower Assam namely Dhir beel and Urpad beel has been provided in this paper. Dhir beel is located in Dhubri district near Chapar town, whereas Urpad beel is situated in Goalpara district and is approximately 12 km away from the Goalpara town. The study found that females are more actively engaged in livestock rearing as compared to cropping and fishing activities. Further, female's participation decision has been assessed by a binary logistic regression model. The model indicates that education, marital status, household size, and help received at home play a significant role in their decision to participate in wetland-based agricultural activities.

Keywords: *Women, Wetland, Farming activities, Logit model.*

Introduction :

Historically speaking, women's work has often been regarded as unpaid one. They are expected to do household chores and take care of their family only. Women's work is by and large neglected or paid not as much as "men's work". For instance; in the United States, most women didn't work outside the home, and those working outside were mostly young and unmarried. This was the scenario of the early twentieth century. Further, only twenty percent of the women have had access to gainful work. As per the Census Bureau, only five percent of married women were engaged in the workforce outside the home. The involvement of women in agricultural and allied activities is crucial and significant. Though, this involvement nature and extent varies across the regions. In agriculture, from planting to harvesting, women were mostly seen in

the activities like sowing, planting, irrigation, fertilizer and manure application, pesticide application, nursery management, harvesting, storing, etc. However, in some research, it was found that women were treated as less efficient crop producers by many policymakers (World Bank, 2001; Quisumbing, 1994). Further, evidence of the gender gap in agricultural activities has been indicated by several literatures. For instance; a study by Thapa, 2009 in Nepal showed that the productiveness of male workers was higher than that of female workers in agricultural activities. Moreover, a study on Nigeria and Uganda by Peterman et al. (2011) stated lower productivity of crops from the female-owned agricultural plots. But these studies have left out some important variable that affects the productivity gap. For example; a study by Quisumbing; (1996), stated that if the most productive lands are assigned to the males by themselves or have better access to inputs then it will no doubt cause a productivity gap between male and female crop producers. Further, rights to land by inheritance in many countries are generally weaker for women which might be an issue (Htun and Weldon, 2011). Therefore, many studies have revealed that lower productivity in crops is not because female are worse workers than male but due to the fact of gender differences in access to inputs, assets, land rights, markets, low-level bargaining power, etc. (Quisumbing, 1996; Rozelle et al., 2006; Croppenstedt et al., 2013; Kilic et al., 2013; Handschuch and Wollni, 2016). Additionally poverty status of many households improves with the economic contribution of women to the household resources."Literature of Kaur and Sharma, (1991); Unnevehr and Stanford, (1985); Agarwal, (1998) claimed that in Asian countries women, especially from rural areas, play a major role in agricultural activity but its relevance is yet to be reflected in policies. Women in Asian countries are capable of balancing both economic and domestic activities by working longer hours (Kabeer, 1994), where the average working hour of women is estimated at 13.2 hours in India (Kaur and Sharma, 1991). As per Census 2011, 65 percent of the total female workers in India are engaged in agriculture. In 2001, the female agricultural labourers were about 21 percent in 2001 and in 2011 it increased up to 23 percent. According to official statistics (National Sample Survey 68th round), in the rural areas, 59% of men work in agriculture, but the figures are 75% for women. The increased participation of females in agriculture indicates not only their increased reliance on agriculture but also their vital role in sustainable agricultural growth. Assam is mainly an agrarian state where women workers constitute a large majority of the workforce. Women in the state are mostly seen associated with agricultural activities like crop production, horticulture, tea plantation, livestock rearing, and fisheries floriculture, and so on. Approximately one-third of the women are involved in agriculture (Khan M.H., 2013). "This paper thus attempts to explore the female labour force participation in agriculture. Female participation pattern in wetland-based agricultural activities has been analysed.

Objectives :

1) To investigate the access of female workers to wetland resources and participation in

wetlands-based agriculture in comparison to men.

2) To analyse the factors influencing females' decision to participate in wetland-based activities.

Materials and Methods :

i. Sources of data :

The present study is mainly based on primary data. This study mainly focused on the households that were engaged in agricultural activities. Here agriculture includes crop production, fishing, and livestock rearing, etc. Data have been collected with the help of a structured interview schedule as well as focus group discussion.

ii. Area of the study :

Dhir beel and Urpad beel has been selected to conduct the study. In the 26.282°N latitude and 90.380°E longitude the Dhir beel is located near the Chapar town in Dhubri district. The beel boundary is shared between Kokrajhar and Dhubri districts. It covers an area of 497 hectares approximately. Urpad beel lies between the 25°15' N latitude and 90°14' E longitude. It is located 12 km away from Goalpara town. The beel covers an area of 795 hectares approximately.

iii. Sampling Procedure :

A multi-stage sampling method has been adopted to conduct the study. In the first stage, adjoining villages from each beel have been identified. From both the study areas, a total of fourteen sample villages have been selected. The second stage covers farming household data, which were gathered from the concerned village headman. The third stage includes the calculation of 284 households from Dhir beel and 288 households from Urpad beel through the Yamane formula (1967). At the fourth stage, an interview has been conducted using a structured interview schedule and focus group discussion. The study was conducted between January and December of 2019.

iv. Line of analysis :

For the first objective data has been analysed through descriptive statistics like tables, percentages, etc. For the second objective, a binary logit model has been applied. The dependent variable in this study is considered binary, which takes value 1 if the respondent (female) is currently working; and takes value 0 if the female is currently not working. More than one independent variable has been considered in the study therefore the model can be specified as-

Probability that a female is currently working $= P[x=1] = e^{w}/1+e^{w} = 1/1+e^{-w}$

Where, W is a linear function of the independent variables. If Y1, Y2,……, Yn represent various characteristics of the household and female respondent, then "W" equation would be as follows:

$W = \alpha_o + \alpha_1 Y_1 + \alpha_2 Y_2 + ... + \alpha_n Y_n$

Yi = ith Explanatory variables (i = 1, 2,…,n)

α i = Parameters of the model (i = 0, 1, 2, ..., n)

Further with a given set of characteristics the probability that a female is not currently working can be interpreted as-

$$P[x=0] = 1 - P[x=1] = e^{-w}/1+e^{-w} = 1/1+e^{-w}$$

The logit model thus postulates that the Probability of a female currently working = $1/1+e^{-w}$.

$W = \alpha_o + \alpha_1 Y_1 + \alpha_2 Y_2 + ... + \alpha_n Y_n$, the

following interpretation holds for each of the coefficients.

Moreover, each α i can be shown as: $\partial \log(odds\ ratio) / \partial yi = -\alpha_i)$, where odds ratio can be defined as: *P(Female is currently in workforce) / P(Female not in workforce)* = e^{-w}

The change in the logarithm of the odd ratio of the chance of a female working to not working is measured by αi. Further, when y_j is increased by unit we can compute the continuous variables. The calculation of this change can be determined through: $\partial p / \partial yj = A_j e^{-w} / (1 + e^{-w})^2$.

Where, $\alpha(A)$ shows the estimated logistic coefficient of each variable. The marginal effects were calculated for every independent variable. Table 1 shows the dependent and independent variables considered for the logit regression model.

Table 1: Dependent and independent variables for Binary Logit model

Variables	Description
Dependent Variables	
Female labour participation decision	1 if the female is working ; 0 otherwise
Independent variable	
Age	Age of the female respondent
Education	1 = Illiterate, 2 = primary, 3 - secondary, 4 = graduate & above
Marital Statuis	1 if married; 0 otherwise (unmarried/widowed)
Presence of children	No. of children (in numbers)
Family income	Total income of family members except for the female worker
Household size	Family size (in numbers)
Has help at home	1 if yes; 0 otherwise

Discussion and Results :

Table 2 represents the socio-economic characteristics of the farmers (household head) of Dhir beel and Urpad beel respectively. The table indicates that in the case of both the beels only 14.79 and 19.79 percentages were female-headed farming households. However, the majority of the farmers were male in both the study areas. In Dhir beel area most of the male and female farmers belong to the age group of 36 to 45. However, in Urpad beel most of the male farmers belong to the age group of 46 to 55, while most of the female farmers belong to the age group of 36 to 45.

Table 2: Farmer's socio-economic characteristics

Variables	Dhir beel (HH=284)		Urpad beel (HH=288)	
	Numbers	Percentage	Numbers	Percentage
A. Gender				
Male	242	85.21	231	80.21
Female	42	14.79	57	19.79
	Dhir beel		Urpad beel	
B. Age Group	Male	Female	Male	Female
25-35	34	8	28	7
36-45	80	20	73	40
46-55	68	14	75	10
56-65	47	-	37	-
65 and above	13	-	18	-
	Dhir beel		Urpad beel	
C. Educational level	Male	Female	Male	Female
Illiterate	29	20	30	23
Primary	88	12	97	25
Secondary	89	10	76	6
Graduation & above	36	-	28	3

Source: Authors own calculation based on survey data (HH=Household)

The farmers of Dhir beel and Urpad beel area were seen involved in mainly three types of wetland-based livelihood activities like cultivation; fishing and, livestock rearing, etc. Women's access and utilization of wetland-based activities in comparison to men are discussed below.

a) Womens access to wetland resources and participation in wetland based activities:

i. Cropping :

It was the main socio-economic activity in the study areas performed by both men and women. Cultivated crops included paddy, jute cabbage, cauliflower, brinjal, maize, sugarcane, tomato, potato, and chilli. Most of the main farmers were male, however, in terms of family labour number of females were larger than that of male. In the study areas, the total cultivated area by males has been found larger than the area cultivated by the female. It was found similar to the study of Rocheleau D. (1995) which shows that women have fewer land ownership rights than men in most societies across the globe. Women were mostly seen cultivating for household food security but men were seen focused mainly on commercial purposes. It was found similar to the study of Francis and Jahn 2001; Flintan 2003, who mentioned that women's role is confined to household maintenance, while men's role includes markets, subsistence production, etc. Further, most of the men i.e. 79.91% in Dhir beel and 78.88% in Urpad beel reported that they have been utilizing these beels for income alone and the rest admitted to utilizing wetland resources for both income and food. On the other hand, about 68.71% (Dhir beel) and 69.82% (Urpad beel) of women admitted to utilizing wetland resources for food. This result indicates that income was the first priority for men while for women it was food."Further, women had less access and control over cropping activities than men. In terms of main farmers, only 14.79 % (Dhir beel) and 19.79% (Urpad beel) were female farmers, whereas male farmers were 85.21% (Dhir beel) and 80.21% (Urpad beel) respectively. In the study areas most of the female members of the sampled households were seen doing different part-time cultivation activities; such as planting, carrying food for family members to fields, storing, cleaning after harvesting, etc. In the case of Dhir beel total main male farmers were 242 (85.21%) and the main female farmers were 42 (14.79%). On the other hand, there were 231 (80.21%) main male farmers and 57 (19.79%) main female farmers in Urpad beel area. "Table 5 shows the participation pattern of females and males in different types of works in cropping activities.

Table 3: Participation of Male and Female farmers in different cultivation activities

	Dhir Beel (In no.'s)				Urpad beel (In no.'s)			
Types of works performed	Male (HH) (n=242)	MFL	Female (HH) (n=42)	FFL	Male (HH) (n=231)	MFL	Female (HH) (n=57)	FFL
Ploughing	239	110	14	07	231	121	32	10
Clearing fileds	235	89	26	10	212	55	31	11
Planting/seeding	231	93	29	25	225	88	50	31
Marketing of products/ instruments	220	89	-	-	209	71	14	03
Watering of fileds	240	75	19	-	228	22	30	-
Harvesting	233	153	31	19	227	164	47	34
Selling of products	238	78	9	-	223	45	12	-

Source: Authors own calculation based on survey data (HH= household head, MFL= male family labour, FFL= female family labour)

The table indicates that the majority of the works in both the study areas were performed by male farmers. If we compare the working pattern of females of both the study areas, we can see that number of female participants in all the cultivation activities was higher in Urpad beel area. Further, in the case of marketing of products/ instruments, the no. of female farmers of Dhir beel area was found nil; whereas in Urpad beel area 34 female farmers were engaged in the marketing of products/instruments. In the case of male family labour the maximum engagement was seen in harvesting activities in both areas. However, in the case of female family labour the maximum engagement was seen in Planting/seeding activities in Dhir beel and harvesting activities in Urpad beel area respectively.

ii. Fishing:

In the study areas of Dhir beel and Urpad beel about 95 (33.45%) and 83 (28.82%) of households were involved in fishing. Fishing activities were seen as providing a good source of income to the households. This particular activity was mostly done by men in both the study areas. However, women's involvement was also prevalent in some of the sampled villages like Chakrasila pt I & II, Tintila of Dhir beel and Agia, Chamaguri, Gendera of Urpad beel. These villages mostly consist of tribal populations. Except for the above-mentioned villages, most of the farmers mentioned that fishing requires a lot of hardship that is why females usually do not prefer fishing activity unless necessary. In table 6, the participation pattern of males and females in different fishing activities are shown. In the table, the main male fisher (MMF) and main female fisher (MFF) include the household heads only.

Table 4: Participation of Male and Female farmers in different Fishing activities

	Dhir beel (In no.'s				Urpad beel (In no.'s)			
Types of works performed	MMF (HH)	MFL	MFF (HH)	FFL	MMF (HH)	MFL	MFF (HH)	FFL
Fishing	85	58	15	-	61	53	22	02
Marketing	82	21	13	-	67	35	16	03
Cleaning of nets	35	23	36	35	55	21	28	11
Fish collection	45	27	39	39	41	20	42	18

Source: Authors own calculation based on survey data (HH= Household head, MMF= Main male fisher, MFL= Male family labour, MFF= Main female fisher, FFL= Female family fisher)

The table indicates that in both the study areas participation of female were quite less than that of male. In fishing, only 15 and 22 main female fishers and from Dhir beel and Urpad beel area were seen involved. Further, participation of female family labours was observed nil in fishing and marketing in Dhir beel area. The involvement of female in different fishing activities was seen more in the case of Urpad beel in comparison to Dhir beel. "iii. Livestock: Approximately 110 (38.73%) and 133 (46.18%) households in Dhir beel and Urpad beel area were engaged in livestock rearing activities. In this case, women were seen playing a dominant role in both the study areas. In the study areas, livestock reared were mostly cow, goat, poultry and, pig. Most of the works associated with livestock rearing were performed by women, such as cleaning of livestock sheds, watering livestock, milking cows & goats, preparing dung cakes, collecting farmyard manure, feeding, fodder collection, egg collection, selling and preparing sheds for poultry's incubation process, etc. Whereas men were seen in fodder collection, Cattle selling, repairing livestock sheds, etc. In comparison to cropping and fishing women's access to livestock was observed more.

Table 5: Participation of Male and Female farmers in different Livestock rearing activities

	Dhir beel (In no.'s)				Urpad beel (In no.'s)			
Types of works performed	Male (HH)	MFL	Female (HH)	FFL	Male (HH)	MFL	Female (HH)	FFL
Cleaning of animal and sheds	21	10	40	29	18	07	47	19
Watering of cattle	28	08	39	22	34	11	33	20
Milking the animals	28	07	40	19	18	14	42	18
Fodder collection	23	33	30	10	13	10	38	08

	Dhir beel (In no.'s)				Urpad beel (In no.'s)			
Types of works performed	Male (HH)	MFL	Female (HH)	FFL	Male (HH)	MFL	Female (HH)	FFL
Preparing during cakes	05	-	40	13	-	-	47	19
Collection farm yard manure	26	-	37	17	16	-	17	10
Poultry shed making	78	19	33	19	89	23	39	10
Manure sell	35	15	14	-	44	20	20	-
Selling items	84	24	30	-	79	21	47	-

Source: Authors own calculation based on survey data (HH= household head, MFL= male family labour, FFL= female family labour)

b) Logit model :

Factors influencing females' decision to participate in wetland-based agricultural activities have been analysed through the binary logit model (Table 6). Results have been presented using marginal effect estimate, which shows the probability of a female's participation decision. Apart from 42 (Dhir beel) and 57 (Urpad beel) main female farmers, spouses of main male farmers of the remaining households have been interviewed.

Table 6: Binary Logit model

Variables	Dhir beel (N=284)				Urpad beel (N=288)			
Participation decision of female labour	Marginal effects	Robust etd. errors	Z	P>|Z|	Marginal effects	Robust etd. errors	Z	P>|Z|
Age of the respondent	.0017634	.0011918	1.48	**0.139**	.0052052	.0013434	3.87	**0.000*** **
Educational level	.0672425	.0218687	3.07	**0.002*** **	.0362342	.0195278	1.86	**0.064***
Marital status	-.0975697	.041568	-2.35	**0.019*** **	-.3049945	.0181042	-16.85	**0.000*** **
Presence of children	-.0347004	.0265066	-1.31	**0.190**	-.0194607	.018796	-1.04	**0.300**
Family income	-7.58e-08	8.38e-08	-0.19	**0.365**	-1.93e-07	1.93e-07	-1.00	**0.317**
Household size	-0.247319	.0121562	-2.03	**0.042** **	-.0018862	.0064784	-0.29	**0.771**
Has help at home	0.879524	0.454642	1.89	**0.058** **	.1169566	.0325495	3.59	**0.000*** **
	Prob > chi² = 0.0000 ***Wald chi² (7) = 32.30*** ***Log pseudo likelihood = -104.594*** ***Pseudo R² = 0.1337***				***Prob > chi² = 0.0000*** ***Wald chi² (7) = 69.95*** ***Log pseudo likelihood = -77.287698*** ***Pseudo R² = 0.5126***			

Source: Survey data (*** Significant at the 1% level, ** Significant at the 5% level, * Significant at 10% level).

Table 6 represents the marginal effect estimation of factors influencing participation decision of females in wetland-based agricultural activities. The marginal effect of age is found positively significant at 1 percent in Urpad beel, which indicates that a female's decision to participate in wetland-based agricultural activities will increase by .0052052 percentage points as her age increases. Although the relation between age and decision to participate in Dhir beel area is positive but it does not have any significant impact on their choices. Education levels marginal effect shows that participation decision of female rises by .0672425 (Dhir beel) and .0362342 (Urpad beel) percentage points as the education level goes up, which are significant at 1 percent and 10 percent level. Educated females were more concerned about their self-employment and they had also greater scope in various jobs as compared to the uneducated ones. Over a decade females were overshadowed by the works of males and often treated as unpaid workers in almost every sector. However, education allows them to extend their horizon and over the years an increasing number of the female are taking part in farm activities also. This is evident from the study. However in the study areas, due to domestic responsibilities, most of the females were not interested in off-farm works. Females were more comfortable in farm works as they can simultaneously manage both farms as well as domestic works. Further, the off-farm works available in the study areas were mainly wage labour and, business. Female farmers reported that these works require more time as compared to the farm works. Although off-farm jobs can give them a higher level of income despite they choose to perform farm works only. "The marginal effect of the marital status of females shows a negative relation between in both the study areas which specifies that their participation decision will reduce by -.0975697 (Dhir beel) and -.3049945 (Urpad beel) percentage points with increasing numbers of married women, which are significant at 1 percent level. The outcome indicates that with marriage, there comes a lot of household responsibilities so most of the females cannot manage to work outside their home even if they wish to. Further, the marginal effect of the presence of children in both the study areas shows a negative relation i.e. females' decision to participate will decrease with more numbers of children, however, it does not have any significant impact. The marginal effect of family income does not have any significant impact. Moreover, the marginal effect of household size indicates females' decision to participate in Dhir beel area will decrease by -0.247319 percentage point (significant at 5 percent) as the size of the household increases. Households with more family members cannot afford to work outside their home as they have household responsibilities. It does not indicate any significant impact in Urpad beel area. Lastly, female members with help at home are more likely to participate in wetland-based agricultural activities. The marginal effect shows that their decision to participate will increase by 0.879524 (Dhir beel) and .0325495 (Urpad beel) percentage points as they get help at home, which are significant at 5 percent and 1 percent level respectively.

5. Conclusion

A study by Meinzen-Dick et al. (1997) suggests that differences faced by women while accessing natural assets can influence the use of natural assets in 4 ways- sustainability of the environment, efficient resource use, equity of asset distribution among users, and user's empowerment (mainly women). The principal reasons are the inherited cultural insights, beliefs, customs, or traditions from predecessors. In most societies, it is generally believed that God designed women to perform household duties and men to perform duties outside the household. Further, lack of opportunity and knowledge regarding natural assets are also the core reasons for the low participation rate of women in terms of access. In this study also a difference between resource access and use has been observed. The study found that land, fish, firewood were the resources that were primarily accessed by males, whereas female access was mainly seen in livestock rearing activities. This shows limited access of women over wetland resources. Further binary logit model indicates that household size, presence of children acts as a hurdle in workforce participation. Education no doubt plays an important role in their participation decision. If they can get proper education with the skill development they will have more job opportunities and can have a better lifestyle. Further, if female can get some help domestically they can manage their time to participate in labour force."The world we live in is still experiencing gender inequality, where women's rights are violated which plays a major role in holding back women around the world. Despite various concerns regarding gender equality, disparities remain to cover uneven rights to use to decision making, land, opportunities, resources, etc. Hence, a positive impact on social, economic, and environmental progress can be only realized with the involvement of women.

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