

**ECONOMICS OF AGRICULTURAL LABOUR IN INDIA
WITH SPECIAL REFERENCE TO WEST BENGAL**

SYNOPSIS

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Agriculture plays a crucial role in the development of the rural economy of developing countries like India. Around 54.6% of labourers of the total rural workforce are engaged in the Indian agricultural sector [70th Round National Sample Survey (NSS) data (2013)]. These labourers are engaged on another person's land either for wages in cash or kind or the combination of cash and kind [Census of India (2001) & (2011)]. They are one of the socially and economically backward classes in India [Unni (1988)]. In the background, the thesis aims to address four economic challenges facing by the agricultural labourers of India such as declining employment participation rate in agriculture, gender-based wage discrimination in the agricultural sector, high incidence of poverty of the agricultural labour households, and low accessibility of institutional credit of the agricultural labour households in India. The first three chapters of the thesis deal with the introduction, literature review, and research objectives respectively.

Chapter-4: Push and (or) Pull? Drivers of Labour Force Participation in Indian Agriculture

Based on different rounds of NSSO surveys, it is observed that the labour force participation rate has declined in Indian agriculture. It has declined from 74.1% to 61.39% from 1993-94 to 2011-12. This trend in the agricultural labour market is observed both at the state level as well as the national level. In the background, the research objectives of the fourth chapter of the thesis are given below-

Research Objectives

- i. To investigate the nature of variation of labour force participation in Indian agriculture across 20 major states during the period between 1993-94 and 2011-12.
- ii. To identify the possible 'push' and 'pull' factors responsible for the gradual decline in labour force participation rate in the agricultural sector in India.

Labour force participation in Indian Agriculture: An Inter-State Comparison

The labour force participation in agriculture as a percentage of the total rural labour force has declined gradually in almost all states over the period 1993-94 to 2011-12 [Different rounds of NSSO data]. The average growth of the labour force participation rate in the agricultural sector is highly negative in some states such as Himachal Pradesh, Kerala, J&K, Bihar, U.P, Punjab, and Orissa. Except in Gujarat, the remaining states have also faced a negative average growth rate of workforce participation in agriculture during the last two decades.

Possible factors behind the cause of gradual decline of labour force participation rate in Indian agriculture.

The possible pull and push factors are considered for this investigation are given below –

- (i) Average agricultural real wage rate (realw): The average agricultural real wage rate is an inflation-adjusted wage rate and it plays as a push factor in the labour market. Higher real wages will reduce the employment opportunity of labourers in the agricultural sector.
- (ii) Labour force participation rate in the construction sector in percentage form (cons): The construction industry provides employment opportunities to the most vulnerable and marginalized people of society and is therefore considered a possible determinant in this study. It is treated here as a pull factor.
- (iii) General educational attainment (Primary education and above) (edu): It is also a crucial factor to examine whether the advancement of general educational attainment (primary education and above) of the male agricultural labourers, creates an impact on the labour force participation rate in the agricultural sector or not. It is considered here as a push factor.
- (iv) The average area of land possessed per household (landp): Around 56 percent of the agricultural labourers still possess less than 0.01 hectare of land, which is far below the requirement to maintain a minimum standard of living [NSSO (2013)]. Therefore, it is important to investigate whether low per capita ownership of land holdings (push factor) is responsible for the declining labour force participation rate in the agricultural sector?
- (v) The average daily real wage rate for non-farm occupations (nonfw): It is a pull factor. Average daily real wages (calculated at 1986-87 prices) of unskilled non-farming labourers are smoothing income over years and that may have some impact on employment participation in the agricultural sector.
- (vi) The share of non-farm employment in the total employment (nonf): It will be tried to find out whether the non-farm employment opportunities play a pull factor in providing an alternative income to rural households.

- (vii) Employed by self-employment within non-agriculture (selfe): One can expect that 'remunerative' income per month from self-employment in real terms, may create a significant impact on the decline in the employment participation rate in the agricultural sector.

Sources of Data

This investigation is based on the secondary data on Employment and Unemployment situations in rural India, provided by National Sample Survey Organization (NSSO) in its different rounds. Longitudinal data of 20 states in six-time points (1993-94 to 2011-12) are here considered.

Econometric Model

For the econometric analysis, initially we have calculated the Variance Inflation Factor ($VIF=1/(1-R^2)$) to detect the multicollinearity or inter-correlations among all explanatory variables. From this test, it is observed that average agricultural real wage (10.44) and non-farm unskilled real wage (10.75) are highly inter-correlated as their observed VIF values are more than 4. Furthermore, it is expected that two pairs of variables such as ('nonf', 'nonfw') and ('nonf', 'cons') are collinear with each other, although their VIF values are less than 4.

Hence, to address our research objective and to avoid the problem of multi-collinearity among the regressors, we have considered four Regression Equations separately to identify the possible factors responsible on employment participation rate in agriculture (EPA). Panel data regression equations are used for the investigation. The Equations are as follows.

$$EPA_{it} = f(\text{realw}_{it}, \text{cons}_{it}, \text{edu}_{it}, \text{landp}_{it}, \text{selfe}_{it}) \dots \dots \dots (1)$$

$$EPA_{it} = f(\text{realw}_{it}, \text{landp}_{it}, \text{nonf}_{it}, \text{selfe}_{it}) \dots \dots \dots (2)$$

$$EPA_{it} = f(\text{cons}_{it}, \text{edu}_{it}, \text{nonfw}_{it}, \text{selfe}_{it}) \dots \dots \dots (3)$$

$$EPA_{it} = f(\text{edu}_{it}, \text{landp}_{it}, \text{nonfw}_{it}, \text{selfe}_{it}) \dots \dots \dots (4)$$

Through Hausman test in each above-mentioned equation, initially, it is proved that fixed effect approach is appropriate for all the four panel data regressions.

Discussion

It is observed that the enhancement of real agricultural wage is significantly related to the gradual decline of labour force participation in the agricultural sector. This is a push factor. The expansion of labour force participation rate in construction work (pull factor) is also responsible for the gradual decline of labour force participation rate in agricultural activity. Expansion of education among the agricultural workers creates a negative and significant effect on the employment participation rate in the agricultural sector. Most of the time, agricultural labourers cultivate their own or (and) leased-in land mainly with the help of the family labour force and hire very few labourers from outside. This reduces the employment opportunity in an agricultural occupation. Gradual expansion of non-farm employment opportunities encourages the agricultural labourers to move towards different non-agricultural activities which reduces the employment participation rate in the agricultural sector. The average daily real wage rate for rural male non-agricultural workers (unskilled labour) and self-employment within the non-agricultural sector are negatively related to the employment participation rate in the agricultural sector.

Chapter-5: Gender Wage Gap in The Agricultural Labour Market of India: An Empirical Analysis

The gender wage discrimination among the agricultural labourers of all stages of the production process is significant across all Indian states [Directorate of Economics and Statistics (2010-11) & (2015-16)]. In rural India, around 39 percent of women and 21 percent of men as agricultural labourers are dependent on agriculture for their livelihood [Census of India (2011)]. Despite performing equal or equivalent work, female agricultural labourers do not enjoy an equal or equivalent wage rate as compared to their male counterparts. In this context, the research objectives of the fifth chapter of the thesis are as follows-

Research Objectives

- (i) To investigate the nature of variations of the money wage gap between male and female agricultural labourers across 18 major states in India over the period between 2010-11 and 2015-16.
- (ii) To examine various possible factors which can reduce this gender-based wage discrimination among the agricultural labourers in India.

Variations of the gender wage gap: Inter-state comparison

The gender-wise wage gap in the agricultural sector is considered in 18 major states of India between 2010-11 to 2015-16. To understand the changing scenario of the gender wage discrimination of agricultural labourers during the mentioned period, two indicators– ranking of states based on average daily money wage and absolute gender wage gap are initially considered. The chapter shows the gradual enhancement of the male-female wage gap among the agricultural labourers is in the states like Kerala, Tamil Nadu, Andhra Pradesh. In Jharkhand, Gujarat, Bihar, and Uttar Pradesh, the absolute gender wage gap is observed low over the years. Out of the eighteen states considered here, only in three states, i.e. in Bihar, Himachal Pradesh, and Rajasthan, the absolute gender wage gap has shown a declining trend over 2010-11 to 2015-16. Concisely, the study shows the prevalence of substantial variations of the gender wage gap across states during our period of analysis. In this context, there is a need to examine the possible factors which are responsible for reducing gender wage discrimination in the Indian agricultural labour market.

Possible factors for reducing the gender wage gap in the agricultural labour market

- i. Percentage of the female population (Age group 15-49 years) by the level of primary education in India (priedu): It is hypothesized that the higher percentage of primary education for a female would have a positive impact on the agricultural wage of the female labour force.
- ii. Percentage of women's participation in the Mahatma Gandhi National Rural Employment Guarantee Programme MGNREGP (wpermgnrp): The agricultural wage of female farm labourers may be directly affected through participation in MGNREGP. Therefore, it is investigated whether a higher percentage of women's participation in MGNREGP can play an important role to reduce the gender wage gap in agriculture?
- iii. Cropping intensity (cropint): An increase in cropping intensity through multiple cropping leads to higher demand for both male and female labourers. The higher demand for female labour is expected to push up the wage rate of the female agricultural labourers which may be negatively associated with the gender wage gap in the farm labour market.
- iv. A total number of Self-help groups in the state (shg): Expansion of the microfinance system indicates more participation of village women in different types of economic activity which help them to enhance their earnings. More involvement of rural women in

the microfinance system will reduce female labour supply that possibly enhance the female wage rate in the agricultural labour market.

- v. Total social expenditure as a percentage of Net State Domestic Product (socialexp). Due to spending on the social sector by the state government through spending on healthcare, shelter, civic amenities, the capability of the poor rural households has increased. This may discourage the female members of the households from joining the farming sector. Hence, the female labour supply in the agricultural labour market will be decreased which can enhance the wage rate of the female agricultural labourer and reduce the gender-wise wage gap.
- vi. Net land irrigated area (netlandirr): Cropping intensity of a state in any particular time depends on the 'Net irrigated area' of that state in that period. It is expected that, if major parts of the cultivatable land of a state are irrigated, the farmers of that state may move towards multiple cropping which means better cropping intensity of that state. It is assumed that better irrigation facilities may not directly create any impact on the male-female wage gap in the agricultural labour market but can influence through enhancing cropping intensity. Here, this is treated as an instrumental variable of cropping intensity.

Sources of data

In this investigation, we consider 18 major states of India and six-time points: from 2010-11 to 2015-16. Data related to male and female agricultural wages of the 18 states of India are taken from various rounds of Agricultural Wages of India (AWI), published by the Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. Data sources of our seven mentioned explanatory variables are the Annual reports of Ministry of Home Affairs, Ministry of Rural Development, Ministry of Agriculture and farmers welfare, various issues of 'State Finances: A Study of Budgets', Reserve Bank of India, and Ministry of Agriculture and Farmers Welfare, Government of India.

The Econometric Investigation

The Panel data regression is applied here to evaluate the influence of different factors possibly responsible for reducing the gender wage gap in agriculture. The equation can be written as-

$$GWPI_{it} = f(\text{priedu}_{it}, \text{wpermgnrp}_{it}, \text{shg}_{it}, \text{socialexp}_{it}, \text{cropint}_{it}, a_i, u_{it}) \dots \dots (1)$$

$$\text{cropint}_{it} = f(\text{netlandirr}_{it}, v_{it}) \dots \dots \dots (2)$$

Here $i = 1, \dots, 18$, and $t = 1, \dots, 6$.

Here $GWPI_{it}^1$ indicates gender wise agricultural wage gap Index of the i^{th} state in the t^{th} period. It is assumed that the cropping intensity of the i^{th} state in the t^{th} period is endogenous and very much dependent on net cropped area of that particular state for that specific period. Cropping intensity of the i^{th} state in the t^{th} period may be correlated with the disturbance term of Equation (1) which accommodates agricultural production related factors like availability of family labour force of the farm household and use of modern equipment in the production process. Both these factors reduce hired labour demand during the time of agricultural production and can influence gender wise wage gap of the hired agricultural labourer. But we cannot accommodate those items in our original model because of lack of availability of state-level data.

In Equation (1) priedu_{it} , wpermgnrp_{it} , socialexp_{it} and shg_{it} can be treated as policy variables which are correlated with a_i which can be considered as the state-specific socio-economic condition of the rural people. Besides that, we consider 18 major states of India which cannot be considered as random in nature. As the cross-sectional unit is here stated (a large geographical unit) we should apply Fixed effect estimation method of our balanced panel data without going for Hausman test.

Initially, to test the endogeneity, we have taken the help of the following two procedures:

1. We regress the endogenous variable ‘cropint’ on exogenous regressors of Equation (1) and the instrumental variable ‘netlandirr’ of Equation (2): Then the augmented equation becomes

$$\begin{aligned} \text{cropint}_{it} = & \alpha_1 (\text{priedu}_{it}) + \alpha_2 (\text{wpermgnrp}_{it}) + \alpha_3 (\text{shg}_{it}) + \alpha_4 (\text{socialexp}_{it}) \\ & + \alpha_5 (\text{netlandirr}_{it}) + \varepsilon_{it} \dots \dots \dots (3) \end{aligned}$$

¹ Gender Wage Gap Index of the i^{th} state in the t^{th} period is measured in the following way-

$$GWPI_{it} = \frac{\text{Mean Male Agricultural Wage Rate}_{it} - \text{Mean Female Agricultural Wage Rate}_{it}}{\text{Mean Male Agricultural Wage Rate}_{it}} \times 100$$

We have applied the Fixed effect model.

2. Next, we have estimated the residual form of cropint_{it} using fixed effect model and get the Fixed effect residual $\widehat{\varepsilon}_{it}$.
3. After that, we estimate the following augmented equation after introducing $\widehat{\varepsilon}_{it}$ another explanatory variable in the original equation.

Then the new equation becomes:

$$\text{GWPI}_{it} = \beta_0 + \beta_1 (\text{priedu}_{it}) + \beta_2 (\text{wpermgnrp}_{it}) + \beta_3 (\text{shg}_{it}) + \beta_4 (\text{socialexp}_{it}) + \theta_1 \widehat{\varepsilon}_{it} + u_{it} \quad \dots \dots \dots (4)$$

Here, the parameter estimates of $\widehat{\varepsilon}_{it}$, i.e., $\widehat{\theta}$ is significant. This study rejects the null hypothesis and establishes the presence of endogeneity in our model. We, therefore, applied the instrumental variable analysis in fixed effect panel regression after considering the net irrigation area (netlandirr_{it}) as an instrumental variable of cropping intensity (cropint_{it}). The value of the $\chi^2 = 21.71$ which is significant at the 1% level. Hence, we can say that the Hausman test in our regression supports the Fixed Effect model.

Discussion

Expansion of education among the females mainly in the rural areas generates awareness about rights of the female labour force which increases their bargaining strength during the time of deciding female farm wage that helps to reduce the gender wage gap in agriculture. Through participating in the microfinance programme, the rural women have got an alternative source of income, and gradually they have become earning members of their families. They are not so much willing to work as an agricultural labourer. Due to less supply of female agricultural labourer, the willing female labourers get comparatively higher wages during agricultural peak season which ultimately can reduce gender discrimination in terms of wages in the agricultural sector. It is observed from our investigation that enhancement of cropping intensity can play a most positive role to reduce the gender wage gap in the agricultural labour market in India. Expenditure on the social sector by the state government and the expansion of MGNREGP work among the female labour force fail to minimize the gender-based wage gap in the agricultural labour market.

Chapter-6: Survey Design and Sample selection for the empirical study

Based on the state-level data (such as NSSO, Census, etc.), we have already discussed two research problems of the agricultural labourers, such as declining labour force in agriculture and gender wage gap in the fourth and fifth chapters of the thesis respectively. In these two chapters, all the considered variables were taken as the macro-level state-specific variables. Because, a state-level analysis provides an aggregate scenario of the socio-economic problem of the agricultural labourers from different macro perspectives. But, to check whether a field-level investigation conforms with the state-level data in understanding the economics of these poor labourers, we need to validate that through the field-level investigation. In addition, as these secondary data are not current year data, we have conducted a sample survey in the district of East Medinipur in West Bengal to get a present picture of their socio-economic conditions. This chapter, therefore, tries to analyze the demographic, socio-economic, and financial information of these labour households. By explaining this survey data, the seventh and eighth chapters of the thesis present two acute problems of the agricultural labour households, such as incidence of poverty and indebtedness respectively. The findings of the study are expected to be helpful to obtain suitable policies for reducing poverty and indebtedness among these labourers that can bring some positive changes in their standard of living.

Chapter-7: Occupational Diversification as Livelihood Strategy among the Agricultural Labour Households of West Bengal, India

According to the Census of India (2011), 40.9 percent of the total rural workforce in West Bengal is working as agricultural labourers who are either landless or marginal farmers in nature and more than 56 percent of marginal farmers possess less than 0.40-hectare agricultural land [70th round NSSO data (2012-13)]. Due to the continuous fragmentation of landholdings, the farming sector alone is not enough to provide a decent earning for their survival. Hence, for survival purposes, they have to involve different types of non-farm employment. In this background, we shall investigate the following research questions are-

Research Objectives

- (i) To identify the possible situation(s) in which only the head of the family is the sole earning member of the household or apart from household head other able-bodied member(s) also have become earning members to supplement family income.
- (ii) To assess the role of occupational diversification among the earning member(s) of an agricultural labour household as livelihood strategy for tackling the incidence of poverty of those households.
- (iii) Besides occupational diversification, this chapter will try to identify the other possible determinant(s) which can eradicate or reduce the intensity of poverty among the agricultural labour households of West Bengal.

Sample design and field investigation

The primary survey was conducted in the district of East Midnapur of West Bengal. In this district, Bhagawanpur block-1 was purposively selected as it is one of the economically backward blocks as well as the largest block of the East Medinipur district of West Bengal. Among the ten Gram Panchayats, we have randomly chosen two large Gram Panchayats: Mahammadpur-I and Mahammadpur-II. Out of 22 villages of these two GPs, nine villages were chosen randomly from those two Gram panchayats. The total sample for our investigation was 405 agricultural labour households. Out of 405 sample agricultural households, 120 are landless labourers and 285 are marginal farmers who have possessed only their farming land within 0.5 hectares.

Single earning member or multiple earning member of an agricultural labour household

During the time of field investigation, two different types of agricultural labour households are identified: (i) the household where there is only one earning member who is involved in different types of employment for the livelihood of his/her family (ii) the sample households where more than one adult member is involved diversified occupations to maintain the livelihood of their family. To investigate the possible causes behind the multiple earning members of an agricultural labour household, we shall apply the simple Probit model where the dependent variable is a dummy in nature.

Hence, the Probit regression equation can be expressed as-

$$\text{earningmem}_i = \alpha_0 + \alpha_1 \text{age}_i + \alpha_2 \text{children}_i + \alpha_3 \text{land}_i + \alpha_4 \text{technicalskill}_i + \alpha_5 \text{unempldays}_i + \alpha_6 \text{shgloan}_i + u_{1i} \dots\dots\dots (1)$$

Where, the dependent variable ‘earningmem_i’ will take value 1 if the sample household has one earning members. But for household with more than one earning members, it takes value 0. The regressors are indicated as- age_i = age of the ith household heads, children_i = Children aged less than 6 years of the ith households, land_i = Possession of landholdings of the ith households, technicalskill_i = Possession of technical skills of the ith households, unempldays_i = Total number of unemployed days of the ith household heads, shgloan_i = Accessibility of Self-help group loan of the ith households.

Discussion

The result shows that if the sample agricultural labour household has operational holdings, then the possibility of a single earning member of that household is much higher. But if the household head is aged and (or) the female member has taken a loan from SHG for income-generating activity and (or) if any household member except the main earning member has some technical skill, then we observe multiple earning members among the agricultural labour households.

Occupational diversification among the earning member(s) of an agricultural labour household and its influence of the livelihood of the agricultural labour household

To investigate how occupational diversification among the agricultural labour households is used as livelihood strategy to enhance their economic condition, we consider two indices: (i) Simpson Diversification index when only one member of an agricultural labour household is involved in multiple occupations throughout the year and (ii) Berry Diversification Index when more than one member of an agricultural labour household including the main earning member is engaged in different types of occupations.

The possible factors are considered for the investigation of the reduction of incidence of poverty

- i. Educational attainment of the ith household heads(edu_i): The relationship between education and poverty is hypothesized to be negative as education empowers people by enhancing knowledge and skill which are associated with higher wages and income [Tilak (2002)].

- ii. Number of unemployed days of the i^{th} household head (unempdays_i): The association between unemployed person-days of the household heads and probability of being non-poor of that households is expected to be negative.
- iii. Total operational land of the i^{th} households (operland_i): The relationship between possession of operational landholdings and the possibility of being non-poor agricultural labour households is expected to be positive.
- iv. Number of dependent persons of the i^{th} household head (or dependency ratio) in the family (depratio_i): The hypothesis is that the probability of being above poverty line households would be inversely related to the dependency ratio, as a higher ‘depratio’ lowers the ability level to attain the basic needs of the households.
- v. Informal loan accessed by the i^{th} households (informalloan_i): The dependency of informal sector loans is expected to be a crucial factor in determining the poverty level of the sample households.
- vi. Age of the i^{th} household heads (age_i): It is assumed that younger age of household heads is more potential, skilled and desire to look forward a diverse set of farm and non-farm activities. Hence, it is used as an instrumental variable of Simpson Diversification Index (D_{SI_i}). Here, ‘age’ may not directly impact poverty but can influence through household head’s diversified activities.

Role of individual level occupational diversification on poverty

To examine the research objective, we have initially determined the poverty status among the households through calculating the adult equivalent monthly per capita consumption expenditure. Then, to examine the impact of the Simpson diversification Index (D_{SI}) on poverty level (P_i^*) of the agricultural labour households, the Probit regression equation can be written as-

$$P_i^* = \beta_0 + \beta_1(D_{SI_i}) + \beta_2(\text{edu}_i) + \beta_3(\text{unempdays}_i) + \beta_4(\text{depratio}_i) + \beta_5(\text{operland}_i) + \beta_6(\text{informalloan}_i) + u_{1i} \quad \dots\dots\dots (2)$$

$$\text{and, } D_{SI_i} = f(\text{age}_i, v_{1i}) \quad \dots\dots\dots (3)$$

Where, the outcome variable is dummy in nature, defined as, $P_i=1$ if households are in APL, and 0 otherwise. D_{SI} represents the value of Simpson diversification index of the i^{th} member (or

Occupational Diversification Index at the individual level) and other regressors are already explained in above section.

Initially, we assume that Probit regression technique is inconsistent estimator as the decision of the sample households towards diversified activities is suffering from endogeneity problem; because, a diverse set of activities may differ according to skill and ability of the individual in multiple tasks (such as brick making, carpentering, vehicle repairing, and masonry, etc.). These types of unobserved factors cannot be controlled in our study that may over or underestimate the true effect of employment diversification. Hence, the error terms, u_{1i} capture unobserved factors which is assumed to be correlated with the exogenous variable D_{SI} mentioned in equation (2). To allow the correlation between the regressor and the error term, we have taken the variable ‘age’ which is strictly exogenous and uncorrelated with u_{1i} .

Now, to do endogeneity test, we use two step procedures as follows-

Firstly, we regress endogenous variable-Simpson diversification index (D_{SI}) on exogenous regressors and the instrumental variable ‘age’.

$$D_{SI_i} = \alpha_0 + \alpha_1(edu_i) + \alpha_2(unempldays_i) + \alpha_3(depratio_i) + \alpha_4(operland_i) + \alpha_5(informalloan_i) + \alpha_6(age_i) + \varepsilon_{1i} \dots \dots \dots (4)$$

Secondly, after regressing the endogenous variables ($DI_{S,I}$) on regressors and the instrumental variable in equation (4), we get estimated residual form $\widehat{\varepsilon}_{1i}$ for $(\widehat{DI_{S,I}})$ and introduced it in the original equation (2). The new equation can be written as-

$$P_i^* = \beta'_0 + \beta'_1(edu)_i + \beta'_2(unempldays)_i + \beta'_3(depratio)_i + \beta'_4(operland_i) + \beta'_5(informalloan)_i + \theta_1\widehat{\varepsilon}_{1i} + u_{1i} \dots \dots \dots (5)$$

In our study, $\text{athrho} < 0.01$ showing that the regressors are suffering from endogeneity problem. It is therefore proved that the application of the Probit regression with Instrumental Variable analysis is here necessary to minimize the biasedness and inconsistency of the model. To do that we have used the instrumental variable (age_i) for D_{SI} .

Discussion

The result shows that the participation of household heads in different occupations (as represented by D_{SI}) in the entire reference period apart from working as an agricultural labourer reduces the

possibility of poverty in those households. Marginal farmer households who own or cultivate some plot of land even taking it in the lease have a higher probability of being non-poor. But if an agricultural labour household has taken a loan from the informal sector with a high rate of interest then that creates an extra financial burden among that household and the possibility of being non-poor of that household will be less.

Role of occupational diversification among the adult members of an agricultural labour household to reduce incidence of poverty

In this investigation, the explanatory variables such as ‘edu’, ‘operland’ and ‘informalloan’ have already been explained in the early model. The other new variables are as follows:

- i. Non-Income generating loans from self-help group (SHG) by the i^{th} households (nonincomeshg_i): If a female member of a sample household has taken loans from the SHG for using non-income generating activities, this may create an extra financial burden which possibly influence the poverty level of that household.

Here D_{BI} is assumed to be endogenous in nature. Two possible variables which may influence D_{BI} but not influence the original dependent latent variable are explained below with the theoretical justification.

- a) Average age of the working members of the i^{th} households (avgagewrkmem_i): We have considered only adult members (14 to 60 years) who can participate in the labour market as the informal workers. It is expected that households with low average age of the working members may help them to move towards more diverse set of occupations.
- b) Unemployed person-days of i^{th} household heads (unempldays_i): In our study area, it is observed that except the household head, other adult member(s) of that household (mainly the female member) have to participate in the labour market either as self-employed or as hired labour. So, this ‘unempldays’ of the head of the family does not influence poverty of his family directly as this may be compensated by other working members of the family.

These two variables are assumed as strictly exogenous and uncorrelated to the error term and do not have any directly impact on the poverty level but can influence poverty through employment diversification at the household level (D_{BI}).

Now the Probit regression analysis can be written as-

$$P_i^* = \chi_0 + \chi_1(D_{BI_i}) + \chi_2(\text{edu}_i) + \chi_5(\text{operland}_i) + \chi_5(\text{nonincomeshg}_i) + \chi_7(\text{informalloan}_i)$$

$$+u_{4i} \dots\dots\dots (6)$$

$$\text{and, } D_{BI_i} = f(\text{avgagewrkmem}_i, \text{unempldays}_i, v_{2i}) \dots\dots\dots (7)$$

Where D_{BI} is assumed to be an endogenous variable like D_{SI} . To perform endogeneity test, we have followed the same procedure which is used in the early model. In this case also ‘athrho’ rejects the null hypothesis confirming that the regressors are suffering from endogeneity problem. To minimize the biasedness, we have used two instrumental variables, (avgagewrkmem_i) and (unempldays_i) for D_{BI} .

Discussion

Involvement of more than one adult member of an agricultural labour household in economic activity and their participation in different types of occupations including as agricultural labourer as livelihood strategy (D_{BI}) can enhance the possibility of that household to keep itself above the poverty line. If any female member of our sample household has taken a loan even from the Self-Help Group for non-income generating activity will reduce the possibility of being non-poor.

Chapter-8: Accessibility of Institutional Credit among the Agricultural labour households and its Impact on their Livelihood

Despite the major structural changes in the Indian credit system, agricultural labour households, such as landless labour households and marginal farmer households whose members also have to work as the agricultural labourers, are still deprived of having institutional credits as they do not possess land or any other collateral which has any market value [Kumar, Singh, and Sinha (2010)]. The non-institutional credit services continue to play a key role in the delivery of credit to rural households, due to the poor institutional credit services, especially, to the marginal farmers and landless labourers [Kumar, Singh, and Kumar (2007)]. The dependency of non-institutional credit has been increased from 36 percent in 1990-91 to 44 percent in 2012-13 [NSSO (2013)]. A well-developed financial system is, therefore, required to bring the poor labourers into the purview of the formal financial system [Ramji (2009)]. In this context, our research objectives of chapter-8 are as follows-

Research Objectives

- (a) To examine the demand side constraints for receiving institutional loans among the agricultural labour households and identify the possible factors which can increase the probability of accessing the formal credit after addressing these constraints.
- (b) To examine the impact of institutional loans using income-generating activities on the livelihood (or monthly per capita income) of the agricultural labour households. For this investigation, we have chosen the district of Purba (East) Medinipur of West Bengal.

Data source

Our sample is drawn from the nine villages of the East Midnapur district of West Bengal. The total sample for this investigation is 405 agricultural labour households. The primary objective of our field investigation tries to capture financial behavior, financial literacy, and financial inclusion of the agricultural labour households.

Examining the possible factors which can help the agricultural labour households during the time of receiving institutional credit.

To address the research problem, the Probit model is applied in the study, as our dependent variable ‘formalloan_i’ is binary in nature. It takes the value 1 if the sample agricultural labour household has taken a loan from formal sources at least once in the entire reference period, otherwise 0. The Probit regression equation can be expressed as-

$$\begin{aligned} \text{formalloan}_i = & \alpha_0 + \alpha_1(\text{caste}_i) + \alpha_2(\text{age}_i) + \alpha_3(\text{depratio}_i) + \alpha_4(\text{edu}_i) + \alpha_5(\text{femaleedu}_i) \\ & + \alpha_6(\text{land}_i) + \alpha_7(\text{alliedincomeagri}_i) + \alpha_8(\text{nonfarmincome}_i) \\ & + \alpha_9(\text{shgmem}_i) + \alpha_{10}(\text{FLI}_i) + u_i \dots \dots \dots (i) \end{aligned}$$

Where, caste_i = Caste of the ith households, age_i = Age of the ith household heads, depratio_i = Number of dependent persons of the ith household heads, edu_i = Education of the ith household heads, femaleedu_i = Education of the female heads (or spouses of ith household heads in the families, land_i = Possession of operational landholdings of the ith households, alliedincomeagri_i = Income from allied activities in agriculture, nonfarmincome_i = Non-farm income of the family, shgmem_i = Membership of SHG, FLI_i = Financial Literacy Index

Discussion

The impact of the age of the household heads on the probability of accessing institutional credit is positively significant as it is expected that aged people are more aware and experienced of formal financial services. Our study confirms that the agricultural labour households belonging to backward classes (SC, ST, and OBC) have less possibility of receiving institutional credit than the general caste agricultural labour households. Land ownership enhances the possibility of getting institutional credit among the agricultural labour households. Allied activities in the farming sector enhances the accessibility of their institutional borrowing. Diversified non-farm activities among the households encourage them more credit transactions in the formal sector banks. The households with any female membership of SHG show a higher probability of getting institutional loans. The higher value of FLI boosts the cognitive ability of the agricultural labour households that helps them to understand the utility of formal financial services. Educational attainment and dependency ratio of the family have no significant impact on the probability of receiving institutional credit in our study area.

Possible determinants to examine the role of institutional credit on livelihood of the agricultural labour households

To investigate the impact of credit using for income-generating activities on the livelihood of agricultural labour households, we consider Average Monthly Per Capita Income (MPCI) of the sample households in adult equivalent term as the proxy variable of its livelihood. Initially possible explanatory factors will be narrated along with theoretical justification.

- i. Size of formal loan for income generating activities ($\text{formalloanincome}_i$): The credit from co-operative banks and Self-Help Group is the key source of working capital of the agricultural labour households in our study area to undertake investment in agriculture or other income-generating activities. It is therefore needed to assess whether these loans disbursement from formal banking sectors for income-bearing activities are adequate to improve their livelihood.
- ii. Size of informal loan for income-generating activities of the i^{th} households ($\text{informalloanincome}_i$): Due to short-term credit and the small and medium amount of loans disbursement with a high interest rate, informal credit may not be favourable for using developmental activities compared to institutional credit. Hence it is also required to

examine whether informal loans even taken for income-generating activity have any influence on improving their livelihood.

- iii. Average monthly health expenditure of the family during reference year (healthexp_i): Agricultural workers are likely to face chronic health hazards due to the prolonged usage of pesticides. Health impairment not only lowers their productivity but also reduces the number of working days in a year [Antle & Pingali (1994)].
- iv. Size of institutional loan used for non-income generating activities ($\text{formalloannonincome}_i$): It is expected that formal loan use for non-income generating activities like for consumption or medical purposes may create a debt burden of the borrower and can create an impact negatively on the livelihood of that household.
- v. Size of informal loan used for non-income generating activities of the i^{th} households ($\text{informalloannonincome}_i$): Non-institutional credit using for consumption purposes is observed to be a huge debt burden on these households as they need to repay principal money with a high rate of interest during a short time. So, we must investigate whether this credit taken from informal sources creates any impact on the livelihood of the agricultural labour households.
- vi. The total number of family labourers of the i^{th} households (familylabour_i): Most of the time agricultural labour households cultivate their land or (and) leased-in land and perform allied activities in agriculture with the help of the family labour force. The family labour force may play an influential role in increasing the income of the households.
- vii. Financial literacy index (FLI_i): The financially literate households are expected to invest institutional credit more on income-bearing activities and less on income non-generating activities which can influence the livelihood of a household positively.

Here, 'FLI' may not directly depend on Monthly Per Capita Income (MPCI) but influence MPCI through the accessibility of credit utilizing on income-generating activities or on income non-generating activities. Hence, we have used 'FLI' as an instrumental variable for the formal credit using income bearing activities (formalloanincome) or for using non-income generating activities ($\text{formalloannonincome}$) and for the informal credit using income bearing activities ($\text{informalloanincome}$) or for using non-income generating activities ($\text{informalloannonincome}$) of the agricultural labour households in our study.

Apart from the above variables, we have taken variables such as age and education of the household head and dependency ratio of the family, which have already been discussed above.

We initially examine the Multi-co linearity test of all the above-mentioned explanatory variables. Among all the regressors, four variables such as formalloanincome, formalloannonincome, informalloanincome, and informalloannonincome are expected to suffer from multicollinearity problems. Hence, to avoid the problem of multicollinearity among the variables, we must consider four separate regression equations in four models to identify the possible factors responsible for the livelihood of the agricultural labour households. The equations of the model-1 can be written as-

$$\text{MPCI}_i = \beta_0 + \beta_1(\text{formalloanincome}_i) + \beta_2(\text{age}_i) + \beta_3(\text{edu}_i) + \beta_4(\text{familylabour}_i) \\ + \beta_5(\text{healthexp}_i) + \beta_6(\text{depratio}_i) + u_{1i} \dots \dots \dots \text{(ii)}$$

$$\text{and } (\text{formalloanincome}_i) = f(\text{FLI}_i, v_{1i}) \dots \dots \dots \text{(iii)}$$

Equations of the model-2 can be written as-

$$\text{MPCI}_i = \gamma_0 + \gamma_1(\text{formalloannonincome}_i) + \gamma_2(\text{age}_i) + \gamma_3(\text{edu}_i) + \gamma_4(\text{familylabour}_i) \\ + \gamma_5(\text{healthexp}_i) + \gamma_6(\text{depratio}_i) + u_{2i} \dots \dots \dots \text{(iv)}$$

$$\text{and } (\text{formalloannonincome}_i) = f(\text{FLI}_i, v_{2i}) \dots \dots \dots \text{(v)}$$

Equations of the model-3 can be written as-

$$\text{MPCI}_i = \delta_0 + \delta_1(\text{informalloanincome}_i) + \delta_2(\text{age}_i) + \delta_3(\text{edu}_i) + \delta_4(\text{familylabour}_i) \\ + \delta_5(\text{healthexp}_i) + \delta_6(\text{depratio}_i) + u_{3i} \dots \dots \dots \text{(vi)}$$

$$\text{and } (\text{informalloanincome}_i) = f(\text{FLI}_i, v_{3i}) \dots \dots \dots \text{(vii)}$$

Two equations of the model-4 can be written as-

$$\text{MPCI}_i = \mu_0 + \mu_1(\text{informalloannonincome}_i) + \mu_2(\text{age}_i) + \mu_3(\text{edu}_i) + \mu_4(\text{familylabour}_i) \\ + \mu_5(\text{healthexp}_i) + \mu_6(\text{depratio}_i) + u_{4i} \dots \dots \dots \text{(viii)}$$

$$\text{and } (\text{informalloannonincome}_i) = f(\text{FLI}_i, v_{4i}) \dots \dots \dots \text{(ix)}$$

In equation (ii) of model-1, accessibility of formal loans using income-generating activities (formalloanincome) of the family may suffer from endogeneity problem. Some unobserved individual characteristics such as skill, proficiency, or any entrepreneurship ability can influence in making of institutional credit decisions of the households that may lead to biased results in OLS regression analysis.

To avoid the endogeneity problem, we use instrumental variable analysis using the Two-Stage Least Square Method. To perform endogeneity test, we initially use the two-step procedures in the equation (ii) with the help of instrumental variable analysis are as follows-

Firstly, we regress endogenous variable 'formalloanincome_i' on its exogenous regressors of equation (ii) and the instrumental variable 'FLI', of equation (iii). Then the augmented equation can be written as-

$$\text{formalloanincome}_i = \beta'_0 + \beta'_1(\text{age}_i) + \beta'_2(\text{edu}_i) + \beta'_3(\text{familylabour}_i) + \beta'_4(\text{healthexp}_i) \\ + \beta'_5(\text{depratio}_i) + \beta'_6(\text{FLI}_i) + \varepsilon_{1i} \dots \dots \dots (x)$$

Secondly, after regressing the endogenous variable (formalloanincome_i) on regressors and the instrumental variable FLI_i in equation (x), we get estimated residual form $\widehat{\varepsilon}_{1i}$ for (formalloanincome_i) and introduce it in the original equation (ii). Hence, the new equation becomes—

$$\text{MPCI}_i = \beta''_0 + \beta''_1(\text{age}_i) + \beta''_2(\text{edu}_i) + \beta''_3(\text{familylabour}_i) + \beta''_4(\text{healthexp}_i) \\ + \beta''_5(\text{depratio}_i) + \theta \widehat{\varepsilon}_{1i} + u_{1i} \dots \dots \dots (xi)$$

The presence of endogeneity problem is established here as the study rejects the null hypothesis, i.e., parameter estimates of $\widehat{\varepsilon}_1$, i.e., $\widehat{\theta}$ is significant in our model. We, therefore, have used the instrumental variable analysis in the regression equation (ii) considering the Financial Literacy Index (FLI_i) as an instrumental variable of accessibility of formal loan for using income generating activities (formalloanincome).

Since there are also possibilities of endogeneity problem of formal loan using non-income generating activities (formalloannonincome), non-formal loans using income generating activities (nonformalloanincome) and non-formal loans using non-income generating activities (nonformalloannonincome), we have followed the same two-steps procedure of instrumental

variable analysis in the equation (iv), (vi) and (viii) of model-2, 3 and 4 as in the earlier model-1 of equation (ii). Financial Literacy Index (FLI) is used as an instrumental variable of ‘formalloanincome’, ‘informalloanincome’ and ‘formalloanincome’.

Discussion

It is observed that more accessibility of institutional loans for using income-generating activities of the sample households results in the enhancement of Monthly Per Capita Income (MPCI). A greater numbers of family labourers engaging their agriculture and allied activities can enhance the MPCI. But a non-institutional loan using consumption purposes reduces the MPCI of the family. Our evidence further suggests that the higher dependency ratio of a family and aged household head influence MPCI of the household negatively. The other variables such as accessibility of institutional credit for family consumption, monthly health expenditure of the family, and educational attainment of the household head have no influence on the livelihood of the labour households.

Chapter-9: Thesis summary and Conclusions

Agricultural wage earners are one of the poorest sections among the rural workers. They are unorganized in nature and mostly dependent on wages for their livelihood. Four key challenges of the agricultural labour households, such as low employment opportunities in agriculture, gender wage disparity, the incidence of poverty, and their indebtedness have been discussed in chapter-4, chapter-5, chapter-7, and chapter-8 of the thesis respectively.

In the fourth chapter, with the development of an economy, a gradual decline in the labour force participation rate in agriculture is observed across all states in India. Increasing marginalization of landholdings is one of the crucial factors for declining the demand for hired agricultural labourers in agricultural activities that ultimately reduces the labour force participation rate in the farming sector. The construction industry is the highest non-farm employment generator for the rural unskilled labourers influenced the labour force participation in agriculture negatively. The higher educated (secondary and above) rural households are unlikely to engage in the farming sector. An increase in the agricultural wage rate reduces the employment opportunity in the farming sector that can ‘push’ poor labourers towards the non-farming sector. On the other hand, informal activities with new employment opportunities can ‘pull’ the unskilled labourers towards the non-

farm sector for an additional income in the slack season of agriculture to cope with the risk and uncertainty in agricultural production in rural India.

In the fifth chapter, we observed that gender wage discrimination in Indian agriculture is increased substantially over the year. In this context, the chapter tries to examine the socio-economic factors which could minimize the variations of the gender wage gap in agriculture. The finding of the study shows that female primary education of rural households is one the most effective ways to reduce GWG by strengthening their bargaining power in decision-making in the determination of farming wage rate. The enhancement of cropping intensity through improving irrigation facilities can also minimize the gender wage gap. Another policy variable such as the number of self-help groups with the non-farm sector provides employment opportunities to unskilled, less educated, or uneducated female labourers to generate an additional income to cope with the risk and uncertainty in agricultural production. But more participation of MGNREGP among women and the percentage of Net State Domestic Product (NSDP) spent on social sector expenditure fail to reduce gender discrimination among the agricultural labourers.

In the seventh chapter, we observed that livelihood diversification is one of the key approaches to poverty reduction of agricultural labour households. The econometric evidence of the study confirms that a household diversifying its activities by increasing the number of working members of the family (D_{BI}) or an individual participating in multiple occupations (D_{SI}) is an important policy variable to lift the agricultural labour households economically. The possession of more operational landholding and loans disbursement from Self-Help Group (SHG) for income-generating activity can reduce the possibility of incidence of poverty among agricultural labour households. On the contrary, the dependency ratio of the family, non-income generating loans from SHG, and the dependency of the informal loans are likely to enhance the possibility of the households falling into a high incidence of poverty.

In the eighth chapter, we have initially tried to identify the possible factors which could help the agricultural labour households to get institutional credit and tried to estimate the impact of the institutional loans on their livelihood when used in income-generating activities. Probit Regression Analysis shows that the possession of landholdings is one of the crucial determinants for the availability of credit from institutional sources. Allied Income from agriculture and non-farm income have a positive and significant impact on the accessibility of their institutional loans. The study emphasizes the need for financial literacy to keep the households well-informed by an

understanding of various terms and conditions of banking services. Using Instrumental Variable analysis, the chapter further observed that the institutional borrowing using income-generating activities impacts the Monthly Per Capita Income (MPCI) of the households positively. The study has also found that the non-institutional sources of loans for income-generating activities have a vital role in creating job opportunities, especially, for the landless labourers, enabling them to be free from at least a chronic level of poverty.

Chapter-10: Policy Recommendations

In the study, we have observed that the agricultural labourers have witnessed four key challenges such as low employment opportunity in the farming sector, gender wage disparity, poverty and indebtedness. To overcome these problems, the thesis has suggested some important policy measures for developing their socio-economic conditions in the long term-basis.

In the fourth chapter, we observe that the labour force participation rate in agricultural activities has declined gradually over time. Due inadequate earnings, these labourers are less interested in working as agricultural wage earners. They are switching over to construction work and other private non-farm activities for alternative sources of employment. In this context, we have suggested strengthening co-operative farming to regain interest and enhance profitability from the agricultural activities, especially among the marginal farmers. This farming operation has been performed co-operatively which reduces the risk of agriculture of the farmers. The profit could be shared among the farmers in the proportion of their possession of landholdings after the entire production process in agriculture and selling food grains to the market. If co-operative farming is successfully implemented in the economy, marginal farmers can enjoy profit from the farming sector as well as raise labour demand in agriculture where landless labourers might be benefited. Agriculture-related training, agricultural education, and vocational course are required to provide agricultural labourers by the Govt. to enhance the skill and knowledge of cultivation. ILO (1996) recommended that basic social security benefits, occupational safety, and healthcare facility must be provided to improve the working condition of the agricultural wage workers.

In the fifth chapter, we have suggested some of the policy variables which may reduce the gender wage gap in agriculture. Expansion of education among the women, particularly in the rural areas, and participation of microfinance system through forming self-help group mainly among local women can enhance the empowerment and bargaining strength during the time of deciding wage

rate of the female agricultural labourers. An enhancement of cropping intensity through improving irrigation facilities helps to minimize the gender wage gap in agriculture.

In the seventh chapter, the policy prescriptions based on our empirical findings are expected to be helpful to tackle the high prevalence of poverty among agricultural labour households. The non-agricultural activities provide economic security to some sub-groups of the population, especially, landless households or women who are not participated in the agricultural labour market [Lanjouw (2001)]. There is a need to take some initiatives under MGNREGA to provide job cards and ensure 100 person-days guaranteed wage employment to at least one female member of each agricultural labour household. The possession of this job card legally empowers the female members to participate in MGNREGA irrespective of caste, creed, and custom, which can mitigate the livelihood risk of the households. Educational attainment and skill acquisition are needed to be emphasized for getting high-paid diversified jobs in the non-farm sector.

In the eighth chapter, we have recommended some important policies that might enhance the accessibility of institutional credit as well as improve the livelihood of the agricultural labour households. The most important issue requires to make institutional credit available among the agricultural labour households is to enhance financial literacy among the members and that can be done if, in each bank, there is a help desk that can help these poor customers to accustom to different banking-related activities. Besides, vocational education, and other skill development programs, especially among the rural females are needed to organize to empower them and to enhance their awareness of financial products and other regulations of formal financial services. The female members should involve in SHG which facilitates employment opportunities and enhances their credit absorptive capacity that can be used for income-generating activities and ultimately can create a positive impact on the average monthly per capita income of those poor households. Special arrangement is required among the agricultural labour households belonging to the backward class that helps them to receive more institutional credit to improve their livelihood.

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