WOMEN PARTICIPATION IN THE WORKFORCE AMONG THE MISING TRIBE IN ASSAM: A CASE STUDY

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Abstract:
In logistic regression model, a dichotomous variable, women participation in labor force is introduced to determine whether woman is employed or not. The ratio of employed individuals to not employed is written as $Pi = (1 - Pi)$ where Pi is the conditional probability that a particular person was employed. The operational model consists of the variables, which are supplied by the data. Various socio-economic variables are analyzed in this paper. The justification for incorporating these variables in female labor force participation decision model and their expected signs, are discussed in this paper.

Key words: *Women Labor Force Participation, logistic regression model, socio-economic variables*

Introduction

Women's labour market decisions, as well as the sort of job they undertake, cannot be decided solely by women (Atal, 2017), since these decisions are heavily influenced by household decisions (ILO, 2012) and are influenced by a variety of variables. To meet the household's demands, members of the family divide several types of everyday activities among themselves. Individual conceptions about gender roles, child raising techniques, and attitudes about the importance of women's efforts, among other things, influence the division of labour among household members. Household members' relative bargaining power influences these, which are determined by "potential income, human capital, economic reliance, possible employment status, as well as individual household requirements and interests" (ibid). Despite the fact that women contribute considerably to the operation of an economy, they are one of the most underused and neglected human resources.

Despite this, women's engagement in paid job is not necessarily empowering. Increased participation by women during economic distress, as noted by Chakraborty and Chakraborty (2009), may cause young girls to drop out of school to help with domestic chores and sibling care, limiting their schooling and, as a result, widening the gender gap in education and labour market opportunities. As a result of their lower levels of education, women are more likely to be employed in low-productivity, casual employment. As a result, gender segregation in the home translates to gender segregation in the workplace. Women's participation in the labour force is recognized to be influenced by a variety of factors. Non-economic factors have been proven to be more important than economic considerations in understanding women's labour market behaviour. Scholars contend that, in addition to economic characteristics such as education, experience, earnings, and incomes, because female labour force participation rates are influenced by so many diverse factors, there is a lot of variation between areas and countries. Because the level, patterns, and trends in female labour force participation vary greatly between and within nations, it would be inaccurate to make any generalizations, as Standing (1981)

correctly points out (Standing, 1981 cited in ibid). As a result, female labour force participation should be examined in light of the socioeconomic and demographic features of the studied region. With this goal in mind, the current chapter examines rural women's contributions to the tribal economy in terms of their agricultural and non-agricultural activities in the context of their family situation. The study then isolates the variables of women's work involvement in the study region using binary logistic regression analysis.

Literature Review
National and global literature assessment on labour force participation and labour supply has been reviewed critically. The literature contains a wide range of research related to economics. There are several researches on home economic theory in the literature. Becker (1965) and Gronau (1977) were pioneers in the topic, documenting how families manage their time. However, there is a large number of empirical studies in literature, particularly for developed countries. The majority of them are based on surveys conducted by Macurdy, Heckman, and Killingworth (1986).

Mincer (1962) investigated the relationship between working hours and female involvement in the labour force. He noticed that the family's financial situation had no impact on the wife's desire for leisure. The likelihood of entering the work market and lifetime wealth metrics are negatively connected. The study finds that the number of children has a considerable impact on the household's female labour theory.

Shah *et al*. (1976) investigated the influence of a number of demographic and socioeconomic factors on labour force participation in Pakistan's provinces. The findings demonstrate that the kind of nuclear family and the child-to-woman ratio are both inversely related to labour force participation. According to the findings, there is a clear link between labour force participation and marital status. In addition, he revealed that the dependence ratio and literacy ratio have a good impact on labour force participation. In Pakistan's metropolitan regions, Kozel and Alderman (1990) looked at the factors that influence employment participation and labour supply decisions. To estimate the correlations, he employed OLS regression and the Tobit model. According to his findings, women's employment involvement increases when their predicted earnings, salary, and level of education grow.

Malik *et al*. (1994) observed the elements that impact women's engagement in economic activities. He revealed that a woman's age, education, and the number of dependents have no bearing on market time. Women's labour supply is influenced by women's wage rates and predicted male wage rates in a substantial and favourable way. Kuwaiti women's labour market participation decisions are influenced by socioeconomic variables, according to Aly and Quisi (1996). According to the findings, women's income rates and education levels are positively associated to labour force participation rates. The number of children, marital status, and age are all proven to be inversely related to labour force participation rate.

Azid *et al*. (2001) investigated the factors that influence female participation in Pakistan's cottage industry and found that the number of children, female age, education, and poverty status all have a positive and substantial effect on female labour force participation.

Naqvi and Shahnaz (2002) investigated the influence of several demographic, socioeconomic, and human capital determinants on women's economic engagement. For the age category of 15-49 years, they used cross-sectional data from the integrated household survey (PIHS) (1998-99). The parameters were estimated using the probit and multinomial logit models. The probit estimates indicate that marital status, primary education, number of children and female head of households are inversely related with women's participation in economic activities.

Khan *et al*. (2005) have focused on hazardous nature of home-based work of women and children. They have investigated the contribution of women and children to the total family income and the impact of increased income on raising household nutrition, health and education. The study has concluded that household size is significantly and positively influencing the decision of household to engage in home-based work while living condition index inversely.

In Pakistan's Southern Punjab, Chaudhry and Nosheen (2009) looked at the elements that impact women's empowerment. The cumulative index was created by the author to account for the diverse nature of women's empowerment. The four criteria utilized by the Socio-Economic 354 women are personal autonomy, family decision-making, home economic decisions, and political autonomy. Education, media access, community socio-cultural norms, women's jobs, and the percentage of household engagement all had a substantial influence on women's empowerment, according to the research. Women's empowerment in terms of participation in family economic activities was the study's main focus.

About the Mising tribe
The Misings are Assam's second-largest scheduled tribal (Plain) group. They are members of the vast Mongoloid race's Tibeto-Burman family. Assam's Dhemaji, Lakhimpur, Jorhat, Golaghat, Sonitpur, Sivasagar, Tinsukia, and Dibrugarh districts have the highest concentrations. According to the 2011 census, their population was 6,80,424, with a male population of 3,45,786 and a female population of 3,34,638. The Misings, officially included as 'Miri' in the Scheduled Tribes of India under the Constitution of India Order 1950, are a hill tribe from North-Eastern India's Himalayan region (Pegu, 1998). Ethnically, the Musings are related to the Adis, Nishis, Apatanis, and Hill Miris of Arunachal Pradesh, and are part of the Mongoloid race's North-Assam branch (Kuli, 1998). exploited (Bordoloi, 1991: 53). Weaving is also a very popular activity among the Misings. The Misings women are experts in weaving. Cooperative outlook is the salient feature of the Misings. On the occasions like the building of a house, solemnizing a marriage ceremony, observing death rites or harvesting paddies, etc., the villagers co-operate wholeheartedly in such activities. The Misings have also some village organizations to maintain social order and unity among themselves. There was a village organisation called '*Kébang*'. The head of the Kébang is called '*Gam*'. The post is not hereditary. Generally, a '*Kébang*' is held in connection with judicial matters to give judgment of different cases. There is an institution called '*Ya:me Mímbír*' and the boys and girls of a village are the members of this institution (Bordoloi, Thakur, Saikia, 1987:120). But, these institutions are gradually disappearing among Misings. '*Murong*'

is another important socio-economic organisation among the Mising tribe, commonly called a bachelor's dormitory. The Misings prefer to live in a joint family. "The Miris (Misings) have the tradition of living joint family based on a patrilineal and patrilocal system. The eldest male member in the family becomes its head" (Doley, 1998: 91-104). After the death of a father the property is divided equally among the sons. Daughters are not entitled to share the father's property. But if a man has no son, his daughter may share the property. According to Sharma Thakur (1972) "Misings are broadly known by two sections namely-'Barogam' and 'Dahgam'. Further, these two divisions are divided into several clans namely -amongst the Barogam Doley, Kutum, Kuli, Pait, Patir, Kardong, Misong, etc., and amongst the Dohgam-Moying, Chayang, Panging, Yein, Morang, Bori, Taye, Noroh, Koman etc". The major festival of the Mising tribe is known as Ali-Ayé-Lígang. It is a spring festival of socio-cultural significance (Sharma Thakur, 1976). The festival is observed to mark sowing seeds on the first Wednesday of Fagun (Assamese) Month of every year. 'Po:rag' is also another important festival of the Misings. They also observe three Assamese Bihu namely- Bohag Bihu, Magh Bihu and Kati Bihu. The religious belief of Misings is based on the belief in supernaturalism and animism. They are also a follower of Hinduism. While they are devout followers of 'Vaisnavism' preached by the great saint Sankardeva and his disciples, they at the same time worship spirits and different deities and sacrifice birds and animals for the appeasement of the spirits and the deities some of which are benevolent and some malevolent (Bordoloi, 1991). The census 2011 figure reveals that the highest concentration of Mising population has been found in Dhemaji district (32.3 percent) of Assam and followed by Lakhimpur (29.1 percent), Jorhat (15 percent), Golaghat (7.8 percent), Sonitpur (7.2 percent), Sivasagar (4.1 percent), Tinsukia (2.7 percent) and Dibrugarh (1.2 per cent) districts. All these districts constitute about 99.6 per cent of the total Mising population in the state.

Objective: Objective of this research is to examine the effect of socio-economic and demographic variables on the women's involvement in the labour force (employed women, age group 15-64) in Golaghat district.

Hypothesis: There is no significant effect of socio-economic and demographic variables on the changes of women's involvement in the labour force (employed women age group 15-64) in the research region.

Methodology, Data Sources and Selection of Variables

Data and Methodology

In order to identify the socio-economic parameters that effect women's labour force participation in economic activities, we picked two blocks in one Assam district, Gomariguri block and Bokakhat block of Golaghat districts. We picked eight villages in the Bokakhat and Gomariguri blocks of the Golaghat region, where the Mising people are concentrated. The study is based on previously unpublished data that was collected at random. A well-structured questionnaire with purposively random sampling of the working women household which is at least one working women (any paid working women) in last 365days of the date of survey . Used to survey around 334 families purposively selection for the study . The age cohort 15-64 for the study in the total women workforce 638 and the not in the workforce 450. In addition to descriptive data, we use the Logit model to determine the major determinants of women's working status in terms of numerous qualitative and quantitative features. The purpose of the model is to evaluate

the impact of the following parameters on women's participation in economic activities among the Mising tribe of Assam.

Socio-economic determinants of women labour force participation

In most countries in the world, women contribute much less than men towards the value of recorded production quantitatively and qualitatively in labour force participation and educational awarded and skilled man power (Lawanson, 2008). The female labour force participation rate has become one of the most important goals of development efforts. In this regard, equity and efficiency particularly, eliminating gender disparities in primary and secondary education, improving maternal health, reducing child mortality and promotes gender equality and empowerment in women, are important goals. still, women are underrepresented in the wage sector in both developed and developing countries (Charles *et al.,* 2009).

Female labour force participation (LFP) is an important driver of growth and development (Verick, 2014). More female LFP are an indication of higher returns on human capital and education (World Bank, 2009). Women contribute significantly to agricultural activities in Africa; they own agricultural firms and mostly makeup up about 70 per cent of total employees (Africa Development Bank, 2015). Although more opportunities are available to women to enter the labour force (LF) even, female participation is limited in certain occupations, and they still find restrictions in attaining some managerial jobs and grapple with maternity decisions and family trade-offs (Murraly *et al*., 2007).

Female labour force participation (FLFP) is important for a nation's enhancement and socio-economic development because it promotes efficiency and equity. Generally, high female participation in the labour market implies two things; advancement in the economic and social position, and empowerment of women. This equity promotion capacity increases the utilization of human potential, which can help in build a higher capacity for economic growth and reducing poverty (Mujahid, 2014; Fatima & Sultana, 2009).Understanding women's decision to supply labour to the market can encourage them to either participate in or opt-out of the labour force, is vital for policymakers to efficiently help any economy develop and remain healthy.

A clear understanding of such factors and their effect on women's propensity to participate plays a very important role in determining the growth and development of countries. It helps us come up with new waysto encourage female participation or address those problems which is discourage females from participating in the labour market.Female Labour Participation (FLP) has still lower than male participation (Elborgh- Woytek *et al*., 2013). Women are generally engaged in unpaid work in the household sector, and when they are engaged in paid work, they tend to be over represented in the informal sector (Blackden & Hallward-Driemeier 2013; Elborgah Woytek *et al*., 2013). Many Studies conducted in Pakistan and the United States (Goldin 1994)

4.5.1 Model Specification

The decision to participate or not in the labour force is a binary one and hence took only two values, either a "yes" or a "no". In the dichotomous nature of the response variable binary logistic regression has been used in the present analysis.

In the binary logistic regression model, the female labour force participation which is the dependent variable (Y) take only two values, Yi = 1 if the respondent is in the female labour force participation and Yi = 0 if the respondent is not in the female labour force participation. The dependent variable is determined by the predictorvariables s also known as covariates which may be numerical or categorical.

For a categorical variable, a dummy variable is used to compare the different categories. For each categorical variable, a baseline or reference category is chosen and all other categories are compared to the baseline category. In a categorical variable with k categories, k-1 dummy variables are to be introduced (Gujarati, 2004).

Logistic regression is often used for binary classification. The formula for logistic regression is: the logit model, commonly used in logistic regression, is a way to model the probability of a binary outcome (e.g., success/failure, yes/no). The formula for the logit model is:

$$logit(P) = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k$$

Here:
(P) is the probability of the event occurring.
(\ln) is the natural logarithm.
(\beta_0) is the intercept.
(\beta_1, \beta_2, \ldots, \beta_k) are the coefficients for the predictor variables (X_1, X_2, \ldots, X_k).

The logistic function, which converts the log-odds back to a probability, is given by:

$$P = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k)}}$$

Dependent variable

The Labour Force Participation (LFP) is a dummy variable female labour force participation (age15-59), yes =1 and not the participation= 0.

Independent variables

There are three main categories of variable in our model which explains the labour force participation:
 a) Female Household characteristics
 b) Female individual Socio-economic and demographic factors
 c) Other factors

The general model specified above can be used as a guiding paradigm. Based on the theoretical rationale, the operational model consists of the variables, which are supplied by the data. Various socio-economic variables are analyzed below.

The justification for incorporating these variables in female labour force participation decision model and their expected signs, are discussed below. It is expected to be positive in female Labour Force Participation. The model is the specification of the basic LFP Logit Model. Where LFP is the labour force participation, the dependent variable and the variables in bracket are explanatory variables.

FLFP = Dummy variable coded 1 if the Female participate in labour force (age 15-59); else=0.

Table: 1.1 Explanatory variables

Variables	Notation	Description	Scale (ordinal/nominal)	Expected sign (positive/negative)
Dependent variable				
Female labour force participation (age group 15-59)	LFP	Dummy Variable =1 if participating in thelabour force (age 15-59) 0= otherwise		
Independent variables				
Household characteristics				
Household head occupation	OHH	1=if the household head occupation is cultivator; 0= otherwise	Nominal /Ordinal	Positive/ negative
Family type	FT	1= if joint family, 0= otherwise	Nominal	Positive
Land holding	LH	Land holding by the household (in bigha)	Nominal	Negative
Sex ratio	SR	Females per 1000 male population. It is normalized to 100	Nominal	Negative
Age 0-6years	0-6	0-6 years old children in the family	Nominal	Negative
Distancefrom the nearest urban area	REMOT ENESS	Distance (in kilometer)	Nominal /Ordinal	Positive
MGNREGA	MGNRE GA	1= if house hold has MGNREGA account; 0=otherwise	Nominal	Positive

Female individual characteristics (socio-economic)				
Marital Status	Married status	1=If the female is married,0= otherwise	Nominal	Positive
	Age-1	=1 if the women belong to age group (15-24) years; else =0	Nominal	Negative

	Age-2	=1 if the women belong to age group (25-34); else =0	Nominal	Positive
Age	Age-3	=1 if the women belong to age group (35-44); else=0	Nominal	Positive
	Age-4	=1 if the women belong to age group (45-54); else=0	Nominal	Negative
	Age-5	=1 if the women belong to age group (55-59); else=0	Nominal	Negative
Education	Edu-1	=1 if the women level of education is up toprimary; else =0 (1-4th)	Nominal	Negative
	Edu-2	=1 if the women level of education is up to middle school; else=0 (5-8th standard)	Nominal	Positive
	Edu-3	=1 if women level of education is secondary; else=0 (9th -10th standard)	Nominal	Negative
	Edu-5	=1 if the women level of education is higher secondary; else=0(11th-12th standard)	Nominal	Negative
	Edu-6	=1if the women level of education isgraduate; else =0	Nominal	Negative
	Edu-7	= if the women level of education P.G andmore; else=0	Nominal	
MPCE (female)	MPCE	Monthly per capita consumption expenditure of female (Rs.1000 as a proxy =1, otherwise=0)	Nominal	Positive
Females other factors				
Family/ husband support	FS	1= if your family /husband support yourprofession;0= 0therwise	Nominal	Positive

Summary Statistics of Binary Logit Model

Table 4.8 shows the mean and standard deviation of the explanatory variables used in the study for the model one. The women in the labour force participation in Model- I (47.93) it means the participation rate is almost 48 percent in the household level However, the average size of landholding of household of women in the labour force in Model I is (0.49),whereas the land holding of women participant household is 49 percent.

For the categorical explanatory variables, the means indicate the proportion of cases with value of the explanatory variable = 1 in each category of the dependent variable. For example, a mean of 3.88 for Marital status for FLFP = 1 implies that 4 per cent of women in the labour force in Model I is in married women.

Table: 1.2 Summary information of women labour force participation total working women (638)

Explanatory variables	FLFP=1; 0= otherwise	
Dependent variables		
FLFP (age group 15-59)	47.93	19.38
Household characteristics of female		
OHH	23.21	9.67
FT	5.11	3.19
LH	0.49	0.43
SR	0.67	0.31
0-6	0.42	0.39
REMOTENESS	0.62	0.49
MGNREGA	0.89	0.45
Individual female socio- economic characteristics		
Marital status (dummy)	3.88	2.72
Age -1	1.96	1.72
Age-2	31.29	7.59
Age -3	7.57	6.91
Age -4	0.18	0.12
Age -5	0.22	0.12
Edu -1	0.18	0.11
Edu-2	1.17	0.29
Edu-3	2.34	1.56
Edu-4	1.28	0.89
Edu-5	6.26	4.34
Edu-6	0.57	0.50
Edu-7	0.24	0.43
Economic status	2.83	1.88
Other variables		
Family/husband support	2.12	1.87

Source: Calculated based on primary data collected from Golaghat district (2020-2021)

Result and interpretation of the Binary Logistic Regression

Model building process was begun with careful preliminary univariate analysis of each predictor variable with dependent variable, women LFP status. In addition, univariate analysis was performed for the Golaghat to select a variable which at Pearson chi square 5% level of significance. For each socio-demographic variable a test of association was carried out to select a candidate predictor variable that would serve the purpose for multiple analyses. Pearson chi-square test is asymptotically equivalent to the likelihood ratio chi-square test. Since the likelihood ratio chi-square test with k-1 degree of freedom, where k is the level of the predictor variable, is exactly equal to the value of the likelihood ratio test for the significant of the coefficients for k-1 design variable in univariate logistic regression model that contains a single predictor variable. Large value of the Pearson chi-square or likelihood ratio chi-square for a given predictor variable can be used as an indication for the existence of strong association between the given predictor variable and the response, keeping the effect of another factor's constant. The decision was based on the Pearson chi-square value, p-value and the 5% level of significance. The finding has been shown in Table …below.

In the various determinant factors, Age is an essential determinant of female labour participation. The simultaneous demands made by children and work reduce women's labour participation during periods of child-bearing and childrearing compared to women outside this Age (Psacharopoulos and Tzannatos, 1989). During the childrearing period, female participation declines but is expected to be the highest before and a few years after the child-bearing period (Mon 2000). In Model I, AGE significantly positively impacts female labour force participation. An increase in Age correlates with increased labour participation up to a particular age, in which labour participation will decrease. This means that younger women - who perform a more significant share of household duties and child-bearing and childrearing activities – and older women are less likely to be in the labour force than middle-aged women. In many cases, education and female participation rates sometimes show a marginal or non-linear relationship (Mon, 2000). Psacharopoulos and Tzannatos (1989), education has an essential effect on women's participation in the labour force.

Table 1.3 **Logistic regression estimates for female labour force participation-Model 1**

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C. I. for EXP (B)	
							Lower	Upper
OHH	21.466	6376.271	.000	1	.997	2.101	.000	
FT	1.088	.294	13.666	1	.000**	2.969	1.667	5.287
LH	-.033	.256	.016	1	.899	.968	.586	1.599
DISTANCE	-1.568	.557	7.913	1	.005**	.209	.070	.622
MGNREGA	-.524	.237	4.908	1	.027*	.592	.372	.941
MARITAL	-.314	.259	1.469	1	.025*	.731	.440	1.214
Age15-24	-.151	.626	.058	1	.810	.860	.252	2.932
Age 25-34	-.361	.611	.348	1	.055*	.697	.210	2.311
Age 35-44	-.173	.613	.080	1	.078*	.841	.253	2.795
Age 45-54	-.037	.638	.003	1	.954	.964	.276	3.367
Primary	.620	.396	2.453	1	.117	1.860	.856	4.042
MID	2.470	1.121	4.852	1	.028*	1.819	.613	3.406
SEC	-.395	.310	1.629	1	.202	.673	.367	1.236
HS	.087	.311	.078	1	.780	1.091	.593	2.007
Graduate andabove	-.014	.360	.002	1	.968	.986	.487	1.997
MPCE (female)	-.231	.216	1.143	1	.085*	.794	.520	1.212
Husband /family support	-.065	.224	.085	1	.071*	.937	.604	1.453
FLFP(Constant)	.826	.912	.820	1	.365	2.283		

** means significant at 1% level of significance
*means significant at 5% level of significance
Source: Calculated based on primary data collected from Golaghat district (2020-2021)

They postulate that labour force participation rate is affected by the decision to participatein the labour market and by the decision of how much time to spend in the labour market.As regards the decision to participate in the labour market, education has a positive effectfor two reasons. Firstly, if education is considered an investment, then the woman must work to recover that cost of investment in human capital. Secondly, suppose education isviewed as a consumption activity. In that case, the woman is induced to work due to higher earning potential as the opportunity cost of not working in terms of forgone earnings increases. As regards the duration of work, education has a positive effect as it raises the earning capacity and increases the cost of not working. On the other hand, higher earnings mean that the income target is reached earlier, allowing the woman to

allocate a part of the higher earnings to consume leisure and work less. The net effect of education on female labour force participation depends on which force dominates. Empirical studies have shown that the female labour supply responds more to wage considerations (substitution effect) than to income, so the participation of educated females is higher than that of the less educated or uneducated (Psacharopoulos and Tzannatos, 1989).

In the study area, family structure (FAMILY- TYPE) is a dummy variable of =1 if the respondent to a joint family and =0 otherwise.

The coefficient for this dummy is negative and statistically significant for models, indicating that a respondent who belongs to a joint family compared to a nuclear family was less likely to be in the labour force.

Presence of child may negatively affect women's participation in economic activities (Chaykowski and Powell, 1999) since women have to expense more time in child caring (0-6 year), in case of married women the presence of child under the age group six is the most significant factor in labour force participation (Cohen, 1970; Anderson and Dimon, 1998).

In rural areas, presence of child don't not pose problem for women in labour force. Participation since elder girl child and female members of the household help in domestic work and child care while elder boys assist in farming activities. Whereas, the primary and secondary school-going children cannot help in childcare and household works. As mentioned above, in nuclear families, the presence of small children, specially under the age of six, may hinder a woman's participation in any economic activities.

In the Present study, the presence of children at six represents dummy variable CHILD_06. In Model I, the children under six years have a negative effect on female participation rates, but the results are not statistically significant.

Marital status is another significant influence on female labour force participation, as married women had larger household responsibilities than women who were not married (Mon, 2000) which restricted their participation in the labour force. Being married influenced women's decision-making ability and also increased the value of non-market activities. In patriarchal family structures, women were expected to fulfill the role of mothers and home-makers, and men the role of bread winners and heads of the household (Blau *et al.,* 1998).

In such patriarchal family, structures are more prevalent in Indian culture, marriage is expected to reduce the women in labour market activities participation. We categorized the respondents into two categories: married and unmarried the variable of marital status (MARITAL_STATUS) is a dummy. The results of the analysis show for Model I, although the coefficient is positive, and it is significant.

The variable (OCCUPATION_HEAD) took a value of 1 if the primary occupation was cultivator and 0= otherwise. For Model I, head of the household occupation is non - significant in explaining the labour participation of the respondents.

Family income source has been noted as an important determinant of female labour participation. Nayyar (1987) writes that according to several scholars, poverty has been regarded as "the single most important factor" which has an influence on participation rates for women. On the other hand, the participation of women in the labour market pushto an increase in family income thereby a positive relation between female participation and income of the household. in the present study, household income is using monthly per capita consumption expenditure (MPCE) as a proxy Rs.1000 of female. The analysis for household MPCE is statistically significant in the model.

Land is not only a major asset in agricultural families but also an indicator of socio-economic status. Some studies have established a negative correlation between landlessness and female participation rates in rural areas in India. Given that landlessness is regarded as poverty in rural areas, it appears logical that women in the landless category participate more in economic activities to supplement family income than women with land (Nayyar, 1987). Some studies,

however, find a positive relationship between women's labour participation in agriculture, size of landholding (Bhati and Singh, 1987). In this study, we have measured the landholdings of households (LAND) in bigha. The results analysis, indicate a non-significant relation between the size of landholding and female labour force participation.

Results from the Logistic Regression

Tables 4.10. represents the results of the binary logistic regression analyses. The *p* values of the Wald statistics in Table 4.10 shows that the variables that are significant in explaining female labour force participation as per Model I are OHH, FT, LH, DISTANCE, MGNREGA, MARITAL STATUS, AGE1, AGE2, AGE3, AGE4, EDU1, EDU2, EDU3, EDU5, MPCE, FAMILY/HUSBAND SUPPORT etc.

The estimated logit equation for Model I may therefore be written as:

Predicted logit of FLFP = *0.826 + 21.466O HH + 1.088 FT-0.1.568 DISTANCE -0.524 MGNREGA - 0.314 MARITAL-0.361 AGE-2-0.173 AGE-3+2.470 EDU-0.2 -0.231 MPCE-0.065 HUSBAND/FAMILY SAPPORT + Ui*

Where, U_i is the stochastic error term.

Interpretation of Log Odds and Odds Ratio

The interpretation of the analysis results involves two issues: (i) determination of the functional relationship between the outcome and the predictor variable and (ii) determining the unit of change for the predictor variables. In linear regression, the interpretation of the slope coefficients for the independent variables is straightforward, as the slope coefficients represent the resulting change in the outcome variable for a unit change in the predictor variable. In the logistic regression model, the link function is the logit function, and the slope coefficients represent the change in the logit corresponding to a change of one unit in the independent variable (Hosmer and Lemeshow, 2000). Therefore, the slope coefficient for a particular predictor variable (represented as the Bs in the results table) is the logarithm of the odds or the logit and shows the change in estimated log odds (or logit) of being in the labour force, for Y=1, for a unit change in that predictor variable, other predictors being held constant. The sign of the B-values (b) (showing the character of the partial effects of each predictor) indicates whether an explanatory variable has a positive or negative impact on the outcome variable, in this case, female labour force participation.

While interpreting the odds ratio for a categorical variable, it is essential to keep in mind the coding for the two categories of the variable. In SPSS, the first or the last category can be chosen as the baseline category. Generally, the absence of the factor is coded as 0 and the presence of the element as 1. In the present analysis, the lower category (X=0) is chosen as the baseline category. For a variable X with slope coefficient b, the quantity exp (b) is represented the odds ratio for a person with value as (X+1) relative to the odds for a person with value X. Therefore, exp (b) is the incremental odds ratio which corresponds to an increase in one unit in variable X, assuming that the importance of other X variables remains the same. The cumulative odds ratio corresponding to the change ofk units in X is exp (kb) (Afifi *et al*.).

For example, the Exp (B) for Marital status for Model I is .731, which indicates the odds of being in the participation for a respondent married women decreases by a factor of 0.269 or 26.9 percent, as compared to a respondent from another than married. The odds can also be expressed in percent terms which can be obtained by using the following expression: [{Exp(B)-1} *100] %. when in the odds ratio is > 1, a unit increase in the predictor increases the odds in favour of the event (Y=1) by the percent obtained.when the odds ratio < 1, a unit increase in the predictor reduces the odds by [1-{Exp(B)} *100] %. For example, the Exp (B) for Marital status for Model I is 0.269, which indicates that the odds of being in the participation in labour force for a respondent belonging to the marital status decreases by a factor of 0.269 or by [{1-Exp(B)} *100] %=[{1-0.269} *100] %= 26.9 % as compared to being in the other than married.

Table 1.3 present the results of the binary logistic regression analyses. The p values of the Wald statistics in Table 4.10 show that the variables that are significant in explainingfemale labour

force participation as per the Model are FT, MGNREGA, DISTANCE, MARITAL STATUS, AGE GROUP -2 (25-34), AGE GROUP -3 (35-44), HUSBAND/FAMILY SUPPORT, MPCE, etc.

Omnibus Test of Model Co-Efficient

The overall fit of the model can be assessed by comparing the fit of the intercept-only model or the null model with the model containing the independent variables. The overall fit of the model can be examined via a likelihood ratio test. It measures how the explanatory variables improve the fit of the given model compared to the null model. The LR (likelihood ratio test) statistic which is referred to as the Omnibus Tests of Model Coefficients and is shown in the table:1.4. For the models the model chi square turns out to be significant indicating that at least one of the predictors is significantly related tothe outcome variable. In the present analysis since all the variables have been entered at the same time using the block entry of variables there is only one model to be compared with the null model, there is no difference in the results in step, block or model chi-squarevalues. Significance at the 0.05 level or lower implies that the given model with the predictors is significantly different from the null model, the constant only model which means that at least one of the independent variables contributes to the outcome.

Table: 1.4 Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	102.246	17	.000
	Block	102.246	17	.000
	Model	102.246	17	.000

Source: Calculated based on primary data collected from Golaghat district (2020-2021)

Hosmer and Lemeshow Test

Hosmer and Lemeshow proposed a goodness-of-fit test, now universally referred to as the Hosmer-Lemeshow test. The Hosmer-Lemeshow (H-L) statistic measures the difference between the observed and the predicted values of the dependent variable. Hosmer and Lemeshow proposed grouping of the observations into deciles on the basis of estimated probabilities (Hosmer and Lemeshow, 2000).

The H-L test statistic is then computed which asymptotically follows a χ^2 distribution with 37 (number of groups -2) degrees of freedom (Park, 2013). The probability value (p) is also computed to test the goodness of fit of the model. A non-significant chi-square value for the H-L statistic (p>0.05) indicates a good fit model as it implies that the model prediction is not significantly different from the actual values. The Hosmer-Lemeshow tests the null hypothesis that predictions made by the model fit perfectly with observed group memberships. The non-significant p-value (0.922 >0.05) signifies the same here (table 1.5).

Table: 1.5 Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	3.192	8	.922

Source: Calculated based on primary data collected from Golaghat district (2020-2021)

R^2 Equivalents for logistic regression/ Pseudo R-square

The most commonly used measures of Pseudo R^2, as reported by SPSS, are the Cox & Snell R Square and Nagelkerke R^2. The problem with Cox and Snell's R^2, as suggested by Cox and Snell (1989), is that it does not reach the maximum value of 1, making it difficult to interpret.

The Nagelkerke R^2 is an improvement over Cox and Snell's R^2 and a more reliable measure. Since its value ranges from 0 to 1, Nagelkerke's R^2 will generally be higher than the Cox and Snell measures. The models have been presented in table 1.5 . Here mentioned that there exists a direct empirical relationship between the R^2 of a linear regression model and the pseudo R^2 of a choice model (Domenic and Mc Fadden,1975), with pseudo R^2 values between the range 0.14.9 and 0.20 translated as an R^2 of between 0.6 and 0.8 for the linear model equivalent (Hensher, Rose and Green, 2005, pp. 338- 339). Since the pseudo R^2, as shown by Nagelkerke R^2 is 0.200 (20%), the model fit is entirely satisfactory.

Table: 1.5 Pseudo R-square

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
1	763.845	.149	.200

Source: Calculated based on primary data collected from Golaghat district (2020-2021)

Summary result of binary logit model

The results of the binary logistic regression analyses, conducted using SPSS software versions 16 and 22 to determine the socio-economic factors affecting female labour participation in the study area, are presented in table 1.5 . The complete Model, including all the predictor variables, was tested against the constant-only Model and was found to be statistically significant, indicating that the set of predictors helped explain the labour force participation behavior of the women in the study area (Chi-square=102.246 for Model I at p =(.922>0.000) at 8 degrees of freedom). The pseudo R^2 values (Cox & Snell R^2=0.149, Nagelkerke R^2=0.200) for Model I show that the set of predictor variables explains 14 -20 percent of the variations in female labour participation.

Conclusion and Policy Implications

The majority of working women are involved in agriculture and related activities. However, due to the unremunerative nature of their work in agriculture and related activities, they face difficulties and challenges in obtaining a sustainable livelihood and a decent life. As a result, policies to accelerate agricultural growth are urgently needed from the government and civil society. Policies must address the barriers that women face in obtaining a better education and acquiring more skills. More funding for education would be a wise investment and a better mechanism for improving society's human capital. They will be better equipped to participate in the labour market in a more productive manner if their human capital is improved. Such a step can improve their employability in formal labour markets, which will have a positive impact on the healthy development of their children and, of course, their family.

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