Status of Women Agricultural Workers in West Bengal during the Post-Reform Period

–Anindita Sengupta[1]

Abstract

This paper investigates the correlates of work-participation of women cultivators and women agricultural labourers in the districts of West Bengal during the post reform period. It also examines whether there has been any change in the relative significance of the explanatory factors over the first decade of economic reforms. The work-participation function of women cultivators and that of women agricultural labourers are estimated. An inter-temporal cross-section regression method has been used in order to determine the proximate explanatory factors behind the work-participation of women cultivators and that of women agricultural labourers. The econometric analysis regarding the work-participation of women cultivators reveals that 'percentage share of irrigated area in net sown area in a district' and 'urbanization index of a district' are the most significant explanatory factors throughout the whole period. However, the results indicate increase in the significance of 'percentage share of working-age women population in total rural women population in a district' and decrease in the significance of 'percentage share of area under marginal landholding in total operational landholding in a district', 'cropping intensity of a district' and 'rate of rural male out-migration from a district' as explanatory factors from 1991 to 2001. Again, the econometric analysis regarding the work-participation of women agricultural labourers shows that 'percentage share of working-age women population in total rural women population in a district', 'cropping intensity of a district' and 'percentage share of irrigated area in net sown area in a district' are the most significant explanatory factors throughout the whole period. However, the results indicate increase in the significance of 'percentage share of Scheduled Caste and Scheduled Tribe women in total women population the rural areas of a district' and

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'percentage share of area under foodgrain cultivation in net sown area of a district' and decrease in the significance of 'rate of rural male out-migration from a district' as explanatory factors from 1991 to 2001.

Key Words: West Bengal; Rural; Women; Agricultural Labourer; Cultivator; Work-Participation; Cross-Section Regression Model.

I. INTRODUCTION

It is well-known that the economy of West Bengal is overwhelmingly an agro-based economy such that about 72% of its total population is still dependent on agriculture as source of their livelihood (Census of India, 2001). Further, because of the inadequate expansion of opportunities of non-farm employment, a vast majority of rural labour force depends on agriculture actively as source of their employment. The Left Front Government after coming to power in 1977 implemented a number of agrarian reforms which consolidated the positions of the smallholder cultivators and the sharecroppers. During the same period, there was an expansion in public and private irrigation system, adoption of HYV seeds and introduction of new technologies as well. In this way, institutional and technological transformations in agriculture have led to an increase in the labour intensity in cultivation through multiple cropping system, particularly, in the districts where there has been extensive application of new seed fertilizer technology. In almost all the districts, there has been a tremendous increase in the cropping intensity over the years, especially in foodgrain cultivation. Table-1 shows that, except Birbum, Hooghly, Purulia and Howrah, all the other districts of West Bengal have experienced increase in cropping intensity during the first decade of the post-economic reform period. On the other hand, Table-2 shows that there has been increase in the agricultural production, especially, the production of foodgrains, rice and potato from 1980-81 to 2000-2001.Therefore, it is perfectly understandable that despite the phenomenal expansion of the urban informal sector and extraordinary increase in the availability of low-skilled urban informal sector jobs, the agricultural sector has still acted as the residual sector for the vast majority of rural labour force in West Bengal during the first decade of the post-reform period. Percentage of agricultural workers to total workers in West Bengal has almost remained the same since independence. While in 1951, 49.82% of total workers in West Bengal were agricultural workers, in 1991, 54.25% of total workers were employed in agricultural and in 2001, 43.95% of total workers were

in agricultural sector[2]. Table-3 shows that the agricultural sector in West Bengal generated 27.5% of the net state domestic product in 1980-81, 27.5% of the net state domestic product in 1990-91 and in 2000-2001 it generated 22.9% of the net state domestic product.

TABLE 1 *Cropping Intensity across the districts of West Bengal*

	Cropping Intensity(%)	
District	***1991***	***2001***
Darjeeling	125	136
Jalpaiguri	136	167
Cooch Behar	184	192
Dinajpur	161	183
Maldah	192	206
Murshidabad	183	192
Birbhum	144	136
Bardhaman	162	165
Nadia	230	242
North Twenty Four Parganas	163	198
Hooghly	203	172
Bankura	139	145
Purulia	106	104
Medinipur	150	164
Howrah	203	190
South Twenty Four Parganas	128	142

Source: Statistical Abstract, Bureau of Applied Economics and Statistics, Government of West Bengal

TABLE 2 *Change in Agricultural Production in West Bengal (Lakh MT)*

Crops	***1980-81***	***1986-87***	***1988-89***	***1999-00***	***2000-01***
Rice	74.66	84.63	133.16	137.6	124.28
Wheat	4.73	6.83	7.78	8.51	10.59
Foodgrains	82.82	96.26	143.67	148.46	138.15
Jute*	44.43	49.5	73.74	75.94	74.28
Potato	19.72	35.42	66.9	74.82	76.73
Oilseeds	1.5	2.64	3.79	4.06	5.71

* Lakh Bales

Source: Economic Review, various issues, Government of West Bengal.

[2] Census of India 1951, 1991 & 2001.

Table 3 *Share of the agricultural sector in the NSDP of West Bengal.*

Year	Share of Agricultural sector (%)
1980-81	27.5235
1990-91	27.1803
2000-01	22.8662

Source: Statistical Abstract, different volumes, Bureau of Applied Economics and Statistics, Government of West Bengal

Therefore, these figures clearly indicate that while the percentage of total workers engaged in agriculture has remained almost the same over these two decades, the productivity of the agricultural workers has diminished substantially. On the other hand, as an outcome of the rigorous land-grab movement of the Left Front Government and also of the patrilineal property relations, all the districts of the state have experienced increased marginalization which has led to the overwhelming dominance of marginal farms in the agricultural sector of West Bengal. Almost all districts have quite high percentage share of area under marginal landholding (with less than 1 hectare) in total operational landholding in West Bengal which has increased over time.

Table 4 *Percentage share of area under marginal landholding in total operational landholding across the districts of West Bengal*

District	1991	2001
Darjeeling	20.35	25.33
Jalpaiguri	26.16	35.24
Cooch Behar	37.03	46.7
Dinajpur	35.71	45.15
Maldah	39.1	53.85
Murshidabad	39.48	48.32
Birbhum	25.89	38.51
Bardhaman	28.13	40.59
Nadia	34.69	51.29
North Twenty Four Parganas	43.86	58.46
Hooghly	49.81	57.6
Bankura	34.66	31.72
Purulia	31.28	38.54
Medinipur	58.48	69.13
Howrah	63.34	75.29
South Twenty Four Parganas	44.35	62.05

Source: District Statistical Handbooks, various issues, Bureau of Applied Economics and Statistics, Government of West Bengal

Table-4 shows that, all the districts had quite high percentage share of area under marginal landholding (i.e. the household owning /operating less than 1 hectare) in total operational landholding in West Bengal during the first decade of the post-reform period and the percentage share of area under marginal landholding in total operational landholding has increased over time in all the districts except Bankura during the same period of time. It should also be mentioned that despite the success of land-reform, rural landlessness remains as a significant problem in many districts of West Bengal. Sixty first round of National Sample Survey indicates that 15% of all rural households in West Bengal still had absolutely no land for cultivation in 2000-2001. Agricultural workers in West Bengal can be classified into two categories: Cultivators and Agricultural Labourers.[3] If the figures of cultivators and agricultural labourers of West Bengal are examined during the period from 1991 to 2001, it is found that while the percentage share of cultivators in total agricultural workers has declined drastically by 34.92 percentage points (i.e. from 29.24% to 19.03%)[4], the percentage share of agricultural labourers in total agricultural workers has declined only marginally, i.e. by 0.39 percentage points (i.e. from 25.01% to 24.92%) [5]. When we talk about agricultural labour, woman labour has a special significance. Women agricultural workers are regarded as the backbone of the rural India. Women workforce outside the four walls is larger in rural areas than in urban India. Anon. (1979) revealed that women are responsible for 50 per cent of food production in the developing world. Most of the women perform various types of work for their livelihood and agriculture is considered as the biggest unorganized sector where large number of rural women takes part actively. While women have always played a key role in agricultural production, their importance both as workers and as managers of farms has been growing, as an increasing number of men has been moving to non-farm jobs. Despite being the vital agent in Indian economy, studies point towards 'statistical purdah' or 'economic invisibility' (Radhadevi 1981) of women workers, especially, women agricultural workers manifested in selective under- documentation

[3] According to the definition of Census of India, Cultivator is a person who is engaged in cultivation of land owned or held from Government or held from private persons or institution for payment of money, kind or share, i.e. Cultivator is a person who cultivates his/her own land or a plot of land taken as lease. On the other hand, according to the definition of Census of India, an Agricultural Labourer is a person who works on another person's land for wages in money or kind or share. He/she has no risk in cultivation, but merely works on another person's land for wages.

[4] Census of India, 1991 & 2001

[5] Census of India, 1991 & 2001.

of their endeavours in a society with strong traits of patriarchal norms. Consequently, in West Bengal the agricultural work-force has always been found to be masculine. However, during the first decade of the post-economic reform period, there has been 32.8 percentage point rise in the percentage share of women agricultural workers in total agricultural workers of West Bengal (i.e. from 18.6% in 1991 to 24.8 % in 2001) [6]. If the statistical figures are verified in a more detailed manner, it is found that there has been 21.7 percentage point increase in the percentage share of women cultivators in total cultivators (i.e. from 13.8% in 1991 to 16.8% in 2001) and there has been 26.8 percentage point increase in the percentage share of women agricultural labourers in total agricultural labourers (i.e. from 24.3% in 1991 to 30.9% in 2001) in West Bengal.[7] Generally, increase in the women population in the working age group (i.e. 15-59 years) can be assumed to raise work-participation of women cultivators and women agricultural labourers. Scheduled Caste and Scheduled Tribe women, being the weakest and most vulnerable people of the society, are supposed to have no other option than to work as agricultural labourers for very low wages. Cultivating small plots of land throughout the whole year cannot be sufficient for the families of the marginal farmers to survive. It is therefore essential for the male members of the marginal cultivator families to migrate to the other districts either for agricultural work in the rural areas or for non-agricultural work in the urban areas. In absence of the male members, women have to take the responsibilities of cultivation of the family farms. Due to the lack of availability of sufficient agricultural work and insufficient increases in agricultural wages in the home districts, cross-district rural-rural and rural-urban migration have been the most important sources of earning for supplementing subsistence for the male agricultural labourers. Their absence creates a vacuum which is supposed to be filled by the female agricultural labourers. As an outcome of the application of modern seed-fertilizer technology which is highly capital-intensive in nature, a tremendous increase in cropping intensity has been possible through the use of quick-maturing HYV seeds in most of the districts of West Bengal. Such increase in the cropping intensity may have fostered more cultivation and also increased the demand for agricultural labourers in those districts. Therefore, higher cropping intensity is supposed to increase the work-participation of both the women cultivators and the women agricultural labourers in the districts.

[6] Census of India, 1991 & 2001

[7] Census of India 1991 & 2001.

Irrigation facilities are extremely essential for cultivation, especially in case of modern farming system. Therefore, it is understandable that better irrigation facilities will improve profitability of agriculture and thereby will encourage work-participation of both the women cultivators and the women agricultural labourers. Foodgrains being the main cultivated crops in West Bengal, opportunities of agricultural works as field labourers are supposed to increase if the area under foodgrain cultivation is large enough in a certain district. Finally, it is interesting to note that while going through the process of development, West Bengal has also experienced rapid urbanization and in the post economic reform period, the process of urbanization in West Bengal has been faster than that in India as a whole. Table -5 suggests that during the post-economic reform period, degree of urbanization has remained quite high in some of the districts like Kolkata, Howrah, North 24 Parganas, Bardhaman, Darjeeling etc. High degree of urbanization means a change in the land-use pattern from agricultural to industrial areas and therefore decreased opportunity of cultivation.

Table 5 *Index of Urbanization in the Districts of West Bengal*

District	1991	2001
Darjeeling	30.47	32.44
Jalpaiguri	16.36	17.74
Cooch Behar	7.81	9.10
Dinajpur	13.34	12.45
Maldah	7.07	7.32
Murshidabad	10.43	12.49
Birbhum	8.98	8.58
Bardhaman	35.09	37.18
Nadia	22.63	21.27
North Twenty Four Parganas	51.23	54.30
Hooghly	31.19	33.48
Bankura	8.29	7.37
Purulia	9.44	10.07
Medinipur	9.85	10.49
Howrah	49.58	50.39
Kolkata	100	100
South Twenty Four Parganas	13.31	15.77

Source: Census of India, 1991 & 2001, Government of India

Interestingly, there is a plethora theoretical literature pertaining to the status of women agricultural workers in India. A number of studies have been done from 1990's to the present date. Charulatha et al (1990) had

made a comparative study of male and female agricultural workers in farming activities. They revealed that the involvement of farm women in paddy cultivation, household and animal husbandry activities was more than that of men. In their study on Gaddi tribal women, Chawhan and Oberoi (1990) had shown that the tribal women had played an important role in the farm operation. According to their study, women had high work participation in almost all farm activities except ploughing of fields, marketing of grains, irrigation and application of pesticides and fungicides. Kapur (1991) had made an empirical study on the role of women in rainfed farming in the states of Maharashtra and Gujarat. According to that study, men did all operations that needed more muscle power such as ploughing, threshing and stocking, women did such jobs that were highly strenuous such as weeding, delicate and time-consuming jobs like planting seedlings, picking fruits, splitting, winnowing etc. Usharani et al. (1993) conducted a study to examine the gender differential in work participation in various operations of crop and livestock enterprises in semi-arid areas of Rajasthan. The study revealed that the major female labour absorbing operations are weeding, harvesting and threshing. The study also showed that Farm women spent about 85 per cent (on large farms) to about 89 per cent (on marginal farms) of their time in these operations only. Badiger (1999), in an empirical study on the participation of men and women in agriculture and allied activities, revealed that participation of women was cent per cent in removing stalks and stubbles, weeding, picking, sieving, processing of milk, making cow dung cakes, preparation of feed and feeding activities. The study also revealed that majority of the women faced the problem of low wages and lack of training. Beohar et al. (1999) had tested the contribution of women in rice cultivation in Chhattisgarh area. Their study showed that both family and hired women labour was mainly engaged in sowing, transplanting, interculture, harvesting, transporting and winnowing. The study also revealed that in operations like transplanting, inter-culture and harvesting the use of female labour hours was more than that of male labour. Birari et al. (1999) in their study have tested the pattern of employment and participation of women in agricultural activities in Maharashtra. Their study revealed that the proportion of family women labour was the highest (14.20 per cent) in Western Maharashtra, while the proportion of hired women labour was the maximum of 65 per cent in Vidarbha region. They also showed that nearly 50 per cent of the labour requirement for agricultural activities was contributed by women in the study area. Chauhan (1999) in his paper had examined the contribution of

Gaddi tribal women in farm and household economy. The findings of the study revealed that the contribution of women was more than that of men in the activities performed near to their dwellings, which was reflected through more labour days put in crop production, cattle rearing and handloom weaving. Kumar (1999) in his study had tested the role of women in the adoption of Integrated Pest Management (IPM) technology in cotton, based on primary data collected from Maharashtra. The study showed that two-third of farm operations in cotton were done by farm women. The study also showed that contribution of women in terms of total labour days was 93 per cent in IPM practice and 88 per cent in non-IPM practice. The study concluded that IPM adoption had doubled the opportunity for employment due to increase in productivity of cotton. Mishra et al. (1999) in their paper had examined the extent and proportion of women labour participation in paddy cultivation and gap in wages between men and women labour in Kymore Plateau and Satpura hill region of Madhya Pradesh. Their study revealed that the participation of women labour was higher in transplanting of paddy, inter-culture and harvesting while, operations like preparatory tillage, sowing, manuring and fertilizer application, irrigation and threshing operations were performed jointly with men. Pandey et al. (1999) in their study had attempted to examine the extent of temporal changes in the pattern of employment of rural women across crop and animal husbandry activities in Hisar district of Haryana. They had pointed out that cotton, paddy, wheat and rabi fodder were the major crops while weeding, hoeing, harvesting/picking, threshing and winnowing as well as transportation were the major operations which absorbed female labour in Haryana. The findings also suggested that concerted efforts were needed to develop better technologies for agricultural operations such as transplanting, weeding, harvesting/picking and cleaning of farm produce to reduce the physical burden and drudgery of the women. Panghal et al. (1999) in their paper had studied the efficiency of men and women labour in performing different crop operations in major crops of Haryana. The study revealed that women labour participation was quite high in operations like transplanting, weeding and picking. Women labour was also found relatively more efficient than men labour in these operations. Saraswati (1999) carried out a study on the time utilization pattern and participation of women in sericulture enterprise in non-traditional areas of Karnataka. It was found that majority of indoor activities like storage of leaves, feeding, harvesting and cleaning and storing of cocoons were carried out

by farm women, while disease management and temperature and humidity maintenance were looked after by men. Sharma et al. (1999) in their paper attempted to study the magnitude of female labour participation in agricultural and livestock enterprises and also the contribution of female labour to farm income. Their study showed that in the cultivation of major crops and in livestock rearing, the contribution of female labour to total labour requirements was more than half except for marketing operations. The result of their study further showed that the contribution of female labour to total income in all the operations was higher than that of male labour. The study suggested that training should be given to females of tribal area in farm/non-farm operations for enhancing farm/gross household income. Shiyani and Vekariya (1999) in their paper studied the gender differences and the role of women in groundnut and wheat production in South Saurashtra zone of Gujarat. The results of the study indicated that the women played a greater role in the production of groundnut and wheat. The results also showed that harvesting and hand weeding were the two major operations performed predominantly by women in the cultivation of both the crops. The study further pointed out that in the activities like sowing, primary tillage, application of manures and chemical fertilizers and irrigation, women played a supportive role. Singh, B. et al. (1999) in their study attempted to examine the women's work participation and estimate the gap in employment of women in different categories of households in agriculturally more developed and less developed districts of Bihar. The analysis showed that the female workforce formed 23 per cent of the total female population in agriculturally more developed situations and about 32 per cent in the agriculturally less developed situations. The study also indicated higher employment gap on landless households in both the situations. Singh, R.K.P. et al. (1999) in their study had attempted to examine the educational status and the extent of participation of men and women in different farm and non- farm activities in the villages in Hissar district of Haryana at two points of time, 1985-86 and 1997-98. The study revealed that while only 14 per cent of the adult female members were engaged in wage earning activity, 86 per cent were involved in own farm activity. The study also revealed that mechanization of ploughing and harvesting / threshing operations had reduced the level of employment of both male and female workers by about one-third in 1997-98 as compared to 1985-86. Singh, V.K. et al. (1999) in their study on the impact of changing cropping pattern on women's participation in crop production in Farrukhabad district of Uttar Pradesh examined the

socio-economic structure of the selected households of farmers and the rate of participation of women agricultural workers in various field operations for different crops under changing conditions. The study showed that in operations like sowing inter-culture, threshing, winnowing and harvesting the participation of females was highest. Subrahmanyam (1999) in his study on 'Female labour absorption in Andhra Pradesh Agriculture' had examined the relative change in the demand for female labour, the extent of increase in income due to technological adoption, the variability of labour absorption across different agro-climatic zones and also the effect of farm size, cropping intensity and cropping pattern on the demand for labour in agriculture. The study pointed out that the differences in demand for female among different crops minght be attributed to cropping intensity and cropping pattern. Tripathi (1999) in his paper had examined the level and pattern of contribution of women in hill economy of Tehri district in Uttar Pradesh. The study revealed that the contribution of female labour in the production of crop, fruit and milk and to gross farm income was positive and significant. Varghese et al. (1999) in their paper assessed the magnitude and direction in the participation of rural women in agriculture in Rajasthan and also the operation-wise labour use in crop production according to different agro-climatic regions of the state. The study concluded that the increased participation of female work force in agriculture when linked with managerial and decision-making process might facilitate to achieve the goal of sustainable development of agriculture with more ease and certainty. Bora et al. (2000) in their study examined the role performance of farm women in animal husbandry activities in the selected villages of Tezu Development Block of. Arunachal Pradesh. The study identified a total of eighteen roles performed by women, viz. fodder gathering, feeding the animals, carrying fodder to the home, cutting and boiling of fodder, watering to the animals, grazing of animals, grinding of feed, bathing of animals, cleaning of sheds, cleaning of mangers, grooming, milking of animals, heating of milk, selling of milk, care of new born animals, care of sick animals and vaccination of animals. Sinha et al. (2000) in their study on the involvement of farm women in jute production technology found that the involvement of farm women is very high in jute production. Therefore, they suggested that training with regard to new technology should be given to increase the efficiency women for doing these operations in skilled manner. Talwar and Ganguly (2003) in their study on 'Feminization of India's Agricultural Workforce' had pointed out that as men migrated in search of better-paid

work, women in rural India were taking over agricultural work in the villages. They had also pointed out that women agricultural labourers faced meagre wages, long hours, hazardous work and sexual harassment. Sindhu and Jayan (2004) in their paper attempted to study the work participation of women in coffee cultivation in Wayanad district of Kerala. With the help of Work Participation Index scores, they showed that gleaming collection, harvesting and weeding were the three farm operations in which women contributed more than half of the labour required for the particular operation. They further showed that for activities such as planting, post-harvest operations and jungle clearing, women contribute nearly about half of the labour actually required to complete the work. Thresia (2004) conducted a study of women agricultural workers in Kodumba village of Palakkad district in Kerala. The study revealed that monotonous manual activities such as transplanting of seedlings, weeding, harvesting, transporting, threshing, drying of hay etc. were wholly done by women. Kachroo (2005) in her study had examined the economic contribution of female labour in farm and non-farm sector towards family income in rural Jammu and Kashmir State. The study implied that women did not lag behind in contributing the agricultural income on par with men, but it was not accounted for. Dhillon et al. (2007) conducted a study in three agro-climatic zones of Punjab on the involvement of farm women in agricultural and allied activities. The results of the study showed that the age of the farm women ranged between 24-56 years and majority of the farm women were illiterate. From the literature survey it can be concluded that most of the studies, based on primary data, have done empirical analysis to examine the participation of women workers in all types of farm activities in different states of India. All these studies have mainly suggested a high work participation of women in agriculture. According to some of the studies hiring of women labour has been highly associated with the increase in the size of the farm. The studies show that small and marginal farms generally have used family women labourers and the large farms normally have been found to use hired women labourers. Most of these studies reveal that women are generally engaged in those jobs which are unskilled as well as low-paid and also highly strenuous, monotonous, delicate and time-consuming e.g. sowing, weeding, transplanting of paddy, inter-culture, harvesting/ picking, threshing, winnowing and cleaning of farm. On the other hand, the studies also point out that man workers are engaged in comparatively higher-skilled and higher paid jobs like field preparation, manuring, fertilizer

application and irrigation. The studies imply that though Green Revolution technologies enhanced agricultural productivity, they also widened economic disparities and deepened gender discrimination in community life. The introduction of capital intensive technologies in the agricultural sector has had differential impact on men and women and women have been adversely affected due to lack of access to technology. Therefore, the studies suggest that the new technologies should address the requirement and skills of women in farm sector. However, in case of West Bengal very few studies have been made (Talwar and Ganguly, 2003), especially at the district-level, i.e. taken all the districts together. Under this backdrop, an intensive study on district-level status of women agricultural workers in the present scenario of the economy of West Bengal, i.e. in the post-economic reform period in West Bengal is quintessential. So this paper tries to find out the proximate explanatory factors behind work-participation of women cultivators as well as women agricultural labourers[8] during the post-economic reform period and also tests whether there has been any change in the significance of these explanatory factors over the first decade of post economic reforms period. I have tried to estimate the work-participation functions of women cultivators and agricultural labourers for the years 1991 and 2001 in terms of inter-temporal cross-section regression model. However, to tackle the problem of multicolliearity, I have made it sure that the correlation coefficients between the explanatory factors are small and insignificant and robust covariance matrix has been used to correct the problem of heteroscadasticity[9]. This paper is structured as follows. Section II explains the methodology and data; section III presents the nature of work-participation of women cultivators and agricultural labourers in the districts of West Bengal, section IV presents the results of the econometric analysis and finally section IV gives the concluding observations.

II. METHODOLOGY AND DATA

In our analysis, work-participation of women cultivators means the percentage share of women cultivators in total rural women workers. It is assumed that work participation of women cultivators depends on a variety of factors and the work-participation function of women cultivators can

[8] Women Agricultural Workers= Women Cultivators + Women Agricultural Labourers

[9] LIMDEP 7 software package has been used for the econometric analysis.

be written as:

$$FWPR\_CULT_i = f(FWORK_i, MRGLAND_i, CI_i, IRRG_i, URBAN_i, MALEMIGR_i) \quad (1)$$

Where, $i = 1, 2, \ldots, n$

$FWPR\_CULT_i$ = Percentage share of women cultivators in total rural women workers in the i-th district

$FWORK_i$ = Percentage share of working-age women population (15-59 years of age) in total rural women population in the i-th district.

$MRGLAND_i$ = Percentage share of area under marginal landholding (below 1 Hectare) in total operational landholding in the i-th district.

CI_i = Cropping Intensity[10] of the i-th district.

$IRRG_i$ = Percentage share of irrigated area in net sown area in the i-th district.

$URBAN_i$ = Urbanisation Index of the i-th district.

$MALEMIGR_i$ = Rate of rural male out-migration from the i-th district = Total rural male out-migration from the i-th district/Total rural male population of the i-th district

It is assumed that there is a linear relationship between $FWPR\_CULT_i$ and the independent variables. Therefore, the above functional form can be written as a linear equation, which is shown as follows:

$$FWPR\_CULT_i = \beta_1 + \beta_2 FWORK_i + \beta_3 MRGLAND_i + \beta_4 CI_i + \beta_5 IRRG_i + \beta_6 URBAN_i + \beta_7 MALEMIGR_i \quad (2)$$

Where u_i is the stochastic error term and i stands for the individual district.

Similarly, in this analysis, work-participation of women agricultural labourers means the percentage share of women agricultural labourers in total rural women workers. It is assumed that work participation of women agricultural labourers depends on a variety of factors and the work-participation function of women agricultural labourers can be written as:

$$FWPR\_AGLAB_i = f(FWORK_i, FSCST_i, CI_i, IRRG_i, FOOD_i, MALEMIGR_i) \quad (3)$$

Where, $i = 1,2,\ldots..,n$

$FWPR\_AGLAB_i$ = Percentage share of women agricultural labourers in total rural women workers in the i-th district

[10] Cropping Intensity = (Gross Cropped Area/Net Cropped Area) × 100.

$FWORK_i$ = Percentage share of working-agewomen population (15-59 years of age) in total rural women population in the *i*-th district.

$FSCST_i$ = Percentage share of Scheduled Caste and Scheduled Tribe women in total women population the rural areas of the *i*-th district

CI_i = Cropping Intensity of the *i*-th district.

$IRRG_i$ = Percentage share of irrigated area in net sown area in the *i*-th district.

$FOOD_i$ = Percentage share of area under foodgrain cultivation in net sown area of the *i*-th district.

$MALEMIGR_i$ = Rate of rural male out-migration from the *i*-th district = Total rural male out-migration from the *i*-th district/Total rural male population of the *i*-th district.

It is assumed that there is a linear relationship between and the independent variables. Therefore, the above functional form can be written as a linear equation, which is shown as follows:

$$FWPR\_ALGAB_i = \beta_1 + \beta_2 FWORK_i + \beta_3 FSCST_i + \beta_4 CI_i + \beta_5 IRRG_i + \beta_6 FOOD_i + \beta_7 MALEMIGR_i \quad (4)$$

Where ε_i is the stochastic error term and *i* stands for the individual district.

This study is based on the district-level secondary data which are available from various issues of Census Report of Government of India and the District Statistical Handbooks of Government of West Bengal. Data for Women cultivators and agricultural labourers, working age population of rural women and the urban population in the districts of West Bengal and male out-migration from the districts of West Bengal in 1991 and 2001, employed in this study are taken from Census of India, 1991 and 2001. Data for marginal landholdings and total operational landholdings, irrigated areas, net sown areas, areas under foodgrain cultivation and cropping intensities in the districts of West Bengal in 1991 and 2001, used in this study, have been taken from the District Statistical Handbooks of 1991 and 2001.

The economic logic behind the inclusion of the explanatory factors is as follows:

Firstly, percentage share of working-age women population (15-59 years of age) in total rural women population has been considered as an important explanatory factor for work participation of both women cultivators and women agricultural labourers. It is assumed that generally girls below 15 years and old women above 59 years do not participate

in any kind of production activity. Therefore, it can be supposed that if percentage shares of working-age women population in the districts increase, work participation of both the women cultivators and women agricultural labourers will increase. Secondly, percentage share of area under marginal landholding (below 1 Hectare) in total operational landholding is considered as another important explanatory factor for work participation of women cultivators. Cultivating tiny plots of land throughout the whole year cannot be sufficient for the families of the marginal farmers to survive. It is therefore essential for the male members of the marginal cultivator families to migrate to the other districts either for agricultural work in the rural areas or for non-agricultural work in the urban areas. In absence of the male members, women have to take the responsibilities of cultivation of the family farms. The studies done in other states of India also reveal that the smaller the size of the farm, the higher is the use of the women family members as cultivators. Therefore, it is reasonable to suppose that the higher the percentage of marginal farms in a district, the higher will be the percentage of female cultivators in total female rural workers. Thirdly, percentage share of Scheduled Caste and Scheduled Tribe women in total women population the rural areas of a district has been considered as an important explanatory factor for work-participation of women agricultural labourers. Scheduled Caste and Scheduled Tribe women, mostly landless, constitute the poorest segment of the population of West Bengal. They belong to the economically backward and oppressed section of the society. They have no other option than to work as agricultural field labourers for very low wages. Therefore, it can be assumed that the higher the percentage of Scheduled Caste and Scheduled Tribe women in a district, the higher will be the percentage of female agricultural labourers in total female rural workers. Fourthly, rate of male out-migration from the district has been considered as one of the important explanatory factors for work participation of both the women cultivators and the women agricultural labourers. It is plausible to assume that since the absence of the male workers creates a vacuum in the agricultural sector of the domestic districts, women cultivators have to take the responsibilities of cultivation of the family farms and the women agricultural labourers have to work as hired labourers in the bigger farms for agricultural wages. Therefore, it is assumed that the higher the rate of male out-migration from the districts, the higher will be the work-participation of women cultivators and women agricultural labourers. Fifthly, cropping intensity of a district has been considered as one of the most important explanatory factors for the work-participation of both the women cultivators and the women agricultural labourers. In fact, as an

outcome of the application of modern seed-fertilizer technology which is highly capital-intensive in nature, the tremendous increase in cropping intensity has been possible in almost all the districts of the state through the use of quick-maturing HYV seeds. High cropping intensity is supposed to bring about a tremendous increase in the work opportunities for both the cultivators and the agricultural labourers in the districts. Therefore, it has been assumed that the higher the cropping intensity in a district, the higher will be work-participation of both the women cultivators and women agricultural labourers. Sixthly, irrigation is the most essential part of any kind of cultivation, especially, the modern cultivation. Moreover, Boro paddy, which is the dominant variety of agricultural crops in West Bengal, is extremely dependent on irrigation. Irrigated Boro paddy in the summer season is popular in West Bengal because of its high productivity. Therefore, it can easily be assumed that with the increase in the irrigation facility production of all kinds of crops, especially, production of Boro paddy will increase, which will indirectly increase the work opportunity for the cultivators and agricultural labourers of the districts. Therefore, it has been assumed that percentage share of irrigated area in net sown area as an important explanatory factor for work-participation of both the women cultivators and the women agricultural labourers. Seventhly, high degree of urbanization has been considered as a significant obstacle to the increase in work-participation of the women cultivators in a district. High degree of urbanization means a change in the land-use pattern from agricultural to industrial areas and therefore decreased opportunity of cultivation. Therefore, it is assumed that the higher the degree of urbanization, the lower will be the percentage of female cultivators in total female rural workers. Finally, percentage share of area under foodgrain cultivation in net sown area in a district has been taken as an important explanatory factor for work-participation of female agricultural labourers. Foodgrains being the main cultivated crops in West Bengal, opportunities for women to work as agricultural labourers are supposed to increase if the area under foodgrain cultivation is large enough in a certain district. Therefore, it has been assumed that the higher the percentage of area under foodgrain cultivation in net sown area, the higher will be the percentage of female agricultural labourers in a district.

Econometric Model

To estimate the work-participation equation (2) of women cultivators and the work-participation equation (4) of women agricultural labourers

quantitatively the inter-temporal cross-section regression method has been applied. The logic behind the use of this model can be given as follows.

Firstly, the purpose of the study is to find out the proximate explanatory factors behind the participation of women cultivators and women agricultural labourers in the agricultural activities of the districts[11] of West Bengal. Secondly, it is evident that with rapid urbanization, overwhelming expansion of urban informal sector has taken place in most of the districts in the state within this time period. Availability of low-skilled urban informal sectors jobs throughout the whole year in the towns and the cities has encouraged the rural workers to switch over from farm sources to non-farm sources of income during the post-reform period. On the other hand, excessive use of groundwater and chemical fertilizers has resulted in ecological degradation of agricultural land in the rural areas of the districts which has resulted in a rapid decline in the agricultural productivity. Under these circumstances this study tries to test whether all these changes have brought about any change in the relative significance of the proximate explanatory factors of work-participation of women cultivators and women agricultural labourers in West Bengal. The first decade of the post-economic reform period in India, i.e. the period from 1991 to 2001 is chosen for the analysis. Since Census of India is the only source of district-level data for women cultivators and women agricultural labourers, both of which are the dependent variables, and it is decadal, a panel data analysis cannot be used. The most appropriate method will, therefore, be to run two cross-sectional Linear Regression models for 1991 and 2001 with the same dependent and independent variables (as mentioned above) and compare the results for the analyses of work-participation of women cultivators and women agricultural labourers. So this study may be treated as a comparative static analysis. But while doing the inter-temporal multiple regression analyses, a serious problem like multi-collinearity may arise. To tackle this problem, before doing the regression, it has been made sure that the bivariate Pearson correlation coefficients of all the explanatory factors are very small and insignificant. To remove the problem of heteroscadasticity, the robust covariance matrix has been used. The ordinary least square (OLS) regression method has been used in the analysis.

[11] Uttar Dinajpur and Dakshin Dinajpur district have been combined as Dinajpur (Combined) and Paschim Medinipur and Purba Medinipur district have been combined as Medinipur (Combined) in order to maintain the comparability of data

III. NATURE OF THE WORK-PARTICIPATION OF WOMEN CULTIVATORS AND AGRICULTURAL LABOURERS

Before finding out the relative significance of the correlates behind the work-participation of women cultivators and agricultural labourers in West Bengal, first of all, the nature of such work-participation during the first decade of the post-reform period has been examined. It is found that there has been overall decline in the work participation of women cultivators as well as women agricultural labourers in the whole

West Bengal during this period. While in case of work participation of women cultivators there has been

TABLE 6 *Work-Participation of Women Cultivators in the State Of West Bengal and its Districts.*

District/State	*Percentage share of Women Cultivators in Total Rural Women Workers in 1991*	*District/State*	*Percentage share of Women Cultivators in Total Rural Women Workers in 2001*
Purulia	49.78	Coochbehar	32.57
Medinipur	42.61	Purulia	27.21
South 24 Parganas	35.90	Bankura	22.06
Coochbehar	32.67	Medinipur	21.24
Darjeeling	32.19	Darjeeling	20.29
Bankura	28.73	Dinajpur	19.23
West Bengal	**27.82**	Jalpaiguri	17.68
Howrah	20.60	South 24 Parganas	17.65
Birbhum	19.07	**West Bengal**	**16.07**
Dinajpur	18.03	Nadia	11.25
North 24 Parganas	17.74	Hooghly	10.86
Hooghly	6.50	Birbhum	10.25
Jalpaiguri	16.29	Malda	7.36
Malda	14.64	North 24 Parganas	6.75
Bardhaman	8.94	Bardhaman	5.97
Nadia	7.73	Howrah	3.96
Murshidabad	5.81	Murshidabad	3.43

Source: Census of India, 1991 & 2001, Government of India

42.24 percentage point decline (i.e. from 27.82% in 1991 to 16.07% in 2001, see Table-6), in case of women agricultural labourers there has been 7.66 percentage point decline (i.e. from 41.76% in 1991 to 38.56% in 2001, see Table-7). If the changes in work-participation of women cultivators are analyzed district-wise, it is found that percentage share of women cultivators in total rural women workers has increased in Dinajpur, Jalpaiguri, Hooghly and Nadia and decreased in all the other districts (see Table-6). Increased urbanization may be one of the important reasons behind the decrease in the work participation of women cultivators in the districts like North 24 Parganas, Nadia, Howrah and Hooghly. Table-6 clearly brings out the fact that throughout the whole period, Purulia, Medinipur, South 24 Parganas, Coochbehar, Darjeeling and Bankura were the six districts above the state figure of work-participation of Women Cultivators, albeit the relative positions of Purulia, Medinipur and South 24 Parganas have descended from 1991 to 2001 and the relative positions of Coochbehar and Bankura have ascended during the same period (see Table-6). It is important to note here that the districts like Purulia, Bankura, Coochbehar, Darjeeling, where high work-participation of women cultivators is found, are known to be agriculturally backward and have quite poor irrigation facilities. However, in both the years depending upon the variability of agro-climatic nature and degree of availability of alternative non-farm sector jobs, high variability is observed.

Table 7 *Work-Participation of Women Agricultural Labourers in the State Of West Bengal and its Districts*

District/State	***Percentage share of Women Agricultural Labourers in Total Rural Women Workers in 1991***	***District/State***	***Percentage share of Women Agricultural Labourers in Total Rural Women Workers in 2001***
Bardhaman	69.72	Dinajpur	54.3
Hooghly	67.42	Purulia	53.61
Dinajpur	65.75	Bardhaman	53.58
Birbhum	59.15	Bankura	50.27
Bankura	58.19	Birbhum	49.75
Coochbehar	45.41	Coochbehar	45.51
Malda	43.18	Hooghly	45.28
Purulia	42.76	Medinipur	41.1

District/State	*Percentage share of Women Agricultural Labourers in Total Rural Women Workers in 1991*	*District/State*	*Percentage share of Women Agricultural Labourers in Total Rural Women Workers in 2001*
West Bengal	**41.76**	**West Bengal**	**38.56**
Medinipur	35.88	Malda	31.9
North 24 Parganas	35.43	South 24 Parganas	28.87
Nadia	29.39	Jalpaiguri	27.96
South 24 Parganas	27.35	North 24 Parganas	23.86
Howrah	26.76	Darjeeling	16.35
Jalpaiguri	21.72	Nadia	13.96
Darjeeling	15.25	Howrah	12.93
Murshidabad	13.45	Murshidabad	10.53

Source: Census of India, 1991 & 2001, Government of India

in the work-participation of women cultivators in the districts, coefficient of variation[12] of work-participation of women cultivators being 59.63% in 1991 and 58.24% in 2001.

If the changes in work-participation of women agricultural labourers district-wise are analyzed, it is observed that percentage share of women agricultural labourers in total rural women workers has increased in Darjeeling, Jalpaiguri, Coochbehar, Purulia, Medinipur and South 24 Parganas and decreased in all the other districts (see Table-7). It seems from the figures that increased cropping intensity in almost all the districts of West Bengal has not been able to increase employment opportunities for the women agricultural labourers. Table-7 clearly shows that throughout the whole period, Bardhaman, Hooghly, Dinajpur, Birbhum, Bankura, Coochbehar and Purulia were the seven districts above the state figure of work-participation of Women Agricultural Labourers, albeit the relative positions of Bardhaman, Hooghly and Birbhum have descended from 1991 to 2001 and the relative positions of Dinajpur, Bankura, Coochbehar and Purulia have ascended during the same period (see Table-7). However, in both the years depending upon the variability of agro-climatic nature

[12]Coefficient of Variation= (Standard Deviation/ Mean) 100

and degree of availability of alternative non-farm sector jobs, quite high variability can be found in the work-participation of women agricultural labourers in the districts, coefficient of variation of work-participation of women agricultural labourers being 45.19% in 1991 and 45.88% in 2001.

IV. RESULTS OF THE ECONOMETRIC ANALYSIS

Now the hypotheses are substantiated as well as the factors responsible for the abovementioned changes in the nature of work-participation of women cultivators and women agricultural workers during the first decade of the post-reform period are analyzed on the basis of the econometric results.

TABLE 2 *Results of the Regression Analysis for Work-Participation of Women Cultivators*

Year	***1991***	***Year***	***2001***
Dependent Variable	$FWPR\_CULT_i$	Dependent Variable	$FWPR\_CULT_i$
Method of estimation	OLS	Method of estimation	OLS
Independent Variables	Coefficient (p value)	Independent Variables	Coefficient (p value)
Constant	-44.282 (0.47)	Constant	-73.233 (0.14)
$FWORK_i$	1.179 (0.26)	$FWORK_i$	2.075 (0.02)
$MRGLAND_i$	0.691 (0.00)	$MRGLAND_i$	-0.155 (0.32)
CI_i	-0.306 (0.00)	CI_i	0.015 (0.76)
$IRRG_i$	-0.228 (0.04)	$IRRG_i$	-0.173 (0.03)
$URBAN_i$	-0.216 (0.03)	$URBAN_i$	-0.413 (0.03)
$MALEMIGR_i$	7.465 (0.02)	$MALEMIGR_i$	-1.021 (0.59)
$\bar{R}^2$	0.51	$\bar{R}^2$	0.38
F	3.60 (0.04)	F	2.51 (0.10)

The results of the analysis of work-participation of women cultivators, as shown in Table-8, can be interpreted as follows:

First of all, it can be found that model specification is statistically significant and all the explanatory variables together explain quite a significant proportion of cross-district variation in work-participation of women cultivators at the inter-temporal level. Further, it follows from the

analysis that although the variable $FWORK_i$ had positive but insignificant coefficient in 1991, it had positive and highly significant coefficient in 2001. In other words, although increase in the percentage of working-age rural women population could not significantly influence work-participation of women cultivators in 1991, after a decade the influence had been positive and highly significant.

Secondly, although the variable $MALEMIGR_i$ had positive and highly significant coefficient in 1991, it had a negative and insignificant coefficient in 2001. This implies that, in 1991, women cultivators were mainly engaged in the family farms which were marginal in size. But, in 2001, firstly, with the increase in the low-skilled job opportunities in the urban informal sector, it might have been profitable for the cultivator families to lease out their plots of land to the relatively well-to-do farmers and switching over totally from farm-sources to the non-farm sources of supplementary income and secondly, women might have started participating in the cultivation process in the small and medium farms also.

Thirdly, the variable CI_i had a negative and highly significant coefficient in 1991 but it had a positive but insignificant coefficient in 2001. This implies that although introduction of capital-intensive technology in agriculture had adversely affected women cultivators in 1991 due to their lack of access to technology, the situation improved in 2001. Although, increased cropping intensity had positive effect on work-participation of women cultivators in 2001, but that effect was not a significant one to increase the overall participation of women cultivators in the districts.

Fourthly, the variable $IRRG_i$ has been found to have a negative and highly significant coefficient both in 1991 and in 2001. This implies that, throughout the whole period of time, districts having better irrigation facilities had lower participation of women cultivators and vice versa. This can be explained by the fact that, the districts having better irrigation facilities had better scopes of profitable cultivation, especially, the cultivation of Boro Paddy. Therefore, those districts had higher participation of male cultivators and the women cultivators could not play significant role in the cultivation process in those districts.

Fifthly, the variable $URBAN_i$ had negative and highly significant coefficient both in 1991 and in 2001. This means that, districts having higher urbanization indices had lower work-participation of women cultivators. This result is clearly understandable by the fact that, higher degrees of urbanization, on the one

Table 9 *Results of the Regression Analysis for Work-Participation of Women Agricultural Labourers*

Year	***1991***	***Year***	***2001***
Dependent Variable	$FWPR\_CULT_i$	Dependent Variable	$FWPR\_CULT_i$
Method of estimation	OLS	Method of estimation	OLS
Independent Variables	Coefficient (p value)	Independent Variables	Coefficient (p value)
Constant	-129.863 (0.06)	Constant	143.245 (0.06)
$FWORK_i$	2.169 (0.06)	$FWORK_i$	2.075 (0.02)
$FSCST_i$	0.652 (0.13)	$FSCST_i$	0.665 (0.03)
CI_i	0.156 (0.09)	CI_i	-0.259 (0.00)
$IRRG_i$	0.615 (0.00)	$IRRG_i$	0.230 (0.01)
$FOOD_i$	0.023 (0.11)	$FOOD_i$	0.022 (0.02)
$MALEMIGR_i$	-14.363 (0.08)	$MALEMIGR_i$	1.900 (0.59)
$\bar{R}^2$	0.39	$\bar{R}^2$	0.42
F	2.21 (0.10)	F	2.82 (0.08)

hand, means changes in the land-use pattern from agricultural to industrial areas and therefore decreased opportunities of cultivation and on the other hand it means greater opportunity of getting low-skilled abundantly available urban informal sector jobs and therefore, both male and female members of the cultivator families might have preferred to lease out their plots of land to the relatively richer farmers and switch over to the non-farm sources of income.

Finally, the variable $MALEMIGR_i$ had positive and highly significant coefficient in 1991 but in 2001, it had negative and insignificant coefficient. Such a result can be explained by the fact that, the vacuum created by the out-migration of male members of the cultivator families was being filled by the female members in 1991 but after a decade, due to high cost of modern cultivation process and its gradually diminishing profitability had compelled the cultivator families to lease out their plots of land to the richer farmers and migrate totally to the urban areas in search of the low-skilled informal sector jobs.

The results of the analysis of work-participation of women agricultural labourers, as shown in Table-9, can be interpreted as follows:

Firstly, Table-9 clearly shows that the model specification is statistically significant and all the explanatory variables together explain quite a

significant proportion of cross-district variation in work-participation of women agricultural labourers at the inter-temporal level. Further, it follows from the analysis that whereas the variable $FWORK_i$ had positive and significant coefficient in 1991, it had negative and significant coefficient in 2001. The possible explanation behind such a result may be that, while in 1991, working as field labourers in exchange of wages used to be the primary source of livelihood for the poorest women, after a decade, with the phenomenal expansion of low-skilled urban informal sector job opportunities throughout the year, more and more working-age women were switching over from farm to non-farm sources of income.

Secondly, the variable $FSCST_i$ had positive and significant coefficient in 1991 and in 2001 it had positive and highly significant coefficient. Such a result can be explained by the fact that Scheduled Caste and Scheduled Tribe women are the poorest and most vulnerable sections of the society and during the first decade of the post-reform period, over the years they might have had no other job options and had increasingly been dependent on the lowest-paid manual works of cultivation.

Thirdly, the variable CI_i had positive and significant coefficient in 1991 whereas it had negative and highly significant coefficient in 2001. This result can be explained as follows. Increase in the demand for women agricultural labourers due to increase in cropping intensity had resulted in an increase in the work-participation of women agricultural labourers in 1991. However, the situation had been quite different after a decade. During 2001, on the one hand, insufficient increase in agricultural wages had discouraged women to work as agricultural labourers and on the other hand, with the phenomenal expansion of urban informal sector and abundant availability of low-skilled urban informal sector jobs throughout the whole year, it had been preferable for the women to switch over from agricultural to the non-agricultural jobs for supplementing their subsistence.

Fourthly, the variable $IRRG_i$ had positive and highly significant coefficient both in 1991 and in 2001. The result is easily understandable, because, with increased irrigation facilities, modern cultivation of HYV seeds had increased in almost all the districts of West Bengal. Such kind of cultivation had high demand for women agricultural labourers in the low-paid manual jobs like sowing, weeding, transplanting of paddy, inter-culture, harvesting/ picking, threshing, winnowing etc. Therefore, with increased irrigation facilities, work-participation of women agricultural labourers had significantly increased in the districts of West Bengal throughout the whole period of time.

Fifthly, the variable $FOOD_i$ had positive and significant coefficient in 1991 whereas in 2001, it had positive and highly significant coefficient. This implies that with the increase in the area under foodgrain cultivation, especially, the Boro paddy cultivation, participation of women agricultural labourers had increased significantly. This result is absolutely comprehensible because demand for women agricultural labourers in low-paid manual jobs of foodgrain cultivation has always been very high in West Bengal since the inception of modern seed-fertilizer technology in agriculture.

Finally, although the variable $MALEMIGR_i$ had negative and significant coefficient in 1991, it had positive but insignificant coefficient in 2001. Such a result can be explained by the following argument. Families of the agricultural labourers have always been the poorest and most vulnerable section of the society. In 1991, in the absence of enough job opportunities in the home districts, women members of the families found it hard to survive alone and therefore they used to migrate together with their male counterparts to the destination districts. But in 2001, the situation had changed. Bigger farmers and sharecroppers, faced with the increasing costs of production required for modern agriculture, had started to prefer women as agricultural labourers more as they had found that they could squeeze their labour costs by using lower-paid docile women agricultural labourers. Therefore, women agricultural labourers no longer needed to migrate to the other districts with their male counterparts in search of job. But such an increase in the demand for women agricultural labourers was not significant enough for increasing their overall work-participation in the districts in 2001.

V. CONCLUSION

This paper is a modest attempt to find out the correlates of work-participation of women cultivators and women agricultural labourers in West Bengal over the period between 1991 and 2001 in terms of Inter-Temporal Cross-Section Regression Method and also to see the nature of the relative contribution of the explanatory factors during the period of study. Firstly, the work-participation of women cultivators is fitted using the 'percentage share of women cultivators in total rural women workers in a district' as the dependent variable and 'percentage share of working-age women population in total rural women population in a district', 'percentage share of area under marginal landholding in total operational landholding in a

district', 'cropping intensity of a district', 'percentage share of irrigated area in net sown area in a district', 'urbanization index of a district' and 'rate of rural male out-migration from a district' as independent variables. The econometric analysis reveals that 'percentage share of irrigated area in net sown area in a district' and 'urbanization index of a district' are the most significant explanatory factors throughout the whole period. However, the results show an increase in the significance of 'percentage share of working-age women population in total rural women population in a district' and a decrease in the significance of 'percentage share of area under marginal landholding in total operational landholding in a district', 'cropping intensity of a district' and 'rate of rural male out-migration from a district' as explanatory factors from 1991 to 2001. Secondly, the work-participation of women agricultural labourers is fitted using the 'percentage share of women agricultural labourers in total rural women workers in a district' as the dependent variable and 'percentage share of working-age women population in total rural women population in a district', 'percentage share of Scheduled Caste and Scheduled Tribe women in total women population the rural areas of a district', 'cropping intensity of a district', 'percentage share of irrigated area in net sown area in a district', 'percentage share of area under foodgrain cultivation in net sown area of a district' and 'rate of rural male out-migration from a district' as independent variables. The econometric analysis shows that 'percentage share of working-age women population in total rural women population in a district', 'cropping intensity of a district' and 'percentage share of irrigated area in net sown area in a district' are the most significant explanatory factors throughout the whole period. However, the results of the econometric analysis indicate an increase in the significance of 'percentage share of Scheduled Caste and Scheduled Tribe women in total women population the rural areas of a district' and 'percentage share of area under foodgrain cultivation in net sown area of a district' and a decrease in the significance of 'rate of rural male out-migration from a district' as explanatory factors from 1991 to 2001.

Major conclusions regarding the work-participation of women cultivators, which emerge from our study, can be outlined as follows.

Firstly, during the first decade of the post-economic reform period, work-participation of women cultivators of working age-group has been found to increase significantly.

Secondly, although the work-participation of women cultivators was mainly associated with the marginal family farms in 1991, after a decade the women cultivators were not at all engaged in the marginal farms only.

This result can be explained in two ways. Firstly, the farms in which the women cultivators were engaged might have been small and medium-sized also. Secondly, women cultivators who were earlier engaged in marginal farms might have found urban informal sector jobs preferable and therefore, they might have leased their plots of land to the richer farmers and completely switched over to the non-farm sector works.

Thirdly, in 1991, unlike the men cultivators, women cultivators could not reap the benefits of increased cropping intensity due to their lack of access in modern technology. But in 2001, increase in cropping intensity had positively influenced the participation of women cultivators, although such influence was not significant enough to boost up the overall work-participation of the women cultivators in the districts.

Fourthly, throughout the whole period, districts having better irrigation facilities and better profitability in agriculture have been dominated by men cultivators. Women cultivators, being vulnerable, could not compete with their male counterparts to reap the benefits of better irrigation facilities.

Fifthly, throughout the whole period of time, high degrees of urbanization in a district had discouraged work-participation of women cultivators, since firstly, high degree of urbanization means changes in the land-use pattern from agricultural to industrial areas and therefore decreased opportunities of cultivation and secondly, increased urbanization implies greater opportunity of getting alternative low-skilled urban informal sector jobs throughout the whole year.

Finally, during 1991, the vacuum created by the out-migration of the male members of the cultivator families were being filled up by the women cultivators, but after a decade, i.e. during 2001, high cost and gradually decreasing profitability of modern cultivation, had compelled the marginal and small cultivator families to lease out their plots of land to the richer farmers and migrate to other districts in search of some alternative jobs.

Major conclusions regarding the work-participation of women agricultural labourers, which appear from our study, can be outlined as follows.

Firstly, in 1991 working as agricultural labourers used to be the primary livelihood option for the rural women of working age-group but after a decade of economic reforms, insufficient increase in agricultural wages on the one hand and abundant availability of low-skilled non-agricultural informal sector jobs in the nearby urban areas on the other hand, have encouraged these women to switch over from agricultural to the non-agricultural sector works.

Secondly, during the period of the study, Scheduled caste and Scheduled Tribe women have increasingly been dependent on the low-paid manual works of agricultural labourers.

Thirdly, increased irrigation facilities have encouraged the cultivation of High Yielding Varieties Seeds, especially, the Boro paddy. Such kind of cultivation has high demand for women agricultural labourers in the low-paid manual works of cultivation. Therefore, significant relationship between the irrigation facilities and the work-participation of women agricultural labourers has been observed throughout the whole time period.

Thirdly, participation of women agricultural labourers in the districts of West Bengal has mainly been associated with the low-paid manual works of foodgrain cultivation. In the modern cultivation method demand for manual labourers in the cultivation process has always been very high. Women labourers are the weakest and most vulnerable and are always lowest paid ones. Therefore, women agricultural labourers are always preferred by the landlords.

Finally, in 1991, in the absence of alternative job opportunities other than the works of agricultural labourers, women members of the agricultural labourer families could not stay in the home districts after the out-migration of their male counter parts. Therefore, they too, used to migrate with their husbands. But after a decade, they do not need to migrate with their husbands, firstly due to increase in the demand for cheap women agricultural labourers in modern cultivation and secondly, due to increase in the availability of alternative low-skilled non-agricultural jobs in the urban informal sector within the home districts.

The major policy implications for women cultivators which appear from our study are as follows:

Firstly, the analysis of women cultivators reveals the fact that although work-participation of women cultivators have increased with the increase in women population of working age but these women cultivators are mainly concentrated in those districts which have inferior irrigation facilities and therefore less profitability in agriculture. Districts which have better irrigation facilities have been dominated by the male cultivators. Therefore, government should take necessary steps so that women cultivators have better access to the cultivation process in the districts which have better irrigation facilities and higher profitability in agriculture.

Secondly, irrigation facilities should also be improved in the districts which have already higher participation of women cultivators but lower

profitability in agriculture, so that the situation of women cultivators can be improved in these districts.

Thirdly, cultivation in West Bengal still lacks profitability, especially in case of women cultivators. Therefore, according to the results of our study, urban informal sector jobs, despite being low-paid, are being preferred by the women cultivators in those districts which have high degree of urbanization. To stop these women cultivators to switch over from agricultural to non-agricultural sector works, Government should take necessary steps so that the cost of cultivation can be reduced. Special subsidies should be introduced for the women cultivators to encourage them to stay in the agricultural sector.

Finally, high degree of urbanization implies changes in the land-use pattern from agricultural to industrial areas and therefore, fewer opportunities of cultivation. Urbanization is definitely welcome for the sake of development, but government should also be careful so that acquisition of fertile lands for the sake of industrialization can be stopped. In fact, such a faulty step has mainly been responsible for the dramatic downfall of the longest-serving Left Front government in West Bengal in the 2011 Assembly Election.

The main policy implications for women agricultural labourers which emerge from our study are as follows:

Firstly, according to the results, women in the districts of West Bengal, are increasingly preferring urban informal sector jobs to the agricultural sector jobs. The reason may be insufficient increase in the agricultural wages over the years and lower agricultural wages of the women labourers compared to their men counterparts. Therefore, government should firstly, take necessary steps so that the cost of cultivation falls and landlords and share-croppers can compete with cheap imported foodgrains. If the prosperity of the landlords and share-croppers increases, they will be able to pay higher wages to the agricultural labourers and this would stop women to switch over to the non-agricultural sector jobs from the agricultural sector jobs. Secondly, government should take care so that women agricultural labourers are no longer discriminated in terms of wages and they may get the same rates of wage as their men counterparts.

Secondly, the analysis reveals that Scheduled Caste and Scheduled Tribe women are the poorest and most vulnerable sections in West Bengal. They are so weak that they cannot even move to the nearby urban areas in the same district and find out some alternative jobs in the urban informal sector. They, indeed have no other options than to be concentrated in the lowest paid manual jobs in the agricultural sector. Therefore, if the

government takes necessary steps to improve the agricultural wages of female labourers, situation of these poorest SC and ST women labourers will also improve. But, in addition to that, government should also take some special steps to improve the overall situation of the Scheduled Caste and Scheduled Tribe people, especially, the Scheduled Caste and Scheduled Tribe women.

Thirdly, results from the analysis show that, although, initially, increased cropping intensity resulted in higher participation of women agricultural labourers, but later on, it had failed to do so. Such a result re-establishes the first point. It can easily be understood that increased cost of cultivation and decreased profitability could not raise agricultural wages sufficiently. Therefore, women who were earlier interested to work as agricultural labourers for wages, have now preferred to go to the urban areas and work in the urban informal sector. Therefore, this result also suggests that government should take necessary actions to raise agricultural wages, especially, the agricultural wages of the women labourers.

Finally, high participation of women agricultural labourers in foodgrain cultivation does not ensure that their situation has improved. In fact, such high demand for women agricultural labourers in foodgrain cultivation is mainly concentrated in the low-skilled and lowest-paid, labourious and repetitive manual works like sowing, weeding, transplanting of paddy, inter-culture, harvesting/ picking, threshing, winnowing etc. Such job opportunities have not improved the economic situation of women agricultural labourers. Women are still engaged in these activities because they are poor and vulnerable and they are not capable to do anything else. Therefore, government should take actions so that participation of women increases in the higher-skilled and higher-paid varieties of work in the cultivation process, such as, field preparation, manuring, fertilizer application and irrigation. For this purpose, special vocational training programmes should be arranged in the rural areas for the women agricultural labourers.

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